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Medical Education

NEWER MEDICAL EDUCATIONAL STRATEGIES FOR PHARMACOLOGY AND PHARMACY TEACHING
Dr. V. Krishnan

Abstract
In this forum, outline of newer educational tools and its suitability for pharmacology teaching is discussed. Process oriented guided inquiry learning (POGIL), Concept mapping, Mind mapping, Pictorial charts are some of the few teaching methods can be adopted for pharmacology and pharmacy teaching. These methods have been proven to be effective in teaching learning process by educationist however, these strategies must be tailor made for pharmacology learning. These are effective and simple methods to adopt by young faculties under guidance of senior faculties. Educational research on this context will provide objective evidence to inculcate these methods in curricular programme.

Keywords
POGIL, concept mapping, mind mapping, pictorial chart

Introduction
H. Miruns saying “What you say is not important, how you say is” is much realized now.

Medical education revamped more effectively than before, statutory bodies like Medical Council of India (MCI), university Grants Commission (UGC) etc are also insisting more on curricular innovations. This awakening is due to certain well proven facts like poor retention time among our students even after an excellent lecture done in a didactic way. Students are made to read ‘so much ‘on something which is not actually required, focused content delivery is missing most of time. Skills and problem solving approach is less among our medical graduates[1].

Primary aim of education is to make the pupil to become lifelong learners but we never involve them during actual learning, in a didactic way of teaching everything is being taught to them. We make them to listen us for a period about 45-60 minutes, students can understand and remember better when they are involved during learning process[2, 3, 4]. To enhance learning process, it is not enough to implement newer educational strategies all together. The primary step to implement new teaching –learning process is to identify the suitable one for own subject. Next to identifying the suitable teaching methods, one has to refine and fix it according to the sub content of their subject. Let us take an example of two teaching methods which is quite familiar for all in pharmacology. Multiple choice questions and problem based learning are not totally new, we implement quite often during our teaching for our undergraduates. Now the question is, among these two methods which one is more suitable to remember adverse effects of drugs. Students can remember the adverse effects when they actually solve the problem created based on such adverse effects whereas drug of choice of particular condition can be best remembered for longer time when you gave them four or five choices and ask them to select most suitable one. Like previous example, there are few newer educational concepts can be made suitable to our pharmacology teaching as mentioned earlier[5,6,7,8,9,10].

Process Oriented Guided Inquiry Learning (POGIL)
POGIL can be done preferably in small group tutorial classes. Unlike conventiona tutorial classes, in this method every student is allowed to have his or her textbook with them to find answer for the constructed question raised by mentor. POGIL was invented as suitable for student centric learning about three decades ago. This method incorporates exploration of a con-
cept by the student and makes them understand in a better way. In this process student is actively involved and his involvement becomes mandatory to find the answer within stipulated time in front his or her mentor. To conduct POGIL more effectively, teaching faculty should identify a concept which a student often find it confusing or be it a simpler, must need concept for undergraduate pharmacology. Five - seven questions must be prepared in a step by step by progression for which our students will find explanation progressively[11].

Implementation of POGIL is effective in understanding mechanism of action of a drug in pharmacology teaching. An example is illustrated here for implementation of POGIL. Let us construct a set of questions to make our wards realize how non selective beta blocker propranolol is effective in hypertension, though it blocks beta 2 mediated vasodilation. This can be made as five step wise questions as quoted in table 1 for which a every student should find answer using their book source. This helps our student in knowing exact cardiac and central actions of propranolol to reduce blood pressure than mere answers we see in their answer sheets propranolol reduces blood pressure by decreasing heart rate and rennin. Though here, pupil finds answer from the book during the process, explanation and concept is understood by themselves.

POGIL method of teaching is being implemented worldwide; it has been found very effective. It increases student involvement and their thinking capacity, also POGIL enhance problem solving capacity [12,13,14]. Pitfalls one can find in this method are, it is not suitable for explaining all concepts of pharmacology. Mentor should select suitable topic for POGIL and set appropriate questions before tutorials which may be time consuming. Coverage on a particular topic scheduled for a tutorial class may be less.

Concept mapping and Mind Mapping

Concept mapping was developed by Joseph D Novak and mind map was elucidated by Tony Buzan. These are appropriately described as multi sensory tools that may help medical students organize, integrate and retain information. These methods have been to initiate critical thinking and helps students to retain more information.

To explain in a lucid way, Concept mapping is a conceptual diagram in which the key concept is mentioned on top in a oval or square box. From the key point started on the top, the successive consequences in narrated by students on paper and interconnectivity is made to explain the connection between each. Mind mapping is quite similar but the process described as radial diagram and students can explain more points than concept mapping[15,16]. This method can be implemented in small group tutorials, every student is allowed to make their concept map on the topic given. Involving them in concept mapping beats the boredom felt by our students. This also gives them a chance to develop their own schematic representation to understand and write in their assessments than mere following a flow chart from the book.

These educations methods seem to be suitable to explain pharmacological actions of a drug. Student can make representation of pharmacological actions. Action of a drug which is useful for a particular condition may not be same if it is continued or exaggerated. For a better understanding of readers, beta blocker is again taken here for representation. Beta blocker which is useful in mild to moderate of cardiac failure may worsen the status if it is given in severe grade of congestive cardiac failure. Similarly beta blocker used in arrhythmias can result in syncope due to heart block in susceptible individuals. We can instruct our students to explain pharmacological actions of beta blocker on cardiovascular system using concept map or mind map approach as shown in the figure 1.

Mind mapping can be used to represent to describe how a group of drugs are employed to treat a clinical condition and the component targeted by the drug. Figure 2 shows a student made mind map of drugs used in cardiac failure. Every student can be asked to prepare their own mind map, this is a simple but extra ordinary way to remember the classification of drugs used in a particular condition, by doing this our students need not copy the similar logical diagrams used by authors in textbooks, instead they themselves are trained to do.
Concept mapping and mind mapping improves critical thinking. Students understand the concept with logical reasoning by themselves [17,18,19]. Cons of these modalities pertaining to pharmacology teaching may be dissimilar concept development by students from the actual one; hence mentor should presumably look each student creation and do rectification if needed.

**Student centric Pictorial Charts**

It is a sort of conventional method, pictorial representation of learning content. This method is also suitable for small group tutorial sessions. Levin et al describes picture made out of text should be representational, organizational, interpretational and transformational. When these elements are kept intact, picture based learning is an excellent tool for long term retention[20,21,22,23].

In pharmacology tutorials classes, students can be instructed to draw outline sketch of human and to mark the uses or adverse effects from top to bottom against each organ-system. Picture need not be aesthetic and skilled, but should be representative to mention uses and adverse effects of a drug as shown in figure 2.

Pictorial representation affects cognitive domain more effectively which can be underneath our students to remember all indication and contraindications than mere reading. It makes them completely involved throughout the tutorial session. Flip chart record can be maintained by each student to draw uses and adverse effects of each drug and can be asked for submission as an adjunctive to our conventional pharmacology record.

**Conclusion**

Recently emerged Educational strategies can be alternative or supplementary, well prepared and interactive lecture is still has its place on medical teaching-learning [25]. These educational methods are expected to provide focussed ideas and knowledge for a medical graduate and facilitate him to retain him for his medical service. Senior professors should encourage newer strategies and junior faculties must practice them with adequate training.

Optimistic ideas and implementations of those ideas in all medical departments in student training will make a medical graduate as skilled clinician, ethical professional, communicator, leader and lifelong learner which are the goals mentioned in vision 2015 by Medical Council of India.

I would like to conclude with Fredrick G.Hopkins quote ‘Be bold to experiment but cautious in claims

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7. Aljarallah B, Hassan MS. Problem based learning (PBL) vs. Case based curriculum in clinical clerkship, Internal
1. Write actions of beta 2 receptor on vessels?
2. What is propranolol ?
3. Should propranolol block beta 2 receptor, How it reduces blood pressure?
4. Write other actions of propranolol in reducing blood pressure?
5. How long it takes to reduce blood pressure clinically?
6. Which group of hypertensive's is most suitable to treat with beta blockers?

Table -1 Sample of POGIL questions to frame and conduct for undergraduates.
Figure 1. A concept map made by an undergraduate on cardiovascular actions of propranolol with beneficial effects and adverse effects out of it.

Figure 2. A mind map by an undergraduate student on ‘why and how various drugs are used in cardiac failure management?’.

Figure 3. A pictorial chart on significant adverse effects of propranolol by an undergraduate student.
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MEDICAL EDUCATION

01. Newer Medical Education strategies for Pharmacology and Pharmacy teaching
V. Krishnan
Why do we do basic research? To learn about ourselves.

Research is to see what everybody else has seen, and to think what nobody else has thought.
INTRODUCTION

Profunda femoris artery (PFA) is an important branch of femoral artery. It is the chief artery of the thigh and supplies all the muscles of the thigh. It gives nutrient artery to the femur and it also supplies the hip joint and knee joint. It arises from the lateral aspect of the femoral artery about 3.5 cms distal to the midpoint of inguinal ligament. Its branches include Lateral circumflex femoral artery, Medial circumflex femoral artery and Perforating arteries. The branches of PFA takes part in important anastomoses like trochanteric anastomosis, spinous anastomosis, cruciate anastomosis, chain anastomosis and anastomosis around knee joint. Since the femoral artery occlusion is common, surgical exposure of PFA is often necessary for Vascular reconstructive procedures. Management of groin sepsis involving the Femoral artery requires the removal of infected tissue and restoration of blood flow in many cases through PFA.

The knowledge about the normal course of PFA and its variations are very important for the Vascular surgeons. Hence a detailed study of the PFA and its variations were done.
Table 1: DISTANCE BETWEEN THE ORIGIN OF LATERAL CIRCUMFLEX FEMORAL ARTERY FROM THE ORIGIN OF PROFUNDA FEMORIS ARTERY

<table>
<thead>
<tr>
<th>Distance (mm)</th>
<th>No. of specimens (Rt Side)</th>
<th>Percentage (Rt side)</th>
<th>No. of Specimens (Lt Side)</th>
<th>Percentage (Lt side)</th>
</tr>
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<tbody>
<tr>
<td>0-10</td>
<td>4</td>
<td>8%</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>11-20</td>
<td>7</td>
<td>14%</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>21-30</td>
<td>21</td>
<td>42%</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td>31-40</td>
<td>8</td>
<td>16%</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>41-50</td>
<td>8</td>
<td>16%</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>51-60</td>
<td>2</td>
<td>4%</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

Table 2: DISTANCE BETWEEN THE ORIGIN OF MEDIAL CIRCUMFLEX FEMORAL ARTERY FROM THE ORIGIN OF PROFUNDA FEMORIS ARTERY

<table>
<thead>
<tr>
<th>Distance (in mm)</th>
<th>No. of Specimens (Rt Side)</th>
<th>Percentage (Rt side)</th>
<th>No. of Specimens (Lt Side)</th>
<th>Percentage (Lt side)</th>
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<tr>
<td>0-10</td>
<td>6</td>
<td>12%</td>
<td>5</td>
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<tr>
<td>11-20</td>
<td>7</td>
<td>14%</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>21-30</td>
<td>15</td>
<td>30%</td>
<td>14</td>
<td>28%</td>
</tr>
<tr>
<td>31-40</td>
<td>16</td>
<td>32%</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>41-50</td>
<td>6</td>
<td>12%</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>51-60</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>2%</td>
</tr>
</tbody>
</table>

DISCUSSION

DISTANCE BETWEEN THE ORIGIN OF LCA FROM THE POINT OF ORIGIN OF PFA

In the present study, the distance between the origin of LCA was recorded from the point of origin of PFA.
- On the right side, in 8% of cases and on the left side, 4% of cases, the distance was between 0 to 10 mm. This study coincides with the study of LIPSHUTZ (1916)2.
- On the right side, in 14% of cases and on the left side 16% of cases, the distance was between 11 to 20 mm which coincides with SNELL (1992)8 and PRAKASH et al7 study.
- On the right side, in 42% of cases and on the left side, 40% of cases, the distance was between 21 to 30mm. Our study coincides with the study of DIXIT D.P et al3.
- On the right side, in 16% of cases and on the left side in 18% of cases the distance was between 31 to 40 mm. This study coincides with BANNISTER et al (1995)1.
- On the right side, in 16% of cases and on left side in 18%
cases, the distance was between 41 to 50 mm. This study coincides with CLARK and CALBORN (1993).5.
- On the right side, 4% of cases and on the left side in 4% cases the distance was between 51 to 60 mm. This study coincides with the study of BRUCE et al 6 and VISHAL K et al9.

**DISTANCE BETWEEN THE ORIGIN OF MCA FROM THE POINT OF ORIGIN OF PFA**

The distance between the origin of MCA was recorded from the point of origin of PFA.
- On the right side, in 12% of cases and on the left side, in 10% of cases, the distance was between 0 to 10 mm. This study coincides with the study conducted by LIPSHUTZ (1916).2.
- On the right side, in 14% of cases and on the left side, in 14% of cases, the distance was between 11 to 20 mm. This study coincides with the study conducted by KEEN.4.
- On the right side, in 30% of cases and on the left side, in 28% of cases, the distance was between 21 to 30 mm. This study coincides with the study conducted by DIXIT et al3.
- On the right side, in 32% of cases and on the left side, in 32% of cases, the distance was between 31 to 40 mm. This study coincides with the study conducted by BANNISTER et al (1995).1.
- On the right side, in 12% of cases and on the left side, in 14% of cases, the distance was between 41 to 50 mm. This study coincides with the study conducted by CLARK and CALBORN(1993).5.
- On the left side alone, in 2% of cases, the distance was between 51 to 60 mm. This study coincides with the study conducted by BRUCE et al6.

**RESULT**

In the present study, the distance between the origin of LCA and MCA from the point of origin of PFA were found to be within 60 mm.

Knowledge of both factors namely (a) distance between the origin of LCA from PFA (b) distance between the origin of MCA from the PFA is very valuable in preventing iatrogenic injury to these vessels.

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BACKGROUND

Diabetes is the most common chronic endocrine disease which is characterized by hyperglycemia resulting from impaired insulin secretion and/or insulin action. The epidemics of Diabetes is increasing steadily because of increase in population, aging, urbanization, obesity and decreased physical activity. The global prevalence is predicted to be 11.1% in 2033, affecting 600 million people [1]. Thus it poses a burden to healthcare services and increases healthcare costs.

Numerous epidemiological studies indicate the higher prevalence of thyroid disorders in type 2 diabetes mellitus (T2DM) population than in the general population[2]. The most common disorder being subclinical hypothyroidism, followed by subclinical hyperthyroidism, overt hypothyroidism and overt hyperthyroidism[3].

SCH is characterized by mild elevations in thyroid-stimulating hormone (TSH) with normal circulating free thyroid hormone concentrations and clinically asymptomatic. [4]. The prevalence of subclinical hypothyroidism has been reported to be 10% -17% in patients with DM in several studies . [5,6,7]. Patients with SCH have a higher risk of metabolic syndrome, atherosclerosis, cardiovascular events, and mortality [8,9].

Screening for thyroid dysfunction is recommended in patients with Type 1 diabetes according to guidelines of the American Thyroid Association (ATA) .[10,11]. However, there is lack of definitive guidelines for screening of thyroid dysfunction in T2DM. It is important to recognize the interdependent relationship between thyroid disease and diabetes which would guide clinicians on the optimal management of both these disease states. The present study aims to find the prevalence of Sub clinical Hypothyroidism in Type2 Diabetes Mellitus patients.

OBJECTIVES

1. To measure fasting plasma glucose, TSH & free T4 levels in Type 2 DM
2. To study the prevalence of subclinical hypothyroidism in type 2 DM.

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MATERIALS AND METHODS

This cross sectional study was done during June to August 2016 in subjects Type 2 Diabetes Mellitus who attended the Out-patient clinic of Department of Diabetiology, Government Stanley Medical College, Chennai. A total of 100 consecutive type 2 diabetic patients with an age ≥30 years, without insulin use in the first year after diagnosis and without history of ketosis or ketonuria were included in the study.

Pregnant women, patients with recent interventions on pulse corticosteroids and/or radioiodine, previous history of hospitalization for less than 6 months and known cases of thyroid dysfunction on treatment, hepatic dysfunctions and psychiatric illness were excluded from the study. The study was approved by the institutional ethical committee and written informed consent was taken from all study participants.

All the study subjects underwent clinical and laboratory evaluation using Proforma. The gender, age (in years), sex, duration of DM (in years), blood pressure (systolic and diastolic) and data on comorbidities such as hypertension, ischemic heart disease were done.

Under strict aseptic precautions, 5 mL of peripheral venous blood was collected after an overnight fasting of 12 hours. Two mL of blood was collected in a fluoride tube for fasting plasma glucose estimation and another 3 mL was collected in a plain tube for estimation of thyroid hormones. Plasma glucose was estimated by glucose oxidase peroxidase enzymatic method, TSH and Free T4 were estimated by electrochemiluminescence assay (ECLIA, Roche e411). Primary hypothyroidism was diagnosed when TSH (normal range 0.4-4.20 μIU/mL) was more than 4.2 μIU/mL and FT4 were less than the normal values (0.8 – 2.2 ng/dl). Subclinical hypothyroidism was diagnosed when TSH was more than 4.2 μIU/mL and FT4 were within the normal range.

RESULTS

100 Type 2 diabetic subjects aged from 44 years to 58 years were enrolled between June to August 2016 and were compared with age matched 100 non diabetic controls. Table 1 shows the age and gender distribution of the study subjects. The mean age of Type 2 Diabetic subjects was 51.8 ± 6.3 and it included 51 males and 49 females. The healthy non-diabetic controls included 47 males and 53 females with mean age of 49.7 ± 3.4.

Table 2 shows the comparison of biochemical parameters among the cases and controls. Fasting blood glucose showed significant difference between the cases and controls (p value -0.001). Serum levels of TSH was significantly higher in Type 2 diabetic subjects (4.87 ± 3.8) when compared to controls (3.43 ± 2.7) with a pvalue of 0.002. Serum FT4 levels was not significantly different among the study populations which is depicted in Figure 1.

The spectrum of thyroid disorders in both the study groups are tabulated in Table 3. In the Type 2 Diabetics, 27 had abnormal thyroid dysfunction and remaining 73 were euthyroid. Of the 27 cases of thyroid dysfunction, 18 had Subclinical hypothyroidism, 8 were overt hypothyroid and 1 had overt hyperthyroidism which are illustrated in Figure 2. The prevalence of SCH was 18% in Type 2 DM in this study when compared to 6% in healthy controls.

Table 4 shows the gender wise distribution of various thyroid disorders among the Type 2 Diabetics Mellitus. In this group, prevalence of thyroid disorders in male and female were 19.6% and 34.7%, of which 22% females had subclinical hypothyroidism, 12% had overt hypothyroidism. Among males, Subclinical hypothyroidism was seen in 13.7%, overt hypothyroidism in 3.9% and hyperthyroidism in 1.9%.

DISCUSSION

Thyroid hormones play a major role in glucose homeostasis by causing modifications in the circulating levels of insulin and counter-regulatory hormones, intestinal absorption, hepatic production and glucose uptake by peripheral tissues.[12]. The excess or deficiency of either insulin or thyroid hormones can cause functional impairment of other.

Insulin is found to regulate the thyroid metabolism primarily at the level of hypothalamus controlling the release of TSH release and secondarily at peripheral tissue level by converting T4 to T3. Hyperglycemia due to insulin resistance seen in Type 2 Diabetics causes reduction
Table I: Age and Gender distribution among the study population

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type2 DM (n=100)</th>
<th>Healthy Controls (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in Yrs)</td>
<td>51.8 ± 6.3</td>
<td>49.7 ± 3.4</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>51</td>
<td>47</td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
<td>53</td>
</tr>
</tbody>
</table>

Table II: Comparison of serum levels of glucose, TSH & FT4 between Type2 Diabetes and healthy controls

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Type2 DM</th>
<th>Healthy Controls</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fasting blood glucose (mg/dL)</td>
<td>157 ± 9.5</td>
<td>93.1 ± 10.3</td>
<td>0.001</td>
</tr>
<tr>
<td>2. TSH (µIU/ml)</td>
<td>4.87 ± 3.8</td>
<td>3.43 ± 2.7</td>
<td>0.002</td>
</tr>
<tr>
<td>3. FT4 (ng/dL)</td>
<td>1.64 ± 0.9</td>
<td>1.83 ± 1.1</td>
<td>0.164</td>
</tr>
</tbody>
</table>

Table III: Prevalence of various thyroid disorders among Type2 Diabetes and healthy controls

<table>
<thead>
<tr>
<th>Thyroid Status</th>
<th>Type2 DM (n=100)</th>
<th>Healthy Controls (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euthyroid</td>
<td>73</td>
<td>89</td>
</tr>
<tr>
<td>Subclinical Hypothyroidism (SCH)</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Overt Hypothyroidism</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Overt Hypothyroidism</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Subclinical Hyperthyroidism</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table IV: Gender-wise distribution of thyroid disorders in Type2 Diabetic subjects

<table>
<thead>
<tr>
<th>Type2 DM</th>
<th>Euthyroid</th>
<th>SCH</th>
<th>Overt Hypothyroidism</th>
<th>Overt Hypothyroidism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males(n=51)</td>
<td>41</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Females(n-49)</td>
<td>32</td>
<td>11</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Fig 1: Comparison of mean & SD of TSH & FT4 levels among study population

Fig 2: Distribution of various thyroid disorders in Type2 DM subjects
in hepatic concentration of T4-5 deiodinase, low serum concentration of T3, raised levels of reverse T3 and low, normal, or high level of T4 leading to altered thyroid status. A variety of thyroid abnormalities are found to coexist and interact with diabetes mellitus. It is furthermore evident that thyroid disease and both type 1 and type 2 diabetes mellitus are strongly associated and have important clinical consequences for treatment requirements (13).

In this study, the age group of type 2 DM was between 44-58 years. The gender distribution shows that males are predominant than females which is similar to several studies. The average FBS level in the type 2 DM population is 157 mg/dl and 95% of the population falls within range of 131 mg/dl to 151 mg/dl which is quite higher than recent study from south India (14). This reflects higher level of abnormal metabolic status that predisposes these subjects to micro and macrovascular complications. Serum levels of FT4 level are within normal limits in both groups whereas that of TSH level is significantly higher in Type 2 Diabetic subjects when compared to controls reflecting underlying thyroid abnormality which is concomitant with the several studies (3,15).

In the present study, the prevalence of thyroid dysfunction was 27% in Type 2 DM which is higher when compared to 11% in non-diabetic subjects. This is in concordance with the results of Diez et al & Agarwal et al (16,17).

Among the thyroid dysfunctions, SCH was predominant followed by overt hypothyroidism in both the groups. The frequency of subclinical hypothyroidism was 18% in type 2 DM compared to 6% in healthy controls. Findings of the present study are in concordance with other studies who have reported a prevalence of 13.8% (18) and 14% (19) subclinical hypothyroidism in type 2 DM patients. A large multi-centered study in India (20) on pediatric group has shown greater prevalence of subclinical hypothyroidism (31.2%). A very high prevalence was also reported from Calabar (46.5%) (C. E. J. Udiong, et al.) (21) and 51.6% (Pimenta et al) (22).

In this present study, the prevalence of thyroid disorders in Type 2 Diabetic subjects was common in females (34.7%) as compared to males (19.6%) which is in agreement with studies of Papazafiropoulou et al (23), Vondra et al (24), Babu et al (25) and Michalek et al (26) who also reported a higher prevalence of thyroid dysfunctions in diabetic females as compared to males. This suggests, that predominance of thyroid disorders in diabetic patients is strongly influenced by female gender.

Several studies report a possible role for hypothyroidism increasing the risk of micro and macrovascular complications in Type 2 DM. An increased risk of nephropathy was shown in type 2 diabetic patients with subclinical hypothyroidism in a study by Chen HS et al (27). The low thyroid levels leads to decrease in cardiac output and increase in peripheral vascular resistance which leads to consequent decrease in renal flow and glomerular filtration rate (28). A study by Den Hollander et al (29). stated that improvement in renal function was observed on treating hypothyroidism in diabetic patients. Yang et al. (30) reported that diabetic patients with subclinical hypothyroidism had severe retinopathy compared to euthyroid patients with diabetes.

Hence it is imperative to screen diabetic population concerning hypothyroidism whether clinical or sub-clinical, as one condition can deteriorate the other if left untreated. Current recommendations for screening thyroid status in Type 2 DM are not consistent and large convincing intervention studies are needed.

CONCLUSION

A high prevalence of thyroid dysfunction was found in Type 2 DM with Subclinical Hypothyroidism being most common. Hence screening for Sub-clinical hypothyroidism in type 2 DM subjects will help to identify the microvascular complications at an earlier stage & hence preventing morbidity and mortality.

FINANCIAL SUPPORT: This study was funded by Tamil Nadu Health Systems Project – State NCD cell.

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1. Surks MI, Ortiz E, Daniels GH, Sawin CT, Col NF, Cobin RH, et al. Subclinical thyroid disease: scientific review and guidelines for diagnosis and management. JAMA. 2004;291(2):228–38.
5. Perros P, McCrimmon RJ, Shaw G, Frier BM. Frequency of thyroid dysfunction in diabetic patients:
INTRODUCTION:
Serum LDL-C is an independent & modifiable risk factor for coronary heart disease. National Cholesterol Education Program Adult Treatment Panel III (ATPIII) guidelines provides a comprehensive overview of clinical evidence maintaining the focus of diagnosis and treatment efforts on TC and LDL-C, with more attention to primary prevention in patients with symptoms of atherosclerotic disease, diabetes, and multiple risk factors[1]. Also they have recommended LDL-C concentration as the major criterion for diagnosis and treatment of patients with Hyperlipidemia. Both secondary and primary prevention of Atherosclerotic cardiovascular disorders includes lowering the levels of plasma LDL-C and follow up [2].

METHODS AND METHODS:
This comparison study was intended to identify the need for direct Homogenous assay in place of calculated LDL-C values to aid in primary prevention from multiple risk factors. Blood samples were collected randomly from 130 fasting patients in plain red topped vacutainers in Stanley Medical College Hospital. Serum separated by centrifugation and lipid profile was performed after calibration and performing QC run using the following methods: 1.Total Cholesterol (TC) -CHOD- PAP method 2.Triglycerides (TAG) -Glycerol Phosphate Oxidase/ Peroxidase method 3.HDL-Cholesterol (HDL-C) by Homogenous Enzymatic Direct Assay 4.LDL-Cholesterol (LDL-C) by Homogenous Enzymatic Direct Assay 2 (selective micellary solubilisation principle using Cobas kit). Then LDL-C values are calculated using Friedewald’s formula: LDL-C = TC- (HDL+TAG/5) .Direct LDL-C and calculated LDL values were compared using Chi-square test, Regression analysis and Bland-Altman plot with the help of Microsoft Excel Software.

RESULTS AND DISCUSSION:
Table.1 shows that calculated LDL-C has significant difference at 5% confidence intervals from direct LDL-C values with TAG levels >300mg/dl based on χ2 test suggesting the disagreement between direct and calculated LDL-C as the TAG levels rise above 300mg/dl. LDL-C values give best Agreement with TAG concentrations <200 mg/dL. With TAG concentrations of 200– 300mg/dL, 300–400 mg/dL, 400–500 mg/dL and 500 mg/dL, concordance decreased to 75% , 61%, 41% and 20% respectively.[3,4]

Positive Predictive value for Direct LDL = % = 36.2%
Positive Predictive value for Calculated LDL= % =27.7%

Abstract
Context: Serum LDL-C is an independent & modifiable risk factor for coronary heart disease and it is the major criterion for diagnosis and treatment of patients with Hyperlipidemia.
Aims: To calculate LDL-C by Friedewald’s formula and compare Calculated LDL-C values with the direct LDL-C measurement by Enzymatic Colorimetric assays to study the need for direct Homogenous assays for LDL-C estimation.
Settings and Design: This Analytical study was conducted in patients coming to the OPD in Stanley Medical College Hospital.
Methods and Material: LDL-C was determined by Enzymatic Colorimetric assays and Friedewaldle’s Formula in blood samples collected randomly from 130 fasting patients coming to the OPD.
Statistical analysis used: Chi-square test, Regression analysis and Bland-Altman plot applied with the help of Microsoft Excel Software for comparing Calculated and direct LDL-C values.
Results: Statistical analysis suggests that the reliability of Calculated LDL-C estimation decreases considerably with increase in the TAG levels
Conclusions: With TAG levels >400mg/dl, Cholesterol is overestimated by Friedewald’s calculation resulting in underestimated LDL-C values and therefore the need for direct method comes in clinical application.
Key-words: Friedewald’s formula, LDL Cholesterol, TAG levels

ORIGINAL ARTICLE - BIOCHEMISTRY
COMPARISON OF MEASUREMENT OF DIRECT LDL-C VS CALCULATED LDL-C
J.Siva Somana (1), R.Mahalakshmi (2), M.Vijayalakshmi (3)
Table 1: COMPARISON OF CALCULATED AND DIRECT LDL USING $\chi^2$ TEST

<table>
<thead>
<tr>
<th>TAG levels</th>
<th>No. of Samples</th>
<th>Calculated LDL Mean ± S.D (E)</th>
<th>Direct LDL Mean ± S.D (O)</th>
<th>Test of significance $\chi^2 = p$ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100</td>
<td>45</td>
<td>102.5 ± 24.3</td>
<td>104 ± 22.4</td>
<td>$p &lt;0.05$, statistically not significant</td>
</tr>
<tr>
<td>101-200</td>
<td>60</td>
<td>119.2 ± 34.2</td>
<td>126.9 ± 35</td>
<td>$p &lt;0.05$, statistically not significant</td>
</tr>
<tr>
<td>201-300</td>
<td>17</td>
<td>119.8 ± 44.6</td>
<td>138.9 ± 39.9</td>
<td>$p &lt;0.05$, statistically not significant</td>
</tr>
<tr>
<td>301-400</td>
<td>4</td>
<td>84 ± 6.2</td>
<td>112 ± 10.7</td>
<td>$p &gt;0.05$, statistically significant</td>
</tr>
<tr>
<td>&gt;400</td>
<td>4</td>
<td>95.5 ± 7.2</td>
<td>126.3 ± 11.3</td>
<td>$p &gt;0.05$, statistically significant</td>
</tr>
</tbody>
</table>

Table 2: PERCENTAGE ERROR OF MEANS OF CALCULATED & DIRECT LDL:

<table>
<thead>
<tr>
<th>TAG Levels in mg/dl</th>
<th>No. of samples</th>
<th>Calculated LDL</th>
<th>Direct LDL</th>
<th>Percentage Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100</td>
<td>45</td>
<td>101.6</td>
<td>104</td>
<td>2.3%</td>
</tr>
<tr>
<td>101-200</td>
<td>60</td>
<td>119.2</td>
<td>127</td>
<td>6.1%</td>
</tr>
<tr>
<td>201-300</td>
<td>17</td>
<td>119.76</td>
<td>138.9</td>
<td>13.8%</td>
</tr>
<tr>
<td>301-400</td>
<td>4</td>
<td>84</td>
<td>112</td>
<td>25%</td>
</tr>
<tr>
<td>&gt;400</td>
<td>4</td>
<td>95.5</td>
<td>126.3</td>
<td>24.4%</td>
</tr>
</tbody>
</table>

Graph 1: Risk Stratification using Chi-Square test

Graph 2: Percentage Error %

TAG Levels in mg/dL
Negative predictive value for Direct LDL = = .9%
Negative predictive value for Calculated LDL %= = 53.1%

Graph 1 shows that the Positive Predictive value of Friedewald’s formula and direct method are 27.7% and 36.2% respectively and their negative predictive values are 53.1 and 46.9% respectively and so the risk stratification varies by about 6-10%. Nauck et al had the PPV for Friedewald LDL-C and the homogenous assay practically identical, whereas the NPV was slightly better for Friedewald LDL-C [5]. Marniemi et al showed in their studies that misclassification of patients with CHD risk occurs with high TAG levels when Friedewald’s formula was applied. Also risk stratification varies by about 5% to 28% in their study population. [6]

Table 2 and Graph 2 shows that the percentage error of difference of means between Direct and calculated LDL values is 2.3% when TAG levels are 1-100mg/dl and it is about 25% and 24.4% with TAG levels 301-400mg/dl and >400mg/dl, thus the degree of agreement decreases with increase in TAG levels. As a result, the reliability of Calculated LDL-C estimation decreases considerably with increase in the TAG levels. The reliability of the LDL-C estimations decreases considerably with increasing TG concentrations. [3,4]

Graph 3 shows that the slope of the equation is 0.89 and it represents the proportional error, where samples will be underestimated in a concentration-dependent fashion by the calculated LDL-C values compared with the Homogenous Enzymatic Direct Assays. The error will proportionally increase with the analyte concentration.

In the linear regression analysis, the correla-
tion coefficient, $r$ is equal to 0.9395. Most clinical chemistry comparisons should have correlation coefficients greater than 0.98. When the correlation coefficient is less than 0.99, then the difference plot / Bland-Altman plot is used to assess the absolute bias (difference). Bland Altman plot is constructed to assess the distribution of absolute bias of LDL values based on their triglyceride levels.[7] Graph 4 shows:

(i) When the TAG levels are less than 100mg/dl, Absolute bias of LDL-C values is mostly less than 10mg/dl and more or less equally distributed on both positive and negative sides. When the TAG levels are more than 100mg/dl, the bias starts shifting slowly in the negative side (i.e., >10mg/dL).

(ii) When the TAG levels are between 200 and 300mg/dl, Absolute bias of LDL-C values has almost shifted to the negative side indicating that the underestimation of LDL-C values starts above TAG levels of 200mg/dl.

(iii) When the TAG levels above 300mg/dl, Underestimation of LDL-C values is clearly evident as the Absolute bias of LDL-C values has completely shifted to the negative side. Thus the Absolute bias between the direct and calculated LDL values is clearly greatest at higher TAG levels >300mg/dl, which is not obvious in the regression plot, also stressing the need for direct homogenous assays of LDL-C in these situations.

CONCLUSION:

From the study, it is evident that Friedewald’s formula for calculation of LDL-C holds good up to TAGs <300mg/dl. It should be further emphasized with more number of samples above 300mg/dl stressing the importance of underestimation.

With TAG levels >400mg/dl, Cholesterol in TAG rich lipoprotein is overestimated resulting in under-estimated calculated LDL-C values. Despite the limitations in Friedewald’s calculation like:

(i) Unacceptable error at TAG levels greater than 400mg/dl,

(ii) Need for fasting in specimens with high chylomicrons and

(iii) Poor precision because of cumulative variations in the three underlying measurements, it is convenient, inexpensive and most accurate in samples with triglyceride levels below 200mg/dl.[8]

Calculated LDL-C will be displaced only if direct homogenous assays can demonstrate clear advantages of substantially better analytical performance like better imprecision, better accuracy (without lot to lot differences, different calibrations) and specificity for LDL-C in unusual and postprandial specimens, improved cost effectiveness in characterizing or monitoring patients.[9] Advantages are yet to be shown. The major advantage with these assays is their ability to measure LDL-C in non-fasting specimens.

[9] Homogenous assays are therefore recommended to supplement calculation for those patients with elevated triglycerides or other conditions precluding calculation.[8]

References:


INTRODUCTION

Vocal cord dysfunction (VCD) is a condition where the larynx exhibits paradoxical vocal cord motion during the respiratory cycle characterized by abnormal adduction of the cords, especially during the inspiratory phase. This results in several symptoms that would be expected from extra-thoracic airway obstruction like wheeze, stridor, dysphonia and cough masquerading common airway diseases like asthma, vocal cord palsy and croup.(1) Primary presentation may be to specialists like physicians or pulmonologists, it is prudent for the otorhinolaryngologist to be well informed on the condition.

SUBJECTS AND METHODS

22 patients who were diagnosed to have VCD in the department of ENT, Government Medical College Kottayam, Kerala, India, from January 2013 to December 2015 were included in this study after obtaining clearance from the Scientific Review Board and Ethical Committee. Informed consent about the study was obtained from every patient (or from the parent, if less than 18 years of age) prior to their inclusion in this study. Patients either reported directly or were referred by physicians or pulmonologists to attend ENT OPD / casualty. They were subjected to detailed history and thorough evaluation including trans-nasal fibre-optic laryngoscopy examination. Patients whose symptoms were found to be due to other conditions like bronchial asthma, vocal cord palsy and neurological diseases were excluded. Pulmonary function study with spirometry evaluation was performed in all patients in consultation with pulmonologist. The findings of history and evaluation were analyzed to make a diagnosis of VCD. After ini-
tiating treatment patient was kept on regular weekly follow up for one month and then monthly follow-up. Minimum follow up period was 6 months. Data collected was analyzed based on distribution by demographic characteristics, presentation, associations, management and follow-up.

RESULTS
A total of only 22 cases were diagnosed to have vocal cord dysfunction during the past 3 years pointing to the rarity of presentation to the ENT clinic; interestingly 11 of them were referred for opinion by general physicians and pulmonologists. There was a strong female predilection in the diagnosis of VCD; 15 females and 7 males. The youngest in the group was a 15-year-old male and the oldest 42 years old female; the mean age of patients was 33 (Table 1).

The most common presentation was noisy breathing aggravated by stress and exertion (45%); among this, in 2 patients it was more dramatic with severe stridor and acute airway obstruction, clinical findings almost masquerading bilateral vocal cord palsy. 41% patients presented as refractory asthma unresponsive to treatment while it was chronic cough and intermittent breathing difficulty in 9%; these patients were referred for ENT opinion by physicians or pulmonologists. Other presenting symptoms included dysphonia and throat congestion reported by 5%. Associated symptoms suggestive of laryngopharyngeal reflux were seen in 77% of patients while classical symptoms of gastroesophageal reflux were reported by 23%. As high as 50% of the patients had strong anxiety overlay; 14% had frank depressive illness with history of seeking medical advice for the same, but were not on sustained medications.

Trans-nasal fibre-optic laryngoscopy could demonstrate paradoxical vocal cord adduction in all patients during the attack of VCD; laryngeal findings were normal in between the attacks. Laryngopharyngeal changes could be demonstrated in all patients with associated LPRD, most common being posterior laryngitis and pharyngeal wall cobble stoning. Spirometry done in all patients after pulmonology consultation were suggestive of extra-thoracic obstruction (Distribution of symptomatology and findings on evaluation has been presented in Table 2).

2 patients who presented with severe stridor mimicking acute airway obstruction needed emergency management with CPAP, benzodiazepines and reassurance; severity of the attack improved. On the long term, patients diagnosed with LPRD were treated with dietary advices, lifestyle modifications and twice daily proton pump inhibitors; all of them responded promptly to treatment. There was a relapse of VCD in 3 patients with LPR, primarily because of premature stoppage of medications but improved on restarting therapy. All 11 Patients with anxiety overlay were sent for speech therapy; 2 Patients who did not improve with speech therapy and the 3 patients with frank depressive illness were sent for psychiatry opinion and were treated successfully with anti-anxiety drugs/anti-depressants.

DISCUSSION
During normal inspiration, respiratory center in the medulla influenced by PO2, PCO2 and intrapulmonary pressure stimulates posterior cricoarytenoid muscle to contract, abducting the vocal cords and widening the glottis to allow air into the lung. Likewise, there is a partial adduction of the cords during end expiration to allow outward movement of the air to the atmosphere and at the same time to maintain the alveolar patency of the lung by providing positive end expiratory pressure. Thus, increasing and decreasing in diameter the larynx has an active influence on the duration of inspiration and expiration and resulting lung volume. VCD also commonly known as Paradoxical vocal cord motion, is characterized by an abnormal vocal cord adduction during the respiratory cycle (especially inspiratory phase) that produces airflow obstruction at the level of the larynx. The 1st modern case report of VCD evidenced by laryngoscopy was made in 1974 by Patterson et al[1] for which he coined the term ‘Manchausen’s stridor’. In affected individuals, the integrated function of the vocal cords ceases leading to intermittent episodes of acute functional airway obstruction. Because of the functional airway obstruction, the symptoms closely mimic wheeze or stridor and is frequently misdiagnosed as asthma or upper airway obstruction; hence VCD is also referred to as ‘Vocal cord Asthma’. The exact mechanisms causing glottis chink narrowing or intermittent inspiratory closure independent of any changes in the lower airway caliber is unknown. Myriad range of causes has been postulated which include irritant exposure, occupational pollutants, psychological stress, malingering and neurological causes. This condition is predominantly observed in females. A systematic literature review on VCD done by Brugman[2] identified a male to female ratio of 1:3 while in another systematic review on the subject by Morris et al[3] the ratio was found to be 1:2. Similar values were noted in our study as well, where the male to female ratio was slightly
more than 1:2. Mean age of patients in our study was 32 years with 50% patients in age group 30-40 years. Typical age group of VCD cited in literature is 20-40 years but may be seen in any individual between the 1st to 8th decades. Brugman[2] in her systematic review has reported an increased incidence of VCD among children and adolescents as well; 35% of patients were children with a median age of 14. In our study, however only 14% of patients were less than 20 years of age with the youngest being 15 years.

Irritant induced VCD was described by Perkner et al[4] and environmental or occupational Irritants such as ammonia, cleaning chemicals, organic solvents, flux flames or smoke were implicated. The hypothesis is that there is an alteration of the laryngeal tone mediated through the vagus lowering the threshold for stimuli to these irritants producing vocal cord spasm or inspiratory adduction. However, the major irritant to cause an irritable larynx and paradoxical vocal cord movement has been identified to be the upper aerodigestive tract manifestations of gastroesophageal reflux disease (GERD), namely Laryngo Pharyngeal Reflux (LPR). Patients with VCD were diagnosed to have an inlet patch of heterotrophic gastric mucosa in the lower esophagus along with posterior laryngitis. Mechanism involved may be accentuation of the glottis closure reflux secondary to acid damage of the laryngeal mucosa. In the study by Powell et al[5], majority of cases diagnosed as VCD had laryngopharyngeal manifestations of reflux. Murray et al[6] described five cases of VCD where patients presented with refractory cough due to LPR. In our study, 77% of patients with VCD had associated laryngopharyngeal symptoms, mainly globus sensation and throat clearing. On the other hand, classical reflux symptoms like heart burn and regurgitation was seen only in 23%. This implies LPR to be the more important entity than GERD in triggering VCD. Significantly, laryngopharyngeal changes could be demonstrable in all these patients on fibre-optic laryngoscopy, most common being posterior laryngitis and cobble-stoning of the pharyngeal wall (Table 2). As compared to the esophagus, the laryngeal mucosa is more damaged by the refluxate since it is not protected by peristalsis and is not buffered by salivary bicarbonate. Morrison et al[7] had described ‘irritable laryngeal syndrome’ causing paradoxical adduction of the cords following acid exposure of the larynx due to reflux. Probably the direct role of LPR in VCD is not fully reaffirmed in literature due to the absence of clear gold standard diagnostic criteria.

According to Leo and Konakanchi[8], stress, emotions and psychiatric disturbances including hysterical conversion and anxiety disorders contribute to VCD. Literature search reveals high incidence of VCD in other psychiatric conditions like depression, obsessive compulsive neurosis and even borderline personality disorders. In our study, there were 3 patients who were diagnosed with frank depressive illness and were treated for the same. More significantly, in 11 patients, anxiety overlay and underlying stress could be clearly elicited in history. History of anxiety may be integral to patients with other airway diseases as well; however, anxiety attacks were found to precede the respiratory symptoms in other airway disorders while it persisted along with respiratory symptoms in VCD. Though majority of these are purely subconscious, it should be kept in mind that voluntarily inducing vocal cord adduction with an intention of secondary gain is not uncommon among malingers.

Neurological causes though uncommon should be ruled out in all cases of VCD. Van der Graaff et al[9] reported that neurological diseases like amyotrophic lateral sclerosis rarely can cause VCD while Maschka et al[10] described brainstem compression or cortical injury to result in VCD. Other diseases implicated include Cerebrovascular accidents, Arnold-Chiari malformation and myasthenia gravis. None of the patients in our study had any associated neurological lesions.

Due to the remarkable similarity of presentation, VCD is very frequently diagnosed as asthma and forms about 10% of the patients at specialized centers seeking evaluation for resistant asthma. It can so much mimic asthma that it is also called as ‘vocal cord asthma’. It may also present as exercise-induced bronchospasm and cough. Among the 49 cases of vocal cord dysfunction described by Doshi and Weinberger[11], 41 cases were incorrectly treated for asthma. Newman et al[12] conducted a retrospective analysis of 95 patients with intractable asthma and found 10% had VCD and 30% had VCD co-existing with asthma. These patients were treated for asthma for an average time-period of 4.8 years before the diagnosis of VCD was made. In our series 9 patients presented with refractory asthma while in 2 patients the presentation was cough and intermittent breathlessness; all of them were referred by pulmonologists for otolaryngology opinion after spirometry demonstrated extrathoracic obstruction. Hence it’s prudent to have an ENT opinion in every case of wheeze once the diagnosis of asthma has been ruled out by PFT.
TABLE 1: VOCAL CORD DYSFUNCTION – AGE & SEX DISTRIBUTION

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>No. of males</th>
<th>No. of females</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-20</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>21-30</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31-40</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>

TABLE 2: DISTRIBUTION OF SYMPTOMS & FINDINGS ON EVALUATION OF PATIENTS WITH VCD

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Findings</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>History - Presentation</td>
<td>a. Inspiratory/ biphasic stridor (aggravated by stress, exertion, irritants)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>b. Refractory wheeze</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>c. Chronic cough &amp; intermittent breathlessness</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>d. Dysphonia &amp; Throat congestion</td>
<td>1</td>
</tr>
<tr>
<td>History - Associations</td>
<td>a. Globus sensation &amp; Throat clearing</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>b. Heartburn &amp; Regurgitation</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>c. Anxiety &amp; stress</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>d. Depressive illness</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>e. Neurological disease</td>
<td>0</td>
</tr>
<tr>
<td>Flexible trans-nasal laryngoscopy</td>
<td>a. Paradoxical inspiratory vocal cord adduction</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>b. Posterior laryngitis</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>c. Cobble stoning pharyngeal wall</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>d. Inter-arytenoid pachydermia</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>e. Post-nasal discharge</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>f. Vocal cord oedema</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>g. Pseudosulcus</td>
<td>1</td>
</tr>
<tr>
<td>Spirometry</td>
<td>During attack - Variable extra thoracic obstruction with Normal lung capacity</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>In between attacks - Normal</td>
<td></td>
</tr>
</tbody>
</table>
for emergency airway including tracheostomy have been initiated on patients with VCD following misdiagnosis. In the study by Newman et al[12], as high as 28% patients with VCD were mismanaged and were intubated. In our series 9 patients presented with stridor and in 2 among them the airway obstruction was so severe that at one stage even endotracheal intubation was contemplated for relief. The spectrum of airway disorders masqueraded by VCD includes allergic or exercise induced asthma, unilateral or bilateral vocal cord palsy, laryngospasm, acute epiglottitis, croup, foreign body obstruction and angioedema or anaphylaxis.

Paradoxical Vocal cord movements and stridor may be triggered by various ways. Stress and anxiety, particularly in social situations is a trigger in clear majority of patients. Powell et al[5] described 22 cases of Juvenile VCD where social stress due to involvement in sports activities were observed in12 patients. Exercise may be the predominant trigger in some; the amount of exercise to induce VCD may vary per individual. Exercise-induced VCD was diagnosed in 19 of the 370 athletes screened by Rundell et al[13]. Protracted reflux especially aggravated by dietary habits is another trigger and so is inhalation of perfumes and strong odors. In our series, such a trigger could be observed in all the 10 patients presenting as stridor; commonest trigger observed was stress (6 patients) followed by physical exertion (3 patients). 1 patient interestingly reported incense fume inhalation during religious rituals as her trigger for developing breathlessness and noisy breathing. Because of the inspiratory adduction the speech pattern is usually broken and may be the presentation at times; we had 1 patient who presented with dysphonia and throat congestion.

Initial Otolaryngology evaluation may reveal an inspiratory or biphasic stridor with dysphonia and strained voice which may immediately suggest an organic laryngeal lesion to the unsuspecting clinician. The classical finding on laryngoscopy done when symptomatic is adduction of anterior 2/3rd of the vocal cord with a posterior chinking or diamond shaped margination between the posterior part of the cords during inspiration, early phases of expiration or both. It goes without saying that the impression conveyed on initial evaluation is of a critical glottic space. Adduction occurring during the end expiration on the other hand is purely physiological and may be visualized in normal individuals and should not be confused with VCD. Further, during laryngoscopy, especially on mirror examination, a protracted gag reflux or cough can cause adduction of cords and hence should be taken into consideration on arriving at a diagnosis. The investigation of choice hence would be a trans-nasal flexible fiberoptic laryngoscopy where the diagnosis can be clinched on persistent viewing of the cords during all phases of respiration. Paradoxical vocal cord adduction during the attack was demonstrable in all patients in our study; vocal cord movements were normal in between the attacks. As discussed earlier, laryngoscopy in addition provides objective evidence of LPR in these patients, as well. Pulmonary function study and spirometry during the attack reveals pattern of variable extra thoracic airway obstruction on the flow volume loop with normal total lung capacity. Chest radiographs are generally not helpful in establishing diagnosis of VCD.

Emergency management: Heliox therapy has been recommended for immediate relief of the respiratory distress in VCD as early as 1995 by Reisner and Borish[14]. Being 80:20 mixture of Helium and Oxygen, it is less dense than air and on inhalation it reduces airway turbulence to bring down respiratory effort and eliminates respiratory noise to allay anxiety. Reybet[15] proposed use of CPAP (Continuous Positive Airway Pressure) device delivering intermittent pulses to resolve an acute attack since it can widen the glottis and act as a pneumatic splint to reduce turbulence. 2 patients in our series needing emergency management for severe airway obstruction were treated with CPAP and readily improved. Benzodiazipines and reassurance reduces anxiety and hence may be useful, especially in prevention of propagation of the attack. Topical lidocaine if applied to the larynx breaks the hyperactive glottal and supraglottal muscle contractions opening the larynx. Superior laryngeal nerve block has been tried in more severe cases. In severe cases, intra laryngeal injection of Botulinum toxin has been proposed as option since it causes neuromuscular blockade and laryngeal muscle weakness to facilitate airflow as advocated by Maillard et al[16] and Altman et al[17].

Long term therapy: The cause of the paroxysm should be elicited. Significant number of cases are either due to LPR or is associated with GERD which needs aggressive treatment with proton pump inhibitors and appropriate lifestyle modifications. All patients with LPR in our series responded well to treatment continued for minimum of 6 months. There was a relapse of VCD in 3 patients who discontinued treatment for LPR, but improved on restarting therapy. According to Murry et al[6], symptoms resolved in an average time period of 8.2 months after treatment with proton pump inhibitors and respiratory retraining.
therapy. A history of prior exposure to occupational or environmental irritants should be obtained and avoidance advised against the same. When secondary to neurological lesions management should be initiated depending upon the condition. Kent and Balkissoon[18] reaffirms that a multi-disciplinary approach should be adopted in the general management which includes speech therapy, psychotherapy and patient education. Speech therapy techniques are aimed at expiration and abdominal breathing than inspiration and laryngeal breathing with pertinent advices on relaxed throat breathing pattern. In study done by Sullivan et al[19] in 20 female athletes, symptoms of vocal cord dysfunction during exercise could be controlled in 95% of study subjects by speech therapy for up to six months following treatment. Mathers et al[20] described inspiratory muscle training (IMT) resulting in increased inspiratory muscle strength hence improving effort tolerance as a treatment modality for exercise-induced VCD. Panting as a maneuver can lead to physiological increase in the glottic aperture by relaxation of the muscles and laryngeal adduction. Psychotherapy and biofeedback training allows the patient to explore for the potential causes and retrain with relaxation techniques to combat stress. Initial response to standard treatment is reportedly good provided prompt diagnosis of the condition is made early in the evolution of the symptoms. Misdiagnosis is common and often results in over treatment which unfortunately may cause even long term morbidity for the patient.

ACKNOWLEDGEMENT

The authors wish to acknowledge colleagues from pulmonary medicine department for kind referral of patients with suspected vocal cord dysfunction and helping out with spirometry. Funding: There was no funding for this study Conflict of Interest: The authors declare that they have no conflict of interest

REFERENCES

Challenges and Risk Factors in Emergency Tracheostomy, Pondicherry, India

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Abstract

Aim: Tracheostomy is indicated frequently in the treatment of critically ill patients who require prolonged mechanical ventilation. It is a surgical procedure, but not always without complications. Therefore the present study is to analyse the impact, risk factors and complications associated with this procedure in a tertiary care hospital.

Methods: We extracted data on all patients admitted over a year period (January 2013 to March 2014) who underwent tracheostomy. The severity of illness were estimated using the Acute Physiology and Chronic Health Evaluation (APACHE) II, Simplified Acute Physiology Score II, post-resuscitation Glasgow Coma Score (GCS) and Injury Severity Score (ISS). Multiple variables such as admission, operative, ventilatory, and outcome were analyzed retrospectively to define the impact that early tracheostomy had on duration of mechanical ventilation, intensive care stay, and hospital stay. Morbidity and mortality rates of the procedures were also assessed.

Results: About 66 patients underwent bedside tracheostomies in intensive care units and wards by open surgical technique. They were all in ventilator. The mean duration of stay in ICU was 14 days and in the ward 21 days. The median age of patient was 35(±10). Male patients formed 59% of the study population. The commonest reason for admission was for poisoning (42%) and neurological causes (33%). Tracheostomy was done within 4-7 days of intubation in 82% and in 18% after 7 days. The main indication for the procedure was prolonged ventilation (84.8%) and tracheobronchial secretions (15.2%). Out of total ventilated patients 52 were on CMV (Continuous mandatory ventilation) mode (79%). There were intra-operative complications in 59% of the patients. Early in 22 (56%) and 6 (9%) patients developed late complications. The median age group to develop complication was 45(±10) years (10%). About 44 (74%) patients were successfully weaned from ventilator. Twenty two (44%) patients were weaned from ventilator in first 3 days. There were total of 17 deaths in ICU and one death in the ward. Mortality was higher in age group more than 45 years total 66.7%. The risk factors significant for complication were male gender and neurological diseases.

Conclusions: Early tracheostomy shortens days on the ventilator and intensive care unit. There is a need to focus training of the multidisciplinary team in management of tracheotomy in an emergency situation to reduce the morbidity.

Introduction

There is an increase in the use of tracheostomy in the management of emergency patients over recent years. Traditionally, it was confined to the emergency management of upper airway obstruction; more recently, indications have extended to include prolonged mechanical ventilation, chronic respiratory insufficiency, failure of airway protective reflexes, management of excessive secretions, and obstructive sleep apnoea. Decision of the adequate moment to perform tracheostomy is not well defined. Some studies have documented a significant increase in the number of patients requiring mechanical ventilation.

The procedure can be performed surgically in the operating room or at the bedside in the intensive care unit. A range of specialties may be involved in the management of such patients, including ENT and maxillofacial surgeons, speech and language therapists, physiotherapists, and critical care outreach nurses. The most common indications for tracheostomy are acute respiratory failure needing for prolonged mechanical ventilation and traumatic or catastrophic neurologic insult requiring airway, or mechanical ventilation or both. Patients who need mechanical ventilation for more than 48 hours receive a tracheostomy for prolonged mechanical ventilation. Studies have documented a significant increase in the number of patients requiring mechanical ventilation. About 34% of patients who need mechanical ventilation for > 48 h receive a tracheostomy for prolonged mechanical ventilation. The most common reason for tracheotomy in the ICU is to provide access for prolonged mechanical ventilation. Observational studies document that 10% of mechanically ventilated patients undergo tracheostomy, but there is significant variability with regard to optimal timing and optimal patient selection.

Tracheostomy subjects had higher rates of morbidity but lower rates of mortality than non-tracheostomy subjects. Currently, rates of complication incidence are relatively low (2.7-4.3%) and seldom lead to death of patients. In cases of accidental displacement of the tube at the early post-surgery complication may range from 0.8 - 1.5%.

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and the mortality rate may reach 100% (10,11). Decisions regarding optimal timing for tracheostomy decannulation require clinical judgment, particularly with determination that the indication for tracheostomy tube placement has resolved (12). The procedure subjects were more resource-intensive to manage as evidenced by longer ICU and hospital stay, higher total hospital costs, and greater likelihood of being discharged to an in-patient facility (long-term care facility, skilled nursing facility, rehabilitation facility (13) .

METHODS
Study Population:

Our study population were in patients in the age group between 18 to 45 years admitted in the intensive care unit and ward who underwent tracheostomy.

Study design:

We did a facility based case series report at General hospital Pondicherry between January 2013 to March 2014.

Operational definitions:

A tracheotomy refers to any procedure that involves opening the trachea (temporary opening). A tracheostomy is a procedure that exteriorizes the trachea to the skin of the neck, producing a more permanent fistula/opening. A tracheostoma is a permanent opening into the trachea through the neck; it also refers to the opening after permanent laryngectomy.

Sample size and Sampling Procedure:

We used our database which includes all consecutive ICU (Intensive care unit) and ward patients admitted since January 2013 to March 2014 who underwent tracheostomy procedure and intubation during their current hospital stay. For the present study we extracted data on all consecutive patients admitted over a one-year period (January 2013 to March 2014) who underwent tracheostomy during their hospital stay. We excluded patients with history of previous trauma but admitted to the ICU for other reasons, re-admissions and trauma referrals from other hospitals. Data were collected on demographics and admission severity of illness, estimated using the Acute Physiology and Chronic Health Evaluation (APACHE) II, Simplified Acute Physiology Score II, post-resuscitation Glasgow Coma Score (GCS) and Injury Severity Score (ISS) (14, 15, 16). We excluded bedside tracheostomies done for maintenance of airway in intubated head and neck carcinoma patients because outcomes in such cases is largely affected by disease itself and usually these patients will require permanent tracheostomy without any chances of de-cannulation. Pediatric patients less than twelve years were also excluded. We used standardized data extraction form to document presence of injuries to brain, maxillofacial bones, chest, abdominal organs, spinal cord and pelvis/lower extremities. We documented whether an extubation trial was given before tracheostomy. The type of tracheostomy procedure (surgical versus percutaneous) was recorded. The number of days from initiation of ventilation to tracheostomy, from admission to tracheostomy, from tracheostomy to weaning, from tracheostomy to discharge from ICU, the duration of mechanical ventilation, ICU length of stay and hospital were all calculated. All these durations were calculated as the number of calendar days, with the day of admission being considered day 0. We also recorded the mortality rates.

Analysis

Data was expressed in the form of frequencies and percentages. We also analysed the various risk factors for complication of tracheostomy. We computed unadjusted and adjusted ORs with 95% CI using the logistic regression method. We adjusted each of the risk factors for age in separate models and used Epi-Info version 3.5.3 for data entry and analysis.

Protection of human subjects

We obtained approval from the Institutional Ethics Committee.

RESULTS

Descriptive Epidemiology

About 66 patients underwent bedside tracheostomies in intensive care units and wards by open surgical technique. They were all in ventilator. The mean duration of stay in ICU was 14 days and in the ward 21 days. The median age of patient was 35(±10). The age group of the patients most effected were 30-45 (Fig1). Male patients formed 59% of the study participants. The commonest reason for admission was for poisoning (42%) and neurological causes (33%) (Table 1). About 62% patients had Glasgow coma scores < 8 and 38% was ≥8. About 68% patients were associated co morbidities (Fig.2). All underwent translaryngeal intubation as emergency procedure. The timing of tracheostomy done was within 4-7 days of intubation in 82% and in 18% after 7 days. The main indication for the procedure was prolonged ventilation (84.8%) and tracheobronchial secretions (15.2%). Out of total ventilated patients 52 were on CMV (Continuous mandatory ventilation) mode (79%) (Fig.3). There were intra-operative, complications in 59% of the study patients. Complications developed early in 22 patients (56%) and late in 6 patients (9%). The median age group to develop complication was 45(±10) years (10%). Early postoperative complications included those that developed within one week of the procedure and late after 10
23 days. The main late complications were saturation fall (10%), bleeding (10%) and stenosis of upper trachea (3%). Laryngotracheal stenosis was seen in four out of 48 patients. The stenosed segment was upper trachea in all these patients. About 44 (74%) patients were successfully weaned from ventilator. Twenty two (44%) patients were weaned from ventilator in first 3 days. Portex was changed to metal tube after weaning, majority within 4-7 days. De-cannulation was done successfully in forty nine patients. Ryles tube removal was done in forty nine successfully de-cannulated patients within 14 days of tracheostomy. Seventeen deaths related to disease occurred while patients still on ventilator in ICU and one patient died in ward after being transferred from ICU.

There were 17 deaths reported in ICU and one death in the ward. Mortality was higher in age group more than 45 years total 66.7%. The cause of mortality was due to primary disease and only one patient died as a result of the procedure.

Analytic Epidemiology

The risk factors significant for complication were male gender and neurological diseases.

DISCUSSION

In our study there is significant better outcome with early tracheostomy and early weaning. There was also less complication due to early de-cannulations. Early tracheostomy placement may lead to a markedly reduced duration of ventilation and shorter stays in critical care units in artificially ventilated, critically ill adult patients. Studies conducted in surgical ICUs have shown that tracheostomy performed within one week after intubation may be beneficial in lowering rates of pneumonia, and in shortening the duration of mechanical ventilation and length of ICU stay (17-19). However there are also studies reported a higher incidence of ventilator-associated pneumonia and longer length of ICU stay in association with tracheostomy (20,21).

Trauma patients had better outcomes in terms of weaning and survival than other disease states. Patients with multiple trauma often require mechanical ventilation for prolonged periods because of their inability to protect their airways, persistence of excessive secretions, and inadequacy of spontaneous ventilation (22). Tracheostomy plays an integral role in the airway management of such patients, but its timing remains subject to considerable practice variation (23). The decision to proceed to tracheostomy is often made only if the patient could not be extubated within 10–14 days or more (24). Patients with early tracheostomy had lower Glasgow Coma Scale (GCS), reflecting the common practice of performing tracheostomies

<table>
<thead>
<tr>
<th>Causes</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poisoning</td>
<td>28</td>
</tr>
<tr>
<td>Neurological cause</td>
<td>22</td>
</tr>
<tr>
<td>Trauma</td>
<td>7</td>
</tr>
<tr>
<td>Metabolic encephalopathy</td>
<td>2</td>
</tr>
<tr>
<td>Brain hematoma</td>
<td>2</td>
</tr>
<tr>
<td>HELLP syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Alcoholic hypoglycemia</td>
<td>1</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>1</td>
</tr>
<tr>
<td>Eisenmenger</td>
<td>1</td>
</tr>
<tr>
<td>Missed abortion, septicaemia</td>
<td>1</td>
</tr>
<tr>
<td>Postoperative peritonitis</td>
<td>1</td>
</tr>
</tbody>
</table>
earlier in patients with low GCS while delaying tracheostomy in patients with higher GCS in case extubation becomes possible. Further studies have shown that tracheostomy was more likely to be performed early in patients with facial injuries and fractures, reflecting the need for this procedure for airway management (25). In patients with spinal injuries tracheostomy is more likely to be performed late because many of these patients had to undergo surgical spinal fixation first. If an early tracheostomy strategy was adopted widely many of the mechanically ventilated patients could have a tracheostomy placed earlier in their stay, a procedure they would not receive when a more conservative, late approach is used (26). Glasgow coma score can predict the survival, chance of developing complications and weaning of these intubated patients. Shorter ICU and overall hospital stay. Complication rate of bedside tracheostomy is less and most of these develop within one week of the procedure. The incidence of complications in adults who have undergone tracheostomy varies from 6% to 51% (27,28). The rate of laryngotraheal stenosis requiring surgical intervention is negligible. So overall, the benefits of bedside tracheostomies appear to outweigh its major risks. A large number of the complications can be managed conservatively without much morbidity and long term sequel. Majority of deaths are related to the underlying disease rather than the procedure. Limitation of the study was that the data extraction and analysis were retrospective. The database was not designed to capture specifically the tracheostomy practices and how the decision for tracheostomy was made as the intensivists and surgeons varied in their timing of tracheostomy.

In spite of the small numbers of patients, it may be advisable to place a tracheostomy earlier on in the course. There is a need to focus training of the multidisciplinary team in management of tracheotomy in an emergency situation. There is a need to conduct further studies and assess the most appropriate timing for tracheostomy.

REFERENCES

INTRODUCTION

Tobacco is the most important preventable cause of death and disease among adults. According to estimates made by the WHO, currently about 5 million people die prematurely every year in the world due to the use of tobacco, mostly cigarette smoking. More important is the fact that this epidemic of disease and death caused by tobacco is increasing very rapidly. By 2030 it is expected to kill more than 9 million people per year; of aged 35-69. The epidemic is increasingly affecting developing countries, where most of the world’s smokers (84% or 1 billion) live. Close to half of all men in low-income countries smoke daily and this has been increasing. Many deaths and much disease could be prevented by reducing smoking prevalence.

Tobacco kills a third to a half of all those who use it. On an average, every user of tobacco loses 15 years of life. Total tobacco-attributable deaths from Ischaemic Heart Disease, Cerebro vascular Disease (Stroke), Chronic Obstructive Pulmonary Disease and other diseases are projected to rise from 5.4 million in 2004 to 8.3 million in 2030, almost 10% of all deaths worldwide. If we look at the prevalence and mortality of tobacco use in a population over time, we see the image of a social epidemic - it is highly contagious at various times to various groups and some population groups abandon it. Social norms do not totally explain the phenomenon of tobacco use, nor do nicotine addiction, personality traits, psychological needs, genetics, history and economic structure of the community or the latitude for marketing tactics by the tobacco industry. They are all interacting factors behind the phenomenon, for which good health promotion activities for tobacco control must take into account.

SUBJECTS AND METHODS

STUDY DESIGN:
The present study is Community based cross sectional study.

SAMPLE SIZE:
According to Global Adults Tobacco Survey 2009 to 2010 in Andhra Pradesh, prevalence of smoking among men in the age group > 15 years was 29.3%. Using this prevalence,
we calculated the sample size with the following formula
\[ n = \left( \frac{Z_{\alpha}}{2} \right)^2 \frac{p q}{L^2} \] and found it to be 242. \[ (p=29.3, q=(1-29.3) = 70.7, L= 20\% \text{ of } p(29.3)=5.86. ]

**STUDY AREA:**
The study was conducted in rural areas of Krishna district of Andhra Pradesh.

**SAMPLING METHOD:**
Random sample method has been adopted. Two villages out of eighteen have been selected from our field practice areas. i.e. rural health centre and primary health centre areas respectively to cover the selected sample size.

**STUDY SUBJECTS:**
Data was collected from men aged 15 - 60 years, who were residents of the study area.

**STUDY PERIOD:**
The study was conducted between August 2014 and December 2014.

**DATA ANALYSIS:**
Data entry was made in MS excel software in codes and analysis done with SPSS software 21 version. Prevalence was expressed in percentage and association with the factors tested for significance using chi-square test.

**ETHICAL CLEARANCE:**
Data was collected from the study population of the villages after getting approval from the Institutional ethics committee. The study population was appraised about the purpose of the study and informed consent was obtained from them. The pretested questionnaire was administered to the questionnaire and their responses elicited and entered in the respective questionnaire.

**RESULTS AND DISCUSSION**
The following are the results of the study. The socio demographic profile of study population is analysed and discussed as follows.

**TABLE – 1: AGE-WISE DISTRIBUTION**

<table>
<thead>
<tr>
<th>Age Group (years)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 years</td>
<td>20</td>
<td>(8.26)</td>
</tr>
<tr>
<td>16 - 30 yrs</td>
<td>82</td>
<td>(33.88)</td>
</tr>
<tr>
<td>31 – 45 yrs</td>
<td>84</td>
<td>(34.72)</td>
</tr>
<tr>
<td>46 – 60 yrs</td>
<td>56</td>
<td>(23.14)</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>(100 )</td>
</tr>
</tbody>
</table>

Table1: shows that out of 242 men under study, 20 (8.26%) were in the age group less than 15 years, 82(33.88%) were in age group of 16- 30years, 84 (34.72%) in 31- 45 years, 56 (23.14%) in 46 - 60years respectively. The mean age is 36.52 years and standard deviation is 14.32.

**TABLE 2: DISTRIBUTION OF MEN ACCORDING TO EDUCATION**

<table>
<thead>
<tr>
<th>Education</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>78</td>
<td>(32.24)</td>
</tr>
<tr>
<td>Primary school</td>
<td>24</td>
<td>(9.91)</td>
</tr>
<tr>
<td>Middle school</td>
<td>23</td>
<td>(9.50)</td>
</tr>
<tr>
<td>High school</td>
<td>42</td>
<td>(17.36)</td>
</tr>
<tr>
<td>College</td>
<td>75</td>
<td>(30.99)</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>(100)</td>
</tr>
</tbody>
</table>

**TABLE 2: SHOWS THAT OUT OF 242 MEN UNDER STUDY, 78(32.24%) WERE ILLITERATES, 24(9.91%) HAD PRIMARY SCHOOL EDUCATION, 23(9.50%) HAD MIDDLE SCHOOL EDUCATION, 42(17.36%)**
TABLE – 4: DISTRIBUTION OF MEN ACCORDING TO SOCIO-ECONOMIC STATUS

<table>
<thead>
<tr>
<th>Socio economic status</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPL</td>
<td>207</td>
<td>(85.54)</td>
</tr>
<tr>
<td>APL</td>
<td>35</td>
<td>(14.46)</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Table 4 shows that, 207(85.54%) of the study group belong to Below Poverty Line Category and 35(14.46%) belong to Above Poverty Line Category.

TABLE – 5: PREVALENCE OF CURRENT SMOKING

<table>
<thead>
<tr>
<th>Category</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Smoker</td>
<td>69</td>
<td>(28.52)</td>
</tr>
<tr>
<td>Current Non-smoker</td>
<td>173</td>
<td>(71.48)</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Table 5, depicts the prevalence of smoking of men in the study population. 69(28.52 %) of the study group were smokers, 173(71.48% This finding was almost similar in a study conducted by Global Adult Tobacco Survey (GATS)6 2009 – 2010 in Andhra Pradesh where the prevalence of smoking was 29.3% among males. But this finding was little low in GATS India 2009 – 2010 where the prevalence of smoking was 24.3%.

This finding was very high in a study conducted by Clara Kayei (2005)7 in east coastal Andhra Pradesh where the prevalence of smoking was 55.7% among males.

This finding was lower than the NFHS8 - 3 value which was 35% in rural area. This finding was higher than the study conducted by Global Adult Tobacco Survey (GATS)6 2009 – 2010 where the prevalence of smoking in the Southern region of India was 13%. In a study conducted by Goswami et al9, in the year 2000 observed that prevalence of smoking among males was 27% which is little lower.

In a study conducted by Kutty et al10, in the year 1990 in Rural population of Thiruvananthapuram, it was observed that prevalence of smoking among males was 21.9% which is little lower.

In a study conducted by Jayakrishnan R et al (2011)11 in Rural population of Thiruvananthapuram, it was observed that prevalence of smoking among males was 28.1% which is little lower.

TABLE – 6: PREVALENCE OF CURRENT NONSMOKING

<table>
<thead>
<tr>
<th>Status of current non smoker</th>
<th>Number(n=173)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former daily smoker</td>
<td>17</td>
<td>(9.83)</td>
</tr>
<tr>
<td>Former occasional smoker</td>
<td>3</td>
<td>(1.73)</td>
</tr>
<tr>
<td>Overall Former smoker</td>
<td>20</td>
<td>(11.56)</td>
</tr>
<tr>
<td>Never smoker</td>
<td>153</td>
<td>(88.44)</td>
</tr>
</tbody>
</table>

Above table shows Current non-smokers were
divided into former daily users, former occasional users and never users. 20 (11.56%) smoked in some form in the past (before 30 days of the survey). The prevalence of former use was 11.56% with the prevalence of former use being 9.83% and former occasional use being 1.73%. 153 (88.44%) had never smoked in their life time. The prevalence of never smokers was 88.44%.

Prevalence of former daily smokers who are currently non-smokers was 9.83% among the study population. In a study conducted by GATS India (2009 – 2010)12 this finding was high which 12.1% was.

### TABLE –7: OVER ALL PREVALENCE OF TOBACCO SMOKING

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall (n=242)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Smokers</td>
<td>69 (28.52)</td>
<td></td>
</tr>
<tr>
<td>Former / Ex-smokers</td>
<td>20 (8.26)</td>
<td></td>
</tr>
<tr>
<td>Never smokers</td>
<td>153 (63.22)</td>
<td></td>
</tr>
</tbody>
</table>

**FIGURE-8: PREVALENCE OF TOBACCO SMOKING**

As shown in [Table 7] and [Figure 8], 69(28.52%) of study population were current smokers, 20(8.26%) were former or ex-smokers and 153(63.22%) were never smokers.

Over all prevalence of tobacco smoking among study population is 69(28.52%) which was almost similar to study conducted by GATS India (2009 - 2010)6 in Andhra Pradesh.

In a study conducted by Clara Kayei Chow7 in rural areas of East and West Godavari regions of Andhra Pradesh, prevalence of current smokers was 45.2%, ex-smokers was 10.4%.This study determines that the prevalence of smoking among study subjects of Pedoutapalli village was 28.52%. This prevalence was similar to reported prevalence (29.3%) by GATS 2010 in Andhra Pradesh but more than the prevalence reported in India by GATS study (24.3%).

Overall there was high prevalence of smoking among study subjects. Bidi was the most common smoking form of tobacco product identified. More use of bidi may be due to less cost and easily available in rural areas. High prevalence in the study subjects may be due to factors like majority of the subjects having no formal education, doing unskilled work and belong to lower socioeconomic status. Other factors affecting prevalence were determinants like early age of initiation of smoking, poor quit attempts, presence of smoking in the family, acceptance of smoking in the family and by friends. Majority of them are aware of the fact and favouring the act. Yet participants opined that the implementation of the ban on smoking is not effective. Among smokers, most of them (63.91%) felt that the act didn’t had any impact on their smoking habit.

### DISCUSSION

**Recommendations:**
The prevalence is around 30% and they are also aware that they should smoke in public places is an offence. Health education measures should be taken in these areas to help them quit smoking habit. They should encouraged to come to the health facility to have periodical health check-ups. The medico social workers, public health nurses, from the department can be utilized to help them with more information with regards to passive smoking and how their family members and children could be affected. The cost incurred also could be explained to create an understanding how they could otherwise use their income to lead a healthy life. Measures to continue with education, and income generating activities provided by the government should be made available to them. We could also explore the local NGOs to help reduce the prevalence of smoking in individuals.

**Limitations:**
Prevalence is based on self reporting and hence the possibility of under reporting. The current study is only confined to two rural areas. There is need to conduct similar studies in other villages of the district to help overcome the problem of smoking. There is no financial support to conduct the study.

**Conclusion**
A considerable number males were smokers. They either smoked cigarette or bidi. The nuclear families had more number of men smoking. Low education status and people below poverty line also showed more men habituated to smoking in rural males.

### REFERENCES

7) Clara Kayei Chow. Cardiovascular risk factor levels and cardiovascular risk estimation in a rural area of India.pdf
8) NFHS 3 report from www.nfhsindia.org/nfhs-3-data/vol-1/summaries/findings

SOURCE OF SUPPORT: NIL

CONFLICT OF INTEREST:
Dr. Usha Rani Chandawala is a member of the editorial board of SMJ and has not been involved in any manner in the selection and review of this article.

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To all the study subjects and their respective family members, institutional authorities, department of community medicine staff.
INTRODUCTION

Our understanding of social anxiety disorder (also known as social phobia) has moved from rudimentary awareness that it is not merely shyness to a much more sophisticated appreciation of its prevalence, its chronic and pernicious nature, and its neurobiological underpinnings. Social anxiety disorder is the most common anxiety disorder; it has an early age of onset—by age 11 years in about 50% and by age 20 years in about 80% of individuals—and it is a risk factor for subsequent depressive illness and substance abuse. It can be severely detrimental to quality of life, with far-reaching consequences for education, employment and relationships. Only a minority of people with social anxiety disorder receive attention and counseling.

Social anxiety disorder differs from shyness and performance anxiety in its greater severity, pervasiveness, resultant distress and impairment. Persons with social anxiety disorder may avoid important activities such as attending classes and meetings or attend but avoid active participation. They achieve less in school and work and are less likely to marry than people who do not have the disorder. In primary care settings, social anxiety disorder contributes to poor functioning and missed work, yet most cases go untreated. Both heredity and environment contribute to the development of social anxiety disorder. Toddlers who appear to be shy and have inhibited temperament are at increased risk for the development of social anxiety disorder by the time they reach their teens, although the disorder does not develop in most shy children. Overprotective and hypercritical parenting has been associated with social anxiety disorder, although the extent to which such parenting is a contributing cause, as compared with a response to a child with social anxiety, is unclear. Community studies using DSM III criteria (Diagnostic and Statistical Manual of Mental Disorder) found prevalence of SAD as approximately 1% with slightly higher prevalence in girls than boys (Kashani and Orvaschal, 1990; McGee et al, 1990). Two German studies used DSM IV criteria for epidemiological studies. The first study of SAD among 12-17 year old adolescents found lifetime prevalence...
OBJECTIVES OF THE STUDY

- To find out frequency of Social Anxiety Disorder among medical undergraduate students.
- To find out association of SAD with relationship related factors, perceived difficulties in studies, facing the faculty and sensitive to criticism.
- To correlate Sociaty Anxiety Disorder with Self-Esteem and academic performance.

MATERIALS AND METHODS

This is a cross sectional study conducted among medical undergraduate students from Govt. M. K. Medical College, Salem, Tamil Nadu during August to October 2015. The sample size of 480 was calculated based on the similar study done in college students by Khyati Mehtalia, G.K.Vankar and the prevalence of SAD was 11.8%. After getting Institutional Ethical Committee approval, the study participants were selected by adopting convenient sampling allowing equal representation. Those students who provided informed consent were included and who had any known mental illness were excluded.

The data was collected by a validated self-administered semi-structured questionnaire consisting of 3 parts. The first part of the questionnaire recorded basic information like gender, age, place of residence, year of study and associated features. The second part used a social anxiety scale developed by Liebowitz which assesses social interaction and performance related anxiety as well as fear and avoidance. The items are scored on separate scales ranging from 0 to 3 for fear or anxiety and avoidance. There are 13 performance items that include questions about telephoning in public and giving report to a group, as well as eleven social interaction items that include returning goods to a store and giving party. The third part of the questionnaire used a self-esteem scale developed by Rosenberg which is a ten-item likert type scale with items answered on a four-point scale — from strongly agree to strongly disagree. Five of the items have positively worded statements and five have negatively worded ones. The scale measures state self-esteem by asking the respondents to reflect on their current feelings. The following risk factors were also included in the instrument and strength of association was established Difficulty in facing the faculty, Sensitive to criticism, Avoiding learning opportunities. Difficulty in making friends and trusting them.

DATA ANALYSIS:

Medical Students with SAD were categorized into different Levels of Social Anxiety. Data were entered in Epidata and analysed by SPSS version 24. Data analysis consists of descriptive statistics for scores on social anxiety and its associated factors, chi square test for association between SAD and its risk factors and correlation for SAD and self-esteem, academic performance.

RESULTS

A total of 480 students’ response was taken for analysis. Out of 480 students 62(12.9%) came under the category of very severe social anxiety, 83(17.30%), 108(22.5%), 110(22.9%), 117(24.3%) came under the category of severe, marked, moderate, mild(normal) respectively. Table 1 represents the distribution of scores on Social Anxiety Scale.

<table>
<thead>
<tr>
<th>Score</th>
<th>N=480(100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 55</td>
<td>117(24.3%)</td>
</tr>
<tr>
<td>56-64</td>
<td>110(22.9%)</td>
</tr>
<tr>
<td>65-79</td>
<td>108(22.5%)</td>
</tr>
<tr>
<td>80-95</td>
<td>83(17.30%)</td>
</tr>
<tr>
<td>&gt;95</td>
<td>62(12.9%)</td>
</tr>
</tbody>
</table>

Demographic characteristics like gender (p<0.005), place of residence (p<0.001), socio-economic status (p<0.001), year of study (p<0.001) were statically significant. Female students have more levels of social anxiety than males. With regard to place of residence, socio-economic status and year of study, students from rural background, of lower socio-economic status and first year of study had higher levels of social anxiety. The study also shows that increasing levels of social anxiety has a negative correlation with marks obtained in exams(r = -0.33) and self-esteem scores (r = -0.25) respectively. Fig 1 depicts the relationship between social anxiety and self-esteem.

Various factors like sensitive to criticism, difficulty
in facing the authority or faculty, difficulty in making friends and trusting them, sensitive to criticism were assessed for the strength of association with increasing levels of social anxiety and it has been found that each of these factors are strongly associated with different levels of social anxiety and there is a statistically significant difference between the groups.

**DISCUSSION**

The study investigated the problem of increasing levels of social anxiety disorder among medical students and its relationship with self-esteem and academic performance. The findings in the study revealed 12.9% of students had very severe social anxiety. This is greater than 10.3% according to study by Vishal Chhabra, MS Bhatia, Sahil Gupta, Pankaj Kumar, Shruti Srivastavathe (April 2009) among higher secondary school students. It is comparable to 12.8% according to Khyati mehtaliya and G K Vankar among university students of various disciplines. and is very low when compared with Gültekin BK, Dereboy IF8 & 9 where the prevalence were 20.9% & 19.5% respectively.

Present study showed a female preponderance to increasing levels of social anxiety. It is also similar to study

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mild Social Anxiety n(%)</th>
<th>Moderate Social Anxiety n(%)</th>
<th>Marked Social Anxiety n(%)</th>
<th>Severe Social Anxiety n(%)</th>
<th>Very Severe Social Anxiety n(%)</th>
<th>Total n(%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>73(31.6)</td>
<td>52(22.5)</td>
<td>42(18.2)</td>
<td>45(19.25)</td>
<td>19(8.2)</td>
<td>231(100)</td>
<td>0.005</td>
</tr>
<tr>
<td>Female</td>
<td>44(17.7)</td>
<td>58(26.3)</td>
<td>66(26.5)</td>
<td>38(15.3)</td>
<td>43(17.3)</td>
<td>249(100)</td>
<td></td>
</tr>
<tr>
<td><strong>Place of Residence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>53(22.2)</td>
<td>35(14.6)</td>
<td>63(26.4)</td>
<td>43(18)</td>
<td>45(18.8)</td>
<td>239(100)</td>
<td>0.001</td>
</tr>
<tr>
<td>Urban</td>
<td>64(26.6)</td>
<td>75(31.1)</td>
<td>45(18.7)</td>
<td>40(16.6)</td>
<td>17(7.1)</td>
<td>241(100)</td>
<td></td>
</tr>
<tr>
<td><strong>Socio-Economic Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>12(8.3)</td>
<td>8(5.6)</td>
<td>39(27.1)</td>
<td>42(29.2)</td>
<td>43(29.9)</td>
<td>144(100)</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>64(25.3)</td>
<td>72(28.5)</td>
<td>64(25.3)</td>
<td>38(15)</td>
<td>15(5.9)</td>
<td>253(100)</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>41(49.4)</td>
<td>5(6)</td>
<td>26(31.3)</td>
<td>5(6)</td>
<td>6(7.2)</td>
<td>83(100)</td>
<td></td>
</tr>
<tr>
<td><strong>Year of study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year</td>
<td>31(20.7)</td>
<td>35(23.3)</td>
<td>34(22.7)</td>
<td>28(18.7)</td>
<td>22(14.7)</td>
<td>150(100)</td>
<td>0.001</td>
</tr>
<tr>
<td>Second Year</td>
<td>51(34)</td>
<td>35(23.3)</td>
<td>32(21.3)</td>
<td>17(11.3)</td>
<td>15(10)</td>
<td>150(100)</td>
<td></td>
</tr>
<tr>
<td>Third Year</td>
<td>15(15)</td>
<td>26(26)</td>
<td>27(27)</td>
<td>17(17)</td>
<td>15(15)</td>
<td>100(100)</td>
<td></td>
</tr>
<tr>
<td>Final Year</td>
<td>20(25)</td>
<td>14(7.5)</td>
<td>15(18.8)</td>
<td>21(26.3)</td>
<td>10(12.5)</td>
<td>80(100)</td>
<td></td>
</tr>
</tbody>
</table>
by Gültekin BK, Dereboy IF8 were females had 1.5 times increased preponderance to social anxiety but several studies by Mehtalia K, Vankar GK. 4&10 show that no gender difference is present as regards the prevalence of SAD. This variation may be due to other factors associated with female gender like inherent inhibition to face the authority, increasing tendency to get afraid of situations in medical field.

With respect to place of residence and year of study, students from rural background and first year of study had very high levels of social anxiety. The current study also determined that increasing levels of social anxiety was associated with reduced academic performances and decreased self-esteem which coincides with study by Igzic et al.(11)

The study revealed that the factors like sensitive to criticism, difficulty in facing the faculties, difficulty in making friends and trusting them & avoiding learning opportunities have a strong association with increasing levels of social anxiety which is also studied by Nair MKC et al. (4)

**LIMITATION**

This is only a single stage study based on findings on screening instruments. Two-stage study employing structured clinical interview would lead to more valid conclusions.

Although this study has explored the relationship of self-esteem with social anxiety; other anxiety disorders and relationship with avoidant personality disorder has not been explored. Future studies on this aspect are needed.

**CONCLUSION**

Prevalence of very severe social anxiety(SAD) was found to be 12.9%. Moderate, marked & severe levels of social anxiety are present in 22.9%, 22.5% & 17.30% respectively. Increased levels of social anxiety is found to be more in females, students studying in first year, from rural
background and among lower socioeconomic group. Students with high levels of social anxiety had low self-esteem, poor academic performances, difficulty in facing the faculty, avoiding learning opportunities, sensitive to criticism, had difficulty in making friends and trusting them. Medical students with SAD need to be evaluated and intervened timely. This can improve certain level of academic performance and their professional skills in future. SAD could be identified and managed in school age itself and that can improve their learning opportunity. This needs larger study with the help of professional experts to address SAD.

REFERENCES
9 Internet Scientific Publications [Internet]. [cited 2016 Aug 29].

ACKNOWLEDGEMENT:
We sincerely thank all the students who participated in the study for their cooperation. We also extend our thanks to Dean, Vice Principal and all the faculties in the department of community medicine for helping in entire study.
INTRODUCTION

Mental health is an integral and essential component of health. The WHO constitution states: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” An important consequence of this definition is that mental health is described as more than the absence of mental disorders or disabilities.

Depression is the most common psychiatric disorder in general practice and about one in ten patients seen in the primary care settings suffer from some form of depression [1][2]. In a study conducted by the World Health Organization (WHO) in fourteen primary care settings world wide, the most common disability was depression [3]. Anxiety and depressive disorders are common in all regions of the world [4]. They constitute a substantial proportion of the global burden of disease, and are projected to form the second most common cause of disability by 2020 [5].

Depression is estimated to affect 340 million people globally [6]. The prevalence of psychiatric disorders is reported to differ between countries, within countries and across various ethnicities [7]. The prevalence of depression in a population based study conducted in urban Pakistan was 45.9%, while in rural Bangladesh, it was reported to be 29% and in a peri-urban clinic in Uganda it was reported to be 6.1% [8-11]. Earlier Indian studies have reported prevalence rates of depression that vary from 21–83% in general population [12–15]. Depression is a disorder of major public health importance, in terms of suffering, family dysfunction, morbidity, and economic burden.

Depression is more common in women than men[16,17]. The report on global burden of disease estimates the point prevalence of uni-polar depressive episodes to be 1.9% for men and 3.2% for women. It is estimated that by the year 2020 if current trends for demographic and epidemiological transition continue, the burden of depression...
will increase to 5.7% of the total burden of disease and it would be the second leading cause of disability-adjusted life years (DALYs), second only to ischemic heart disease[16].Depressive symptoms and disorders negatively impact one's perceived quality of life.

In recent years, depression has been recognized as a major health problem for rural women. The prevalence of depression and factors associated with depression among rural women with a particular context to the productive age group of 18 to 45 years is less known. Depression may lead to major disorder in terms of disability and morbidity. With this clause in mind we conducted a study with the objective to study the prevalence of depression and its associated risk factors for rural women in Poonamalle Health Unit District [HUD] ,TamilNadu, India.

METHODS

Study Population:

Our study population were women who attended the outpatient units of healthcare facilities in the age group between 18 & 45 years for any of their health needs.

Study design:

We did a facility based cross-sectional survey at Primary Health centres [PHCs] between January and March 2014.

Operational definitions

All the study participants were screened by using Becks Depression Inventory (BDI). A Performa was also developed to collect the socio-demographic profile of the participants. Those of the participants with a score of >17 in BDI were considered as clinically depressed.

Sample size and Sampling Procedure:

The sample size was 378 based on the assumption of 15% prevalence,5% absolute precision and at 95% confidence interval with 5% non-response [8]. We did a facility based survey in each of the ten healthcare facilities in Poonamalle HUD. Selection of participants were made on the basis of consecutive sampling of cumulative cases over one week per facility in order to obtain the sample size. The principal investigator and two trained investigators collected the data. Participants were recruited after sharing the information about the purpose of the study in their local language. Subsequently their consent was obtained alongside a witness in case of illiterates. We used a structured questionnaire to collect data regarding sociodemographic details, behavioural risk factors and history of other diseases. We use standard tools for screening assessment of depression after translating into local language. Supervision of data collection by field investigators was done by the principal investigator.

Analysis:

Data was expressed in the form of frequencies and percentages. We calculated the prevalence depression and various other co-morbid conditions with 95% CI. We also analysed the various risk factors for depression. We computed un-adjusted and adjusted ORs with 95% CI using the logistic regression method. We adjusted each of the risk factors for age in separate models and used Epi-Info version 3.5.3 for data entry and analysis.

Protection of human subjects:

We obtained approval from the Institutional Ethics Committee of the National Institute of Epidemiology, Chennai, Tamil Nadu as well as written informed consent from all the participants. We referred patients with moderate to severe depression for psychiatric evaluation at the district hospital.

RESULTS

Characteristics of the study population and the health facility

The prevalence of depression among women who were interviewed was 20% [95%CI :15.8 – 24.0 %]. The mean age of participants was 35[±10] years. The participants largely belonged to Hindu religion [82%]. Two thirds [60.6%] of the respondents lived in their own houses. Most of the of the participants were literates having middle school education and above [83.3%]. Almost 90% of the participants were married and 87% of them were homemakers with a family income of ≥Rs.4000/- per month. About 61.5% of the participants live in joint type of family. 55.3% of the participants lived in pucca houses receiving water supply through municipality [64%]. Majority of the participants were having an in-house toilet facility [87%]. A large segment of the participants [87%] lived close to a public health care facility within a span of 4km. They were able to walk or use public transport for accessing these facilities [77.5%] for their healthcare needs. Physical illness among family members was accounts for (27.7%) [Table1].

Health Characteristic Of Study Population

The health characteristics of the study population showed about 27.8% of the participants gave history of premenstrual complaints with generalized body ache, irritability and frustration being the chief complaints during this phase. The 21.7% participants of them revealed the matter of debts to the interviewer and of these, debts towards housing (5%), studies (6%), marriage (6.9%)and healthcare needs at (3.7%). Substance of abuse includes alcohol (12.4%)and smoking (15.9%) in the family members and
(11.9%) of the family members use both alcohol and smoking. (Table 2)

**Risk factors**

The risk factors for depression were low income (AOR 2.1; 95% CI 1.3–4.2), living away from healthcare facility (AOR 1.1; 95% CI 1.5–2.5), nuclear family type (AOR 1.3; 95% CI 1.1–2.2), illness among family members (AOR 1.2; 95% CI 1.1–2.1) pre-menstrual syndrome (AOR 1.9; 95% CI 1.5–2.6), history of physical illness (AOR 1.1; 95% CI 1.4–2.7), substance abuse in family (AOR 1.6; 95% CI 1.1–2.9). (Table 3)

| TABLE 1 SELECTED CHARACTERISTICS OF THE STUDY POPULATION, POONAMALLE TAMILNADU (N=378) |
|--------------------------|--------------------------|--------|
| Variables                | Characteristic           | n      | %      |
| Age (Years)              |                          |        |
| 18-25                    |                          | 129    | 34.1   |
| 26-35                    |                          | 192    | 50.8   |
| 36-45                    |                          | 57     | 15.1   |
| Income                   | ≤4000                    | 49     | 13.0   |
|                          | >4000                    | 329    | 87.0   |
| Marital Status           | Married                  | 341    | 90.2   |
|                          | Unmarried/Widow          | 37     | 9.8    |
| Religion                 | Hindu                    | 310    | 82     |
|                          | Christian                | 35     | 9.3    |
|                          | Muslim                   | 33     | 8.7    |
| Education                | Up to primary school     | 63     | 16.7   |
|                          | Middle school and above  | 315    | 83.3   |
| Occupation               | Homemaker                | 299    | 79.1   |
|                          | Others                   | 79     | 20.9   |
| House type               | Pucca                    | 209    | 55.3   |
|                          | Others                   | 169    | 44.7   |
| House Ownership          | Own house                | 229    | 60.6   |
|                          | Rented                   | 149    | 39.4   |
| Water supply             | Municipal water          | 244    | 64.6   |
|                          | Others                   | 134    | 35.4   |
| Toilet                   | In house                 | 329    | 87.0   |
|                          | Public                   | 49     | 13.0   |
| Health facility          | ≤4Km                     | 324    | 85.7   |
|                          | >4Km                     | 54     | 14.3   |
| Mode of transport        | Own Vehicle              | 85     | 22.5   |
|                          | Others                   | 293    | 77.5   |
TABLE 2 SELECTED HEALTH CHARACTERISTICS OF THE STUDY POPULATION, POONAMALLE TAMILNADU, INDIA. (N=378)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual complaints</td>
<td>Premenstrual complaints</td>
<td>105</td>
<td>27.8</td>
</tr>
<tr>
<td>H/o suffering from illness</td>
<td>Physical Illness</td>
<td>29</td>
<td>7.7</td>
</tr>
<tr>
<td>Substance abuse family</td>
<td>Alcohol</td>
<td>47</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
<td>60</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>45</td>
<td>11.9</td>
</tr>
<tr>
<td>Debts</td>
<td>Family debts</td>
<td>82</td>
<td>21.7</td>
</tr>
<tr>
<td>Reasons for debts</td>
<td>Housing</td>
<td>19</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Studies</td>
<td>23</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Marriage</td>
<td>26</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>Health care</td>
<td>14</td>
<td>3.7</td>
</tr>
</tbody>
</table>

TABLE – 3 RISK FACTORS ASSOCIATED WITH DEPRESSION, POONAMALLE, TAMILNADU, INDIA, 2014

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Depression</th>
<th>No Depression</th>
<th>Unadjusted Odds Ratio</th>
<th>Age -Adjusted Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n =74</td>
<td>n =304</td>
<td>95% CI</td>
<td>95%CI</td>
</tr>
<tr>
<td>Income ≤4000</td>
<td>17</td>
<td>33</td>
<td>2.5 (1.3–4.8)</td>
<td>2.1(1.3-4.2)</td>
</tr>
<tr>
<td>Family type (Nuclear)</td>
<td>27</td>
<td>76</td>
<td>1.5 (1.9–2.6)</td>
<td>1.3(1.1-2.2)</td>
</tr>
<tr>
<td>Away from health post</td>
<td>15</td>
<td>44</td>
<td>1.5 (1.7–2.9)</td>
<td>1.1(1.5-2.5)</td>
</tr>
<tr>
<td>Family Illness</td>
<td>36</td>
<td>193</td>
<td>1.6 (1.8-3.1)</td>
<td>1.2(1.1-2.1)</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>8</td>
<td>29</td>
<td>2.0 (1.2-3.5),</td>
<td>1.2(0.5-2.6)</td>
</tr>
<tr>
<td>Pre menstrual syndrome</td>
<td>19</td>
<td>86</td>
<td>2.1 (1.6–2.9)</td>
<td>1.9(1.5-2.6)</td>
</tr>
<tr>
<td>H/O Physical illness</td>
<td>21</td>
<td>39</td>
<td>1.6 (1.8-3.1)</td>
<td>1.1(1.4-2.7)</td>
</tr>
<tr>
<td>Substance Abuse in Family</td>
<td>38</td>
<td>114</td>
<td>1.8 (1.8-3.1)</td>
<td>1.6(1.1-2.9)</td>
</tr>
</tbody>
</table>

DISCUSSION

The prevalence of depression among rural women in our study was around 20% which is quite higher than those reported in previous studies done in rural settings (17). There are few epidemiological investigations of maternal depression in developing countries. Most of these studies were from urban localities. A recent well-designed study of an urban township in South Africa reported a similarly high rate of depression (34.7%) (18). The rates of depression that we found in our study are no higher than those
Women experience depression about twice as much as men. Women are more susceptible than men to stress-induced depression and to changes in photoperiod (59,63). While pregnancy does not increase the risk for depression, women with past histories of depression are at risk for recurrent episodes or relapse if antidepressant medications are discontinued. Hormonal changes during the postpartum period also increase the incidence of depression. This difference may be accounted for by women experiencing greater poverty, differing social roles and sex discrimination, more negative life events, and violence and abuse (64,65). The association of depression with poverty-related variables, such as low level of education and income, as reported from other studies in developing countries were replicated (65). Psychosocial events such as role-stress, victimization, sex-specific socialization, internalization coping style, and disadvantaged social status have all been considered to be contributors to the increased vulnerability of women to depression (63-66). The study confirms our hypothesis that gender-based factors are important determinants of postnatal depression.

The stressors that are unique to the women living in rural environments which include isolation, few social outlets, limited access to health services and healthcare providers due to distance, poor roads, and travel costs, lack of health insurance, irregular income and traditional family (30). Women typically do not disclose their depression on their visits. Instead, they tend to seek help for somatic problems such as headaches, backaches, sleep problems, and fatigue (67). It is not surprising that depression is present in many of the women who seek help from rural primary care providers, particularly those women who are also chronically ill (68,69). With more provider visits due to stress the latent depression may go undetected. However, should their depression be diagnosed, obtaining specialist care for these women is often difficult because mental healthcare providers to whom they can be referred are limited (35,67).

Analyses in our study show that there is a strong interaction among many risk factors, such as socio demographic and economic variables. The implications of the findings are integrated maternal health care with mental health care in these low income settings. Given the shortage of mental health manpower, the role of care will need to be met by midwives, gynecologists, and pediatricians.

Previous investigations have suggested that the detrimental impact of stress may depend more on one's cognitive appraisal of a situation and on the perceived efficacy of one's coping responses than on the stressor itself (68,69). Thus, actual life events are less significant than one's perception and interpretation of them. Psychologically distressed people have the tendency to commit cognitive errors and view reality in a manner that is self-deprecating (70). These stressful events may be sickness of oneself or within the family as seen in our study. A common cognitive judgment error leads to faulty assumptions and misinterpretations leading to pessimistic beliefs about oneself, others, and the future. Which is quite dangerous when one assumes that the worst possible outcome will occur (70).

The key finding that the majority of women had an onset of depression is also consistent with evidence from other prospective studies. It is usually a consequence of pre-existing morbidity and social factors. It is also associated with greater maternal disability and use of health services.

**Limitations**

Study conducted at the level of healthcare facility may not reflect the true prevalence of depression in the community. We excluded study subjects with past history of major depressive disorder and psychotic disorders. Secondary depression due to organic and medical causes,
substance related disorders, drug induced depression were also excluded considering feasibility. The possibility of selection bias was avoided by recruiting all consecutive cases and by the low refusal rate. We attempted to minimize the recall bias by collaborating with local community health workers and by using a detailed and structured interview.

CONCLUSION

In our study we found that socioeconomic factors and health issues were major risk factors for depressive disorders in rural women. Whereas supportive family and friends may protect against development of these disorders. Rural women with depression should be made aware of alert signs of psychological distress. An important step in illness self-management is to provide education materials to those at risk for depression and experiencing symptoms of distress. Primary care providers should routinely instruct these individuals to monitor for symptoms of psychological distress, changes in existing symptomatology, and the circumstances under which to contact their health care provider. Voluntary healthcare organizations should organise community events, stress-modification workshops and educational programmes serving rural communities to increase the awareness of mental health in rural population. It would helpful to have a national epidemiological rural survey of mental disorders[60]. Such surveys are useful to assess the needs of the population, document the use of existing services, obtain valid information on prevalence and associated risk factors, and monitor the health of the population and trends. National representative psychiatric morbidity surveys are required to design health policy to control morbidity from depressive disorders in rural women folk and their empowerment.

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Conflict of interest:
Authors report no conflicts of interest.
INTRODUCTION

Dengue fever occurs worldwide, in nearly all tropical and subtropical countries (1). The global incidence of dengue fever (DF) and dengue haemorrhagic fever (DHF) has increased dramatically in recent decades (1,2). More than half the world’s population are threatened with widespread infection because of migration and industrialisation (3). It has emerged as an important public health problem due to its potential to cause large scale outbreaks (3,4).

Dengue virus was first isolated in India in 1945 (4). It has now reached endemic proportion in few districts (5). Outbreaks have been reported at regular intervals from different parts of India (5-12). The risk of dengue has shown an increase in recent years due to rapid urbanization, lifestyle changes and deficient water management. Dengue is a self-limiting disease characterized by fever, headache, muscle, joint pains, rash, nausea and vomiting (6). The initial symptoms of dengue mimic the clinical symptoms of malaria, typhoid and leptospirosis (7). Therefore a differential diagnosis of infection at an early stage helps in patient care which is the essential component of management of dengue virus infection in the absence of suitable therapeutic and prophylactic measures (8).

Over the last two decades there is a resurgence of dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) (10-13). All four virus types of dengue virus can cause epidemic (14).

In south India, dengue virus were first isolated from febrile patients in Vellore, Tamil Nadu between 1956 and 1966 (15). During the same period dengue virus isolations were made in wild Aedes aegypti mosquitoes (16-20).

Abstract

Introduction: Dengue has fast emerged to be an important public health problem for its ability to occur in large scale outbreaks. During the first week of October 2012, there were reports of rapid increase in number of fever cases reported from Melur block of Madurai. On 10th of October 2012 an Outbreak investigation was initiated along with the district health team with the objectives were to confirm the existence and recommend control measures.

Methods: The standard case definitions provided by the National Vector Borne Disease Control Programme (NVBDCP) (2) were used. A confirmed case was defined as demonstration of dengue virus antigen (NS1 Ag) in serum samples by ELISA. We used active (door-to-door survey) and stimulated passive (healthy facility-based) surveillance to identify cases. We described the outbreak by time, place, and person. Environmental survey was conducted information on frequency of water supply, water storage practices and number of waste containers with and without larvae was collected. We drew line graphs to describe time trends and created area maps. Calculation of attack rate for blocks, age & gender specific attack rates and case fatality rate.

Results: We identified 260 case-patients of Dengue among the 127492 residents [Attack rate 0.2%], there were seven deaths reported [case fatality 2.7%]. The attack rate was higher among females and in the age-group of 50 years and above. We also identified 2330 suspected fever cases among 127492 residents [Attack Rate 18%]. The age groups were 6 to 14 years and females were most affected. Nearly 70% of the case-patients had fever and headache. The cases began appearing during the first week of September 2012, followed by a rapid increase to peak on 1 week of October and, thereafter, declined from 24 October with the. Cases were spread out around six major streets of Therkutheru area on either side of Melur High. Larval indices index were significant in areas Therkutheru, Vellalapatti, Vellalore Keelavalavoo, Thiruvathavoor. The correlation coefficient of cases of dengue is 0.67 with House Index, 0.65 with container index and was 0.68 with Breateau index. The identified vector in causation of this outbreak is Aedes aegypti. Viruses identified: Dengue virus type 2 and 3.

Conclusion: There was a resurgence of dengue virus infection in the affected area. Unprecedented rains and irregular water supply leading to water storage and larval breeding.

Key-words: Dengue fever, risk factors, outbreak
Key Messages: Dengue fever in rural area.
During the month of September 2012 an increase in the number of dengue cases was reported from a few districts of Tamil Nadu. In this regard a team was sent to Mellur Block of Madurai District to conduct fever surveillance and an outbreak investigation. Epidemiological and entomological studies were carried out during the investigation and the results are given in the present communication.

METHODS

Descriptive epidemiology

To confirm the outbreak, we reviewed the monthly surveillance data for the period between January 2009 and January 2012. Further, we ascertained information regarding any recent population migration or changes in the surveillance system and found to be none. There was unprecedented rainfall during the period of June-July and followed by period of monsoon failure. The water supply in the study area was erratic and low pressure. This made the people the supplied water in containers for long periods facilitating the breeding of vectors and transmission.

We defined a case of Dengue fever (DF) according to the standard case definitions provided by the National Vector Borne Disease Control Programme (NVBDCP)2. We included all the confirmed Dengue fever cases from Melur Block, admitted to Govt. Rajaji Medical College Hospital, Madurai and District Health Centres between 25th Sept. and 25th Nov. 2012. The investigation team conducted active door-to-door fever survey in the affected localities and also stimulated passive surveillance in health facilities to identify new cases. We collected personal history, including symptoms, from case-patients and established a line-listing. An epidemic curve was constructed to describe the development of the outbreak over time. We calculated the attack rate (AR) by age and gender, using population census available at the health centre as denominator. The cases were plotted on a map to understand the spatial distribution. To aid in generating hypotheses, we gathered information from case-patients, health workers, and local leaders, using an unstructured trawling questionnaire to determine the possible source of exposure and about the possible sources of the outbreak.

Laboratory procedure

For the identification of serotype, virus isolation followed by indirect fluorescent antibody assay(IF) was done. Acute phase serum samples within six days of infection were collected from 55 suspected patients. Samples were transported to the virology laboratory under cold chain. Dengue specific IgM antibodies were detected by NS1-ELISA.

Environmental Survey

Information on source, frequency of water supply, water collection, storage practices (details of containers, type) and number of waste containers with and without larvae was carried out.

Entomology Survey & Larval survey

Entomological surveys were also carried out in areas of the district from where confirmed cases of dengue fever were reported. These surveys resulted in the calculation of Aedes larval breeding indices such as house index (HI), container index (CI) and breafeau index (BI). Larval survey was carried out in the study area. Identification of species of emerging mosquitoes done by a team of entomologist from Centre for Research in Medical Entomology (CRME) team along with the District Entomology unit from the department of public health and cross verification done at NIE Malaria reference laboratory.

Virus isolation was carried out in the C6/36 clone of Aedes albopictus cell lines as described earlier (11). IFA was performed using specific monoclonal antibodies to dengue virus types 1-4 (provided by Dr. D.J. Gubler, then at CDC, Atlanta, during the 1996 outbreak). (14)

Descriptive epidemiology

We collected information on various potential exposures, using standardized, closed-ended questionnaire. For all the exposures, we used a reference period of three days preceding the illness. Calculation of attack rate for blocks, age & gender-specific attack rates and case fatality ratio

Confidentiality

We protected the confidentiality of participants through the use of codes. However, review of ethical committee did not apply as this was a public-health emergency response to an outbreak and was covered by normal practice.

RESULTS

On the basis of surveillance data for the previous year, available with the primary health facilities and the health office of the district, we confirmed that the an unusual increase in the incidence of fever cases for September 2012 in the affected localities and the entire district Fig 1. Further, we identified that there was neither any influx of population nor any changes in the surveillance system in any of these localities during that period. Hence, the increase in number of cases was considered an outbreak.

We identified 260 case-patients of Dengue among the 127492 residents [Attack rate 1.5%], there were seven deaths reported [case fatality 2.8%]. The attack rate was
higher among females and in the age-group of 50 years and above (Table 1). We also identified 2330 suspected fever cases among 127492 residents [Attack Rate 18%] The attack rate for these fever cases was higher among females and in the age-group of 6-14 years and. Nearly 70% of the case-patients had fever and headache. The cases began appearing during the first week of September 2012, followed by a rapid increase to peak on 1 week of October and, thereafter, declined from 24 October with the (Figure 1). Cases were spread out in a wide area in five affected blocks Therkutheru, Vellalapatti, Vellalore Keelavalavoo, Thiruvathavoor (Figure 2). There were some clustering of cases around six major streets of Therkutheru area on either side of Melur High Road (Figure 3).

**Laboratory Investigation**

A total of 600 hospitalised cases of clinically sus-

**Table 1:** Attack rate of dengue cases by age and sex, Melur Taluk, Madurai District, Tamilnadu, India, 2012

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Age grp (yrs)</th>
<th>No of cases</th>
<th>Population</th>
<th>Attack Rate Per 1000</th>
</tr>
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<tbody>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>0-5</td>
<td>11</td>
<td>11474</td>
<td>1</td>
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<tr>
<td></td>
<td>6-14</td>
<td>56</td>
<td>25498</td>
<td>2.1</td>
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<td></td>
<td>15-49</td>
<td>122</td>
<td>70120</td>
<td>1.7</td>
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<tr>
<td></td>
<td>&gt;50</td>
<td>71</td>
<td>20400</td>
<td>3</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>109</td>
<td>70120</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>151</td>
<td>57372</td>
<td>2.6</td>
</tr>
<tr>
<td>Case Fatality</td>
<td></td>
<td>260</td>
<td>127492</td>
<td>15</td>
</tr>
</tbody>
</table>

**Table 2:** Attack rate of fever cases by age and sex, Melur Taluk, Madurai District, Tamilnadu, India, 2012

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>No of cases</th>
<th>Population</th>
<th>Attack Rate Per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-5</td>
<td>215</td>
<td>11474</td>
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<tr>
<td></td>
<td>6-14</td>
<td>564</td>
<td>25498</td>
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<td></td>
<td>15-49</td>
<td>1222</td>
<td>70120</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td>329</td>
<td>20400</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>1057</td>
<td>70120</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1273</td>
<td>57372</td>
</tr>
<tr>
<td>Total</td>
<td>2330</td>
<td>127492</td>
<td>18</td>
</tr>
</tbody>
</table>

**Table 3:** Attack rate and larval indices of affected area, Melur Taluk, Madurai district, Tamilnadu, India 2012

<table>
<thead>
<tr>
<th>Name</th>
<th>Population</th>
<th>Cases</th>
<th>AR/1,000</th>
<th>HI</th>
<th>CI</th>
<th>BI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiruvathavoor</td>
<td>21000</td>
<td>422</td>
<td>20</td>
<td>16</td>
<td>19.6</td>
<td>23</td>
</tr>
<tr>
<td>Keelavalavoo</td>
<td>31492</td>
<td>320</td>
<td>10</td>
<td>10</td>
<td>11.5</td>
<td>13.6</td>
</tr>
<tr>
<td>Vellalore</td>
<td>30000</td>
<td>556</td>
<td>18</td>
<td>14</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Vellalapatti</td>
<td>20000</td>
<td>478</td>
<td>23</td>
<td>21.3</td>
<td>24.5</td>
<td>35.3</td>
</tr>
<tr>
<td>Therkutheru</td>
<td>25000</td>
<td>553</td>
<td>22</td>
<td>30.6</td>
<td>33.3</td>
<td>47.3</td>
</tr>
</tbody>
</table>
expected dengue fever were identified for the period of 1st September to 7th November 2012. Department of Microbiology, tested & reported positive for 260/600 (16%) serum samples of suspected Dengue patients from Melur block, Madurai district) with NS1 antigen capture ELISA. Out of the above 96 cases were positive by rapid card kits and later on confirmed by NS1 antigen capture ELISA.

**Larval Investigation**

Larval indices for PHC area of Therkutheru, Velalapatti, Vellalore Keevalavalo, Thiruvathavoor were found to have high larval indices with co-related increase in area wise attack rates. The correlation coefficient of cases of dengue is 0.67 with House Index, 0.65 with container index and was 0.68 with Breateau index (Table 3) (Figure3).

**Entomology Survey**

The vector in causation of this outbreak is Aedes Aegypti mosquito identified and the Viruses identified: Dengue virus type 2 and 3

**DISCUSSION**

Dengue affects humans of all age-groups. Usually maximum number of cases was in the 5-20 year group. (21-23) Where dengue is endemic, only a few individuals exhibit severe disease (11,14,18). But even mild dengue infection is important since studies suggest that sequential infection with different serotypes of dengue virus may increase the risk of Dengue Hemorrhagic Fever and Dengue Shock Syndrome (17,18). In our study, maximum dengue cases were from adults more than 50 years of age though the fever survey showed paediatric and adolescent age group. The shift from paediatric/adolescent population to adults getting affected reflects the presence of non-immune adult population falling prey to the circulating serotype of dengue virus.

The role of environmental factors in infectious diseases is well-known. Most dengue outbreaks in India have been reported to occur during the post monsoon period (23-25). The present outbreak occurred during September to November 2012, immediately after an unusually heavy rainy season during which favourable conditions. The epidemics are reported to occur, during temperature (25-35°C) and humidity (60-70%) for breeding which favor abundant mosquito growth and shorten the extrinsic incubation period as well. High mosquito density with high larval indices of the main vector Aedes were noted before and during the outbreak (26). In our study, the largest pro-
portion of serologically positive cases was recorded after unprecedented rains period, which is in agreement with previous studies.(25,26).

Immediate control measure were taken to control the epidemic was done by the Inter-sectoral coordination committee to mobilize resources from non-health sectors, namely Urban Development, Ministry of Education, Water Supply Department and Waste Disposal Department. Daily indoor and outdoor fogging was undertaken early morning and late evening. Malathion was used for outdoor fogging and Pyrethrum extract 2 percent was used for indoor fogging. Cleaning of all Overhead tanks, desilting and cleaning of all open drains. Removal of garbage's and discarded tyres was done by the Village sanitary department. Water storage containers were covered with cloth to prevent mosquito breeding. Heath education sessions stressing the importance on Personal protective measures and general sanitation were conducted by health inspectors for the residents of the affected Micro plan for weekly antilarval activity in outbreak areas were carried out. Intensive IEC Activities were carried out in the form of Pamphlets, sticking posters at households, radio and television news in the effected areas. Vaccines or antiviral drugs are not available for dengue viruses; the only effective way to prevent epidemic dengue fever/dengue haemorrhagic fever (DF/DHF) is to control the mosquito vector, Aedes aegypti and prevent its bite. Activities like source reduction measures for mosquito breeding sites, fogging, and residual spraying should be enhanced to prevent dengue transmission. These should be taken up routinely not only during epidemics or under pressure. Anti larval measures and source reduction are the main strategy to reduce adult mosquito load and transmission. These should be undertaken in all seasons as the mosquito breeds in clean water stored in containers and non degradable sources. Increasing community awareness will surely result in increased responsibility by the individual and community participation. Improved surveillance both passive and active surveillance for early detection of suspected dengue cases and confirmation for effective action and control measures to prevent transmission. Enhanced activity in this regard will help to identify the outbreak at the beginning and contain the epidemic effectively.

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15. Lall R, Dhanda V. Dengue haemorrhagic fever


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We extend our gratitude and thanks to our patient and siblings for their cooperation to participate in the study. We would also like to thank the Directorate of Public Health and Deputy Director for all the logistic and administrative support.

CONFLICT OF INTEREST:

Authors report no conflicts of interest.
INTRODUCTION

Pain in and around Shoulder joint is one of the commonest presenting complaints by the patients attending physiatric OPD. In a study, self-reported prevalence of shoulder pain is estimated to be between 16% and 26%, third most common cause of musculoskeletal consultation in primary care, and approximately 1% of adults consult a general practitioner with new shoulder pain annually.

Occupations as diverse as construction work and hair dressing are associated with a higher risk of shoulder disorders. Physical factors such as lifting heavy loads, repetitive movements in awkward positions and vibrations influence the severity of symptoms. Recent studies reveal the chronicity and recurrence of shoulder disorders.

Causes of painful shoulder are primarily grouped into 2 categories, one arising from shoulder and the other one is the pain referred from elsewhere like neck, myocardial infarction etc. The differential diagnosis include rotator cuff injury, shoulder impingement syndrome, supraspinatus tendinitis, adhesive capsulitis, gleno humeral arthritis, traumatic injuries like dislocations and fractures, referred pains of cardiac origin, diaphragmatic irritation and cervical brachialgia.

Adhesive capsulitis (coined by Naviesar in 1945), also known as Frozen shoulder is a common condition affecting the shoulder joint, the etiology of which is not completely known. Codman has stipulated a set of diagnostic criteria and it holds true to this date. These include gradually increasing pain in the shoulder and is felt at the insertion of deltoid, inability to sleep on affected side, atrophy of biceps, and pain on abduction of shoulder.


duro and rotate the arm slowly to the opposite side. Inability of the shoulder to move to the side of the head ache is common. The patient may report a specific location of the pain, however, in frozen shoulder the pain is more generalized and there may be no point of the pain.

The pain in frozen shoulder is generally not as severe as with rotator cuff syndrome and not as sudden to have had a traumatic cause. The shoulder will not move well and sometimes may lock while moving.

Materials & methods: The study group included 49 consecutive patients (27 males & 22 females with age groups varying from 21 to 75 years) attending physiatric OPD in a tertiary care centre (Government Institute of Rehabilitation Medicine, Madras Medical college, Chennai) with presenting complaint of pain in and around shoulder joint including neck pain radiating to arm, 29 with Adhesive capsulitis(Ad Cap), 12 with Cervical Brachialgia(CB), 5 with Supraspinatus tendinosis(SST), 3 with Acromio clavicular joint disruption(ACJD) and 49 age and sex matched asymptomatic subjects as controls. Visual Analogue Scale (VAS) was used to assess the severity of pain. The test was considered positive when pain on pressure over coracoid area is more severe than over Acromio Clavicular joint and Sub Acromial area (>3 points in VAS).

Results: The test was positive in 79.31%(Ad Cap), 91.66%(CB), 20%(SST), 66.66%(ACJD) of patients with mentioned four conditions with mean VAS score of 5.10, 6.25, 2 and 5.33 respectively, and also positive in 14.81% and 54.55% of male and females of control group respectively. And Positive CPT is statistically significant (99%) with p value <0.01 among patients with Ad Cap, CB and females of control group.

Conclusion: With the sample size limitations, our study suggests positive Coracoid Pain Test may not be a pathognomonic sign of Adhesive Capsulitis shoulder. In other words, positive CPT could be one more additional clinical test to suggest a diagnosis of Adhesive Capsulitis. CPT instead was more correlated to Cervical Brachialgia though it was nonspecific. However, a double blinded large scale controlled study is required to prove it.

Keywords: Coracoid Pain Test (CPT), Adhesive Capsulitis (Ad Cap), Cervical Brachialgia(CB), Supraspinatus Tendinitis(SST), Acromio clavicular joint disruption(ACJD), Visual Analogue Scale(VAS).
scapular muscles and local tenderness. He also identified marked reduction in forward elevation and external rotation that are the hallmarks of the disease. Diagnosis of Adhesive capsulitis is mainly clinical as X-ray shows normal radiology in most of the patients. Till date there is no specific clinical test/ sign characteristic of adhesive capsulitis. Though MRI6 clinches the diagnosis, considering the cost effectiveness, the pathognomonic clinical sign, if any, would add value to the diagnosis. S Carbone et al7 have proposed coracoid pain test (CPT) as the one.

The primary objective of this study was to analyse Coracoid pain test (CPT), proposed by S Carbone et al, as a pathognomonic sign of Adhesive Capsulitis in our set up. The secondary objectives were to study the associated factors like age, sex, laterality, diabetes, occupation and history of injury.

**METHODOLOGY**

It was an observational study, conducted from March 2016 to July 2016 to validate the hypothesis of CPT as pathognomonic sign of adhesive capsulitis in a tertiary care center, Government Institute of Rehabilitation Medicine, Madras Medical College, Chennai. 49 consecutive patients were selected from those attended physiatric OPD with presenting complaint of pain in and around shoulder joint including neck pain radiating to arm, excluding those with UMN or LMN type of weakness of shoulder, ulcers, history of surgeries, dislocation or fractures in and around shoulder joint. Morbidly obese individuals with difficult coracoid localization and those with difficulty in understanding Visual Analogue Scale (VAS) were also excluded from the study. Subjects with coexisting systemic illness like diabetes8 were included in the study. With proper history taking, detailed physiatric assessment through standard clinical tests9 and investigations if needed, the diagnoses9,10 were arrived as one among the following 1. Adhesive Capsulitis (Ad Cap), 2. Supraspinatus Tendinitis (SST), 3. Acromio-clavicular joint disruption (ACJD), 4. Gleno humeral arthritis (GHA), 5. Cervical Brachialgia (CB). 49 age and sex matched asymptomatic subjects were also selected as controls. Visual Analogue Scale11 (VAS) was used to assess the intensity of pain. The test was considered positive when pain on pressure over coracoid area was more severe than over Acromio Clavicular joint and Sub Acromial area (>/=3 points in VAS).

### TABLE 1. COMMON CLINICAL TESTS FOR DIAGNOSIS OF PAIN AROUND THE SHOULDER9,10

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive capsulitis – Apley’s scratch test</td>
</tr>
<tr>
<td>Supraspinatus tendonitis – Empty can test, “Hawkin’s test”</td>
</tr>
<tr>
<td>Acromio-clavicular Arthritis – Cross adduction test.</td>
</tr>
<tr>
<td>Cervical brachialgia – “shoulder abduction test”, spurling test.</td>
</tr>
<tr>
<td>Glenohumeral arthritis – clinical restriction of ROM and radiological evidence</td>
</tr>
</tbody>
</table>

### OBSERVATIONS & RESULTS

The Study group included 49 patients (27 males & 22 females with varying age groups from 21 to 75 years), and the control group included 49 age and sex matched asymptomatic subjects.

**Case distribution**

The study group of 49 subjects included 29 with Adhesive Capsulitis, 12 with Cervical Brachialgia, 5 with Supraspinatus tendinitis and 3 with Acromio-clavicular joint disruption and none with Glenohumeral arthritis.
Age-distribution

Maximum number of patients with Adhesive capsulitis as well as cervical brachialgia were in the age group of 51-55 years.

Sex distribution

Adhesive capsulitis was the most common diagnosis in males as well as females. But occurrence of CB in females was thrice that of males.

Associated Factors

Adhesive capsulitis was almost equally distributed between all four mentioned vocational sub groups whereas non strenuous work and clerical sub groups of vocation shared equal number of CB all together. But all the cases of ACJD occurred in non-strenuous work sub group and maximum number of SST in strenuous manual work sub group.

Duration of illness on presentation

Right and left shoulders were almost equally affected by Adhesive Capsulitis and maximum numbers of CB (9 / 12) occurred in right side.

Laterality

Vocational distribution

All 3 diagnostic subgroups except that of ACJD presented with
93% of patients with Adhesive capsulitis did not give any significant trauma to the shoulder and only less than half were diabetic, where as in CB sub group only one was diabetic and none presented with traumatic history. 2 in SST, 1 in ACJD subgroups had traumatic history and none were diabetic.

**H/O TRAUMA, H/O DIABETES IN ADHESIVE CAPSULITIS**

<table>
<thead>
<tr>
<th>Sub Groups</th>
<th>Total No</th>
<th>Positive CPT</th>
<th>Negative CPT</th>
<th>Mean VAS</th>
<th>Level of significance</th>
<th>Confidence level</th>
<th>P value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad Cap</td>
<td>29</td>
<td>23</td>
<td>6</td>
<td>5.10</td>
<td>0.01</td>
<td>99</td>
<td>&lt;0.01</td>
<td>Significant</td>
</tr>
<tr>
<td>CB</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>6.25</td>
<td>0.01</td>
<td>99</td>
<td>&lt;0.01</td>
<td>Significant</td>
</tr>
<tr>
<td>SST</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0.05</td>
<td>95</td>
<td>&gt;0.05</td>
<td>Not significant</td>
</tr>
<tr>
<td>ACJD</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5.33</td>
<td>0.05</td>
<td>95</td>
<td>&gt;0.05</td>
<td>Not significant</td>
</tr>
<tr>
<td>Control Females</td>
<td>22</td>
<td>12</td>
<td>10</td>
<td>3.05</td>
<td>0.01</td>
<td>99</td>
<td>&lt;0.01</td>
<td>significant</td>
</tr>
<tr>
<td>Control Males</td>
<td>27</td>
<td>4</td>
<td>23</td>
<td>1.40</td>
<td>0.05</td>
<td>95</td>
<td>&gt;0.05</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

**Coracoid Pain Test-Results & Significance:**

The test was positive in 79.31% (23 out of 29) of patients with Adhesive Capsulitis with mean VAS score of 5.10, in 91.66%(11 out of 12) of patients with cervical brachialgia with mean VAS score of 6.25, in 20%(1 out of 5) of patients with supraspinatus tendinitis with mean VAS score of 2 and in 66.66%(2 out of 3) of patients with and acromio clavicular joint arthritis with mean VAS scores of 5.33. The test was also positive in 14.81% and 54.55% of male and females of control group respectively. The Positive CPT was statistically significant with p value <0.01 among patients with Adhesive Capsulitis, Cervical Brachialgia and females of control group and in case of Ad Cap negative test at sub acromial area was more significantly correlated (with p value <0.001) than a positive CPT. The test was insignificant in patients with supraspinatus tendinitis and acromio clavicular joint arthritis and number of subjects in these sub groups were also small. As there were no subjects with glenohumeral arthritis, the correlation of CPT with that sub group could not be tested.

**DISCUSSION**

The results of our study suggest that a positive CPT, with statistically significant p value, was associated with adhesive capsulitis, cervical brachialgia and in asymptomatic female controls as well. In comparison to the study by S Carbone et al7 which showed statistically significant changes only with adhesive capsulitis, 82/85 (96.4%) with a mean VAS score of 8.3, our study results showed that the CPT was positive in 79.31%(Ad Cap), 91.66%(CB), 20%(SST), 66.66%(ACJD) of patients with mentioned four conditions with mean VAS score of 5.10, 6.25, 2 and 5.33 respectively, and also positive in 14.81% and 54.55% of male and females of control group respectively. And Positive CPT was statistically significant (99% confidence level) with p value <0.01 among patients with Ad Cap, CB and females of control group.

In adhesive capsulitis, S Carbone et al7 discusses that Rotator cuff interval(RCI) is the region that corresponds to the coracoid process which is the region in the antero superior aspect of glenohumeral joint formed by a complex intersection of the fibers of the coracohumeral ligament, the superior glenohumeral ligament, the glenohumeral joint capsule and the supraspinatus and subscapularis tendons. The coracohumeral ligament and the joint capsule of rotator cuff interval are thickened in adhesive capsulitis as revealed by MR arthrogram. Hence a pressure at coracoid process in this vicinity is expected to be characteristic of frozen shoulder.

In addition to the diagnostic conditions that were considered in the study by S Carbone et al, cervical brachialgia was also included in our study. Out of 49 subjects in the study group, 12 were diagnosed to have cervical brachialgia and 11 of them (91.66%) showed positive CPT with mean VAS score of 6.25. And 3, 5 and 7 out of 12 subjects with cervical brachialgia presented...
CONCLUSION

With the sample size limitations, our study suggests positive Coracoid Pain Test may not be a pathognomonic sign of Adhesive Capsulitis shoulder. In other words, positive coracoid pain test could be one more additional clinical test to suggest a diagnosis of Adhesive Capsulitis.

Coracoid Pain Test instead is more correlated to Cervical Brachialgia. Though nonspecific, a positive test may be considered as a new clinical sign in addition to the existing ones in case of Cervical Brachialgia.

The phenomenon that females have different and elevated pain sensitivity is well accepted. However, a double blinded large scale controlled study is required for the results to be generalized.

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INTRODUCTION

History of prosthetics dates back to the famous ancient Roman, General Marcus Sergius who is considered the first documented user of a prosthetic limb. In the second Punic War, Sergius lost his right hand and was given a prosthesis, fashioned from iron that enabled him to hold his shield and continue fighting. His loss of limb happened very early in what would become a long military career. The history of prosthetics has always been intertwined with the history of warfare.

Today is an exciting moment in the evolution of prosthetics. It’s a time when great strides are being simultaneously made on both aesthetic and functional fronts, thanks to new technology and the never-before-seen pace of innovation. Modern materials like carbon fiber has made prostheses both lighter and stronger. Advancements like 3D printing and biometrics have enhanced the lives of amputees and will continue to do so. An even more exciting advancement in science is Composite Tissue Allografts.

There are basically two types of upper limb prostheses - Body powered & Externally powered. The conventional or Body - powered prosthesis consists of a socket, suspension, interposition joints, terminal device and a control system. Upper limb body-powered prostheses are less likely to break down and may enable the amputee to work faster. In addition, body-powered systems enable the amputee to get some sensory feedback since they are using the shoulders to open or close the terminal device. In doing so, the amputee can sense how much tension needs to be placed on the cable to operate the terminal device so as to perform the task.

External power for upper extremity prosthesis refers to the use of small electric motors incorporated into the prosthesis to control various functions. At present reliable external power units are available for terminal device operation, wrist rotation and elbow flexion-extension. The electric motors are controlled by switches or myoelectric signals. Small switches are incorporated into the prosthetic socket and are operated upon contact by the amputee. Pull switches incorporated into conventional harness and cable motions are also available.

The Myoelectric hand prosthesis is an alternative to conventional hook prostheses for patients with traumatic or congenital absence of forearm(s) and hand(s). These prostheses have a stronger pinch force, better grip, and are more flexible and easier to use than conventional hooks. Myoelectric control is used to operate electric motor-driven hands, wrist, and elbows. Surface electrodes embedded in the prosthetic socket make contact with the skin and detect and amplify muscle action potentials from voluntarily contracting muscle in the residual limb. The amplified electrical signal turns on an electric motor to provide a function (e.g., terminal device operation, wrist rotation, elbow flexion). The recent electronic control systems perform multiple functions and thus allow for sequential operation of

Abstract

**Aim:** To evaluate the Prosthetic usage and to assess the short term outcome of Upper Limb Amputees.

**Design:** Descriptive Cohort study.

**Materials and Methods:** 40 Upper limb amputees who have received Prosthesis from Government Institute of Rehabilitation Medicine, Chennai were called for follow up. Using data from Medical Records and by an interview a proforma was filled.

**Results:** Majority of the amputees 65%, were independent in all activities of daily living. 25% were partially dependent and the 4 bilateral amputees who comprised 10% were fully dependent for their ADL. Symptoms of overuse injury were reported 35%. Majority of amputees, around 62.5% reported Phantom pain and 40% stump pain. More than half of the study group, 55% have discarded their body powered prosthesis after about a month’s time.

**Conclusion:** Prosthesis usage of more than 8 hours was quite less and the overall rejection rate of prosthesis was 55%. Hence the role for designing and fabrication of advanced prosthetics systems and newer developments are the need of the day for restoring function to the upper limb amputee.

**Key words:** Amputees, Prosthesis, ADL (activities of daily living), Phantom pain, i-limb.
elbow motion, wrist rotation and hand motions. Myoelectric hand prostheses provide improved function and range of functional position as compared to “hook” prostheses. Myoelectric hand prostheses can be used for patients with congenital limb deficiencies and for patients with amputations sustained as a result of trauma or surgery. The motor and drive mechanisms typically last 2 to 3 years and may need to be replaced after this period. When used on a child, the sockets may need to be replaced every 12-18 months due to growth. With heavy use the entire prosthesis might require replacement by the fifth year. The device is appropriate for both above-the-elbow and below-the-elbow amputees, and for both unilateral and bilateral amputees. Patients must possess a minimum microvolt threshold (i.e., minimum strength of microvolt signals emitting from the remaining musculature of the arm) and pass a control test to be considered a candidate. Myoelectric hand prostheses are indicated for persons at least one year of age or older. Children with congenital absence of the forearm(s) and hand(s) are usually fitted with a conventional passive prosthesis until approximately age 12 to 16.

Phantom limb is the sensation that an amputated or missing limb is still attached to the body and is moving appropriately with other body parts. Approximately 60 to 80% of individuals with an amputation experience phantom sensations in their amputated limb, and the majority of the sensations are painful. Phantom sensations may also occur after the removal of body parts other than the limbs, e.g. after amputation of the breast, extraction of a tooth (phantom tooth pain) or removal of an eye (phantom eye syndrome). The missing limb often feels shorter and may feel as if it is in a distorted and painful position. Occasionally, the pain can be made worse by stress, anxiety, and weather changes. Phantom limb pain is usually intermittent. The frequency and intensity of attacks usually decline with time.

This study was conducted to observe the changes in life style, complications and compliance with prosthesis among upper limb amputees. One of the main aims of the study was to find out the hours of usage of prosthesis by upper limb amputees. Further, the incidence of complications like phantom pain, stump pain and over use injury of the normal limb in upper limb amputees was evaluated. Life style modifications of upper limb amputees following the amputation regarding the activities of daily living, leisure activities, occupation and social engagement were also assessed.

**MATERIALS AND METHODS**

This is a descriptive cohort study of upper limb amputees who have received prosthesis during the period from January 2014 to December 2015 at Government Institute of Rehabilitation Medicine, Chennai, India. Data was collected from the medical records as well as through interview of the amputees.

40 Upper limb amputees who had received Prosthesis at least 6 months ago were called for follow-up. Proforma was filled using data from Medical Records and by an interview. Demographic details such as age, sex and education was obtained. The cause, level of amputation, dominance of the involved limb was noted.

The data compiled through the interview included the type of prosthesis used, cosmetic or body powered and whether they had changed the type of prosthesis. The compliance was evaluated by assessing the number of hours the amputee used the prosthesis in a typical day. If prosthesis was not being used why and since when it was discarded was also considered for the data. Information regarding the occupation prior to amputation, and any change in vocation following amputation and current employment status was collected. The level of independence whether partial or complete was observed, as well as any engagement in recreational and social activities after amputation. Presence or absence of phantom pain and stump pain or any symptoms of overuse injury such as shoulder pain, wrist pain, swelling in the normal limb were observed.

**RESULTS**

Demographic details revealed male preponderance in the age group of 20 to 35 years. Involvement of the dominant limb was 22(55%), non-dominant limb was 14 (35%) and 4 patients(10%) were bilateral amputees.

![Fig 1. Dominance of the amputation](image)

All the 40 patients had received prosthesis – a total of 44 prostheses since 4 patients were bilateral amputees. 24 (55%) prostheses were functional body powered prostheses -16 above elbow & 8 below elbow. 20 (45%) were cos-
metic prostheses -16 below elbow & 4 wrist disarticulation. Among these 4 below elbow amputees had obtained Myoelectric prosthesis on their own from private concerns.

Majority of the amputees 26 (65%) were independent in all activities of daily living. 10 (25%) were partially dependent on their family for bathing and dressing. The 4 bilateral amputees (10%) were fully dependent for their ADL though they had functional prosthesis but did not use them as they needed assistance for donning and doffing. Moreover the body powered prosthesis were heavy and were difficult to use for ADL, but was used occasionally for cosmesis.

ADL - 40 patients

Overuse injury of the normal side was evidenced by complaints of shoulder and wrist pain and was reported by 14 patients (35%).

10 Patients (25%) were continuing the same occupation, 12 Patients (30%) had changed their occupation following the amputation. 7 Patients (17.5%) were students and they were continuing their studies and 11 Patients (27.5%) have stopped working and are supported by their family members.

25 patients (62.5%) reported Phantom pain and 16 patients (40%) stump pain. This complication was common to prosthetic users and non-users. Minimal Life style modifications were done by these amputees, 70% of the amputees continued their recreational activities. Some had changed the sports to one which does not need both upper limbs like Chess, Table Tennis etc. They took part in family functions and outdoor activities some wearing their prosthesis and a few without them. However 30% of the amputees had no recreational activities and avoided socialising.

DISCUSSION

Amputation is one of the lifesaving surgical procedures performed by the orthopaedic surgeons and the general surgeons. The social, psychological and economic burden of the amputation on patient and family is enormous. The challenges faced by the upper limb amputees in restoring function is huge compared to the lower limb amputation and functional restoration is the mainstay of any amputee rehabilitation.

The majority of our patients were male patients and it is comparable to studies from many authors. In our study 55% of patients received the functional body powered prosthesis and 45% used cosmetic prosthesis while in a study conducted by the Chul Jo Hung et al.
cosmetic hand prosthesis (80.2%) was the most used upper limb prosthesis.

On functional assessment our patients found limitation in bathing and dressing as the major activities of daily living affected, while Chul Jo Hung et al15 reported lacing shoes, removing bottle-tops with a bottle opener, and using scissors as the major functional limitations. He has also reported that the correlation between satisfaction with the prosthesis and level of amputation or prosthetic type is not statistically significant.

With regard to occupation of the amputees, in our study 57.5% of patients have either changed their jobs or have stopped working, while in the study by Chul Jo Hung et al15, it was 69%; He also observed that clerical workers were most likely to return to work; however 17.5% of the patients in our study were students who were never employees, in addition to the 57.5% who either changed their jobs or left them.

62.5% of our patients reported Phantom-limb pain 40% reported residual limb pain, while in a study conducted by Marisol A Hanley et al16 it was 79% and 71% respectively. They also reported that non amputated limb pain can cause the highest levels of interference and pain related disability days. It is clear that pain in the amputated limb or normal limb can be a significant factor in the functional outcome of the upper limb amputee.

Prosthesis use of 8hrs/day was noted in 14 patients (35%) and 10% (4 patients) used their prosthesis for 4 hours or less in our study which is comparable to observation made by Chul Jo Hung et al15 where it is 44.7%. He also observed that most patients preferred cosmetic usage than functional usage. In his study only 30% reported satisfaction with their prosthesis.

Majority of the amputees, 22 (55%) have discarded their body powered prosthesis after about a month’s time, the main reasons being prostheses provided inadequate function, was heavy and the suspension caused shoulder pain. Wright et al14 reported 38% rejection rate in his study. The main causes for poor prosthetic usage were stiff shoulders and brachial plexus injury in their study.

In a study by H.Burgeret al17 majority of the patients (70%) were prosthesis for cosmetic purposes only. The major reason for non-usage of prosthesis in this report was heat and consequent sweating of the stump.

Francesca Cordella et al18 has made a list of requirements of an upper limb prosthesis based on user needs. It insists on (i) acceptability on the grounds of hand function (ii) developing prosthetic systems satisfying user wishes; (iii) method to understand or questionnaires for understanding the user satisfaction with their prostheses. These requirements reinforce that the human hand is a powerful tool for sensing and means of social and physical interaction. The 21 degrees of freedom for hand and 6 for wrist and major role of thumb opposition has to be given priority while developing the prosthesis. Advances in the management of amputees need to address the above issues. Osseointegration is a new method of attaching the artificial limb to the body. This method is sometimes referred to as exoprosthesis (attaching an artificial limb to the bone), or endo-exoprosthesis. This allows better control of the prosthesis and attempted in the lower limbs. The main disadvantage of this method is that amputees with the direct bone attachment cannot have large impacts on the limb, such as those experienced during jogging, because of the potential for the bone to break.19

The i-LIMB prosthetic hand was developed by a technology company based in Scotland. The thumb and three digits are powered individually; the little finger is slanted to the third finger. The thumb can rotate, so that the hand can perform the three most common grip configurations of the human hand. The digits can be articulated to hold a mug and the thumb can be held against the phalange of the index finger to hold a key, or against the first and second digits to grasp a pen. This prosthesis is therefore anatomically more similar to that of a human than any previous prosthetic hand. It is covered with high definition silicon rubber to give the appearance of a real hand.20

Hand prostheses that are currently available on the market are used by amputees to only a limited extent, partly because of lack of sensory feedback from the artificial hand. A pilot study has shown how amputees can experience robot-like advanced hand prosthesis as part of their own body. A perceptual illusion was induced, by which touch applied to the stump of the arm was experienced from the artificial hand. This illusion was elicited by applying synchronous tactile stimulation to the hidden amputation stump and the robotic hand prosthesis in full view. This stimulation caused referral touch sensation from the stump to the artificial hand, and the prosthesis was experienced more like a real hand. This illusion can work when the amputee controls the movements of the artificial hand by recordings of the arm muscle activity with electromyograms.21

A traumatic arm amputation was reattached surgically for the first time in 1962 when Malt and McK-
hann22 described their experience with a ten-year-old boy, but microsurgical techniques were not used, as blood vessels were large enough to be repaired by conventional methods. In 1965, the first successful replantation of an amputated finger by microvascular technique was done by Komatsu and Tamai23 in Japan. The first microsurgical transplantation of the great toe (big toe) to thumb was performed in April 1968 by Mr. John Cobbett24 in England. In the 1970s, a number of surgeons opened the way to the routine use of free flaps to cover defects around the body.

This has paved way for the next concept of hand transplantation. With “organ transplantation” booming in the state of advanced surgical techniques, a successful transplant method is the next step forward in the rehabilitation of an upper limb amputee. The first allograft hand transplantation in India was performed by Subramaniam Iyer25 in Kochi, Kerala. A new hope has now risen for the upper limb amputees, to live a more dignified life, a life with quality.

CONCLUSION

Restoration of the upper limb function following amputation is the most challenging task for any Rehabilitation physician. Our study has again highlighted the issues faced by the present day problems by the upper limb amputee. With prosthetic usage for more than 8 hours being only 35%, with high overall rejection rate being 55% and symptoms of overuse injury in the unaffected limb being 35%, these finding reinforce the necessity for further research in the development of novel designs of prosthesis and in innovative concepts like allograft hand transplantation.

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INTRODUCTION

Spinal cord injury is a low incidence high cost disability requiring tremendous changes in an individual’s lifestyle. It can be grossly divided into two broad etiological categories like traumatic injuries and non-traumatic damages. It results in impairment such as paralysis, loss of sensation and autonomic nervous system dysfunction. It has great impact on individual as well as family.

In traumatic spinal cord injury forces involved may be hyper flexion, hyper extension, lateral stress rotation, compression or distraction. The loss of function following spinal cord injury occurs even though the spinal cord is intact due to compression or bruising. Spinal cord injuries are divided into two functional categories, quadriplegia and paraplegia. Quadriplegia refers to complete paralysis of all four extremities and trunk including the respiratory muscles and results from lesion of cervical cord. Paraplegia refers to complete paralysis of all or part of the trunk and both lower extremities, resulting from lesions of thoracic, lumbar spinal cord or cauda equina. American Spinal Cord Injury Association created the international standards of neurological classification of spinal cord injury [1]. It defines a complete injury as having no sensory or motor function in the lowest sacral segment (S4, S5). Sensory and motor function at S4 and S5 are determined by anal sensation and voluntary external anal sphincter contraction. Incomplete injury is classified as having motor and / or sensory function below the neurological level including sensory and / or motor function at S4 and S5.

Non traumatic etiology may be due to Degenerative disc diseases, Infection, Inflammation, Vascular, Neoplasia, Metabolic or nutritional, Toxic or environmental, Developmental or hereditary condition, Motor neuron diseases.

MATERIALS AND METHODS

Retrospective analysis was conducted by collecting the inpatient data with sample population size, n=411 which includes male population size of 350 and female population size of 61 for a period of 3 years from 2012 to 2015, admitted for rehabilitation at Government Institute of Rehabilitation Medicine, Madras Medical College. Simple statistical analysis was done among male and female patients regarding the etiology, incidence and age group affected.

RESULTS

The incidence of spinal cord injury is more common in male population as per the study than in female population. The ratio of male to female was found to be 6:1. This ratio indicates that the disparity in spinal cord injury in males is more than in females. Major cause of spinal cord injury among male and female population by reviewing medical records of patients admitted for rehabilitation for the period of 3 years starting from 2012 to 2015 at Government Institute of Rehabilitation Medicine (GIRM), Madras Medical College Chennai. Based on the analysis primarily affected age group is in the range of 31 to 40 years and second highest impacted age is 21-30 years in male population. Similarly primarily impacted age group is 21 to 30 years and second highest impacted age group is 41-50 years in female group. Traumatic etiology is common among both male and female. Paraplegia is found to be more prevalent than quadriplegia. Considering the non-traumatic etiology tuberculosis affecting the spine is a common factor among male and female population.

Conclusion: In traumatic etiology, male population in the age group of 21 to 40 is highly prone to spinal cord injuries. Similarly in female population in the age group from 21 to 30 and 41 to 50 are highly prone to spinal cord injuries. Preventive measures should be focused on these groups.

Keywords: Spinal cord injury, trauma, paraplegia, quadriplegia, tuberculosis of spine.

Abstract

Objective: To determine gender disparity in spinal cord injury, common age group affected and the type of etiology among the population considered for this study.

Study Design: This is a retrospective study of comparative analysis of spinal cord injury between male and female population by reviewing medical records of patients admitted for rehabilitation for the period of 3 years starting from 2012 to 2015 at Government Institute of Rehabilitation Medicine (GIRM), Madras Medical College Chennai.

Results: Incidence of spinal cord injury is comparatively higher in male than female population with ratio being 6:1. Based on the analysis primarily affected age group is in the range of 31 to 40 years and second highest impacted age is 21-30 years in male population. Similarly primarily impacted age group is 21 to 30 years and second highest impacted age group is 41-50 years in female group. Traumatic etiology is common among both male and female. Paraplegia is found to be more prevalent than quadriplegia. Considering the non-traumatic etiology tuberculosis affecting the spine is a common factor among male and female population.

Conclusion: In traumatic etiology, male population in the age group of 21 to 40 is highly prone to spinal cord injuries. Similarly in female population in the age group from 21 to 30 and 41 to 50 are highly prone to spinal cord injuries. Preventive measures should be focused on these groups.

Keywords: Spinal cord injury, trauma, paraplegia, quadriplegia, tuberculosis of spine.
injury is of traumatic etiology. Road traffic accident is more common than fall from height.

Most of the injured patients were of low socio-economic status group and who are engaged in occupation like drivers and people riding two-wheelers

Incidence of fall occurs for people engaged in jobs such as tree climbing, painting and construction workers.

**TABLE – 1: SAMPLE STUDY SIZE BASED ON ETIOLOGY AND TYPE OF LESION**

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Type of Lesion</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traumatic</td>
<td>Paraplegia</td>
<td>226</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Quadriplegia</td>
<td>110</td>
<td>9</td>
</tr>
<tr>
<td>Non Traumatic</td>
<td>Paraplegia</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Quadriplegia</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>350</td>
<td>61</td>
</tr>
</tbody>
</table>

**TABLE-2: NON TRAUMATIC ETIOLOGY**

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis of Spine</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Space Occupying lesion</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Primary affected age group is 31-40 years for males under traumatic etiology. Second most impacted age group is 21-30.

In female population trauma is the common etiology. Common age affected is 21-30. Second most affected age group is 41-50.

**Age wise Incidence of Spinal Cord Injury**

85% accounts for traumatic etiology for female population. 15% accounts for non traumatic etiology as shown in below pie chart.

In non traumatic etiology, tuberculosis affecting the spine is the common etiology irrespective of age group and gender.

Study shows that paraplegia is common than quadriplegia in both traumatic and non traumatic etiology.

Below depicted pie chart shows the distribution of etiologies of spinal cord injury. Traumatic etiology accounts for 86% population and 14% accounts for non-traumatic etiology.
DISCUSSION

It is well known from the studies conducted across the world that trauma is the most common etiology for spinal cord injury [2, 3, 4]. Males are commonly affected by traumatic injury than in females correlating with other studies [5, 6, 7].

Incidence of traumatic spinal cord injury can be reduced by emphasizing the below mentioned primary preventive measures such as:

a) Creating awareness about drunken driving
b) Restricting cell phone usage while driving
c) Conducting designated driver program
d) Avoiding driving after taking sedatives and
 e) Creating awareness about usage of safety measures (like wearing helmets, seat belts etc)

As this is a retrospective study, there may be some data loss and it was minimized by examining the related medical records.

It is also found from the study that females in the age group 41-50 have increased incidence of spinal cord injury. As osteoporosis is more common in females, screening for osteoporosis and fall preventive measures may be emphasized. This study analyzed the impacted age among both male and female patients. This study is similar to study done in China where their study considered demographics and injury characteristics with focus being on traumatic etiology [8]. In our study we focused on both traumatic as well as non traumatic etiology. While reviewing the literature we found that comparative analysis of epidemiological characteristics of traumatic spinal injuries in Asia with other region of the world done, age group impacted was in the range of 20 to 50 years [9]. In our study we found that age groups are not continuous across both male and female population. In males impacted age group was found to be between 21 to 40 years. When female population was examined the prominent impacted age group was split across two different age groups i.e., between 21-30 and 41-50 years. Our study correlated with other studies where in majority of the spinal cord injury was prevalent in adult population with possible reason being adults are active and socially productive [10]. Disparate gender ratio may be due to differences in socio economic and cultural background. Male population is engaged in risky occupation and hence spinal cord injuries are more in male than in female [11].

CONCLUSION

In traumatic etiology, male population in the age group of 21 to 40 is highly prone to spinal cord injuries. Similarly in female population age group between 21 to 30 and 41 to 50 are highly prone to spinal cord injuries. Preventive measures should be focused on these groups as per the type of etiology.

Limitation of the Study
1) Study period is of short duration
2) Sample size is small
3) Sampling is done from one institute, GIRM, Madras Medical College

Future Scope of Study:
1) Study period may be extended
2) Sample size can be increased
3) State wise data and nation wise data to be collected
4) More parameters can be included for statistical analysis
5) Advanced statistical techniques can be used to define model and then find correlation between different parameters. So that an empirical model can be arrived and used for future studies

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Spinal Cord 2011;49(3):386–90
INTRODUCTION

The estimates by International Diabetes Federation show that India is home to 69.2 million people with Diabetes (1). Type 1 Diabetes is the most common type of Diabetes Mellitus occurring in the young age (<25 yrs). Besides T1DM, other types of Diabetes Mellitus were encountered. These include Type 2 DM, Diabetes due to genetic defects in Beta Cell function or in insulin action and Diabetes due to exocrine pancreatic diseases, endocrinopathies, drugs, chemicals, infectious agents and genetic syndromes. (2). There has been increasing incidence of T2DM in childhood and adolescence in the past decade. According to recent studies in India, T2DM accounted for 6 – 17% for diabetes occurring in young. V.Mohan et al in his study has shown 48% prevalence of T2DM occurring in young.(3). T1DM and T2DM are heterogeneous diseases in which clinical presentation and disease progression may vary considerably.

Classification is important for determining therapy, but some individuals cannot be clearly classified as having T1DM or T2DM at the time of diagnosis. The traditional paradigm of T2DM occurring only in adults and T1DM only in children are no longer accurate, as both diseases occur in both cohorts. Although difficulties in distinguishing type of Diabetes may occur in all age groups at onset, the true diagnosis becomes more obvious over time.(4). Fasting C-Peptide levels are good discriminators in identifying subjects who require insulin therapy.(5). Once hyperglycaemia occurs, patients with all forms of Diabetes are at risk for developing the same complications. Hence early good glycaemic control with appropriate therapy as either insulin or oral drugs helps in prevention of the complications.

AIMS AND OBJECTIVES

Diabetes in the young is defined as first onset of diabetes by the age at or below 25 years. Classification of diabetes is important for determining therapy particularly insulin. Hence this study was conducted to assess the role of fasting basal C-peptide level for insulin therapy occurring in the younger individuals with Diabetes Mellitus.

MATERIALS AND METHODS

This was a prospective longitudinal study of 50 young patients (age < 25 yrs) with diabetes attending diabetes outpatient clinic at Stanley Government Medical College Hospital, Chennai, Tamilnadu during January 2004 – January 2005. All patients who have diabetes with age of onset < 25 years attending diabetes OPD were included for study. Diabetes after 25 years of age and Diabetes during pregnancy were excluded. Study was approved by Ethical
committee of our Hospital. An informed consent was obtained from the patients after explaining the need to take blood sample. Detailed history regarding the age of onset, duration, family history and present glycaemic state and treatment were noted. Clinical examination along with anthropometric measurements like height, weight, BMI were done and registered. Blood samples were taken after an overnight fasting. 5ml of blood sample was drawn in a vaccutainer, immediately centrifuged and the serum kept frozen at -20 degrees and samples were sent to Thyrocare Lab Mumbai. C-peptide assay was determined from serum sample by chemiluminescence method.

RESULTS

Of the 50 patients studied, 38 had T1DM, 10 had T2DM and 2 had other specific types. Among 38 T1DM patients, sex distributions were equal. While in T2DM, females were predominant.

AGE AT ONSET OF DISEASE

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BODY MASS INDEX

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C-PEPTIDE LEVELS

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<td>Type 2 :</td>
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<td>&gt;1.1</td>
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MEAN C PEPTIDE LEVELS

<table>
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<th>DIAGNOSIS</th>
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</thead>
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<tr>
<td>TYPE 1</td>
<td>0.61</td>
</tr>
<tr>
<td>TYPE 2</td>
<td>1.73</td>
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</table>

C-Peptide assays are significantly useful in the classification of diabetes.

DISCUSSION

T1DM is the most commonly associated form of diabetes occurring in the young but lately T2DM is also occurring more commonly besides other type of diabetes. An increase in diabetes prevalence has not only resulted in increase in complications of diabetes but has also exponentially added to health care cost while decreasing the quality of life. Landmark trials like DCCT [Diabetes Control and Complication Trial] and UKPDS [United Kingdom Prospective Diabetes Study] had clearly highlighted the importance of good control in prevention of complications from diagnosis.

C-PEPTIDE ASSAY:

1. Good marker of insulin secretion because of equimolar secretion with insulin.
2. Negligible hepatic extraction.
3. Constant peripheral clearance at different plasma concentration and in the presence of alteration in plasma glucose concentration.
4. Excreted exclusively by Kidneys.
5. Half Life : 30mins.
6. Cross reactivity with pro insulin is negligible (10% ) c-peptide assay can be performed by radio immunoassay or chemiluminescence methods.

The normal value of C-Peptide level is between 1.1 – 4.0nmol/L.

Elias.S.Siraj et al showed basal fasting C-peptide levels are good discriminators between type 1 and type 2 diabetes in Ethiopians. It is also useful in identifying subjects with type 2 diabetes who require insulin therapy. This has been confirmed in our study too that shows a statistically significant role of C-peptide for therapy with insulin in diabetes occurring in the younger individuals ( p<0.001 ). All the 10 patients of non-insulin requiring diabetes had basal fasting c-peptide levels of > 1.1. The
mean c-peptide in type 1 was 0.61 while that in type 2 diabetes was 1.73.

CONCLUSIONS

Classification of diabetes mellitus occurring in younger individuals is difficult. The true diagnosis of the type of Diabetes becomes more obvious over time in young diabetes individuals. Estimation of C-Peptide level in fasting state has a role in determining insulin therapy for Diabetes Mellitus occurring in younger individuals.

REFERENCES

INTRODUCTION

Normal kidneys filter large amounts of organic phosphate of which about 98% is handled by the proximal tubules. Early stages of renal dysfunction do not alter serum phosphorus levels as the filtered load and degree of reabsorption decrease proportionately. With failure of this homeostatic mechanism there is progressive hyperphosphatemia.

Phosphate is now regarded as a uremic toxin1 according to many studies and the statistical association between serum phosphorus and all-cause mortality has transformed phosphate into a 'dialysis enemy'. Inspite of all this, phosphate control in CKD patients continues to be poor. Various factors have been implicated such as difficulty in adhering to a low phosphorus diet, efficacy, cost and palatability of the phosphate binder.

Untreated hyperphosphatemia leads to secondary hyperparathyroidism, renal bone disease and increased vascular/soft tissue calcification all of which contribute to increased mortality and morbidity in CKD patients3-5. Thus phosphate control is an important therapeutic option in CKD patients with an aim to reduce cardiovascular mortality and morbidity. Buschinsky et al6 makes the point that a prudent clinician cannot dismiss evidence that serum phosphorus correlates with cardiovascular morbidity and consequently the addition of phosphorus to the list of cardiovascular risk factors in CKD7.

The three key elements in the management of elevated serum phosphorus levels are dietary restriction, drug treatment using phosphate binders and adequate hemodialysis. Dietary phosphorus restriction always carries a risk of severe protein malnutrition and thus phosphate binders play a pivotal role in the management of stage 3-5 CKD8,9. All phosphate binders have limitations of one sort or another.

ORIGINAL ARTICLE - NEPHROLOGY

Effect Of Lanthanum Carbonate vs Calcium Acetate As A Phosphate Binder In Stage 3-4 CKD- ‘Treat To Goal Study’

K.S. Sajeev Kumar (1), M K Mohandas (1), Ramdas Pisharody (1), Rakesh S Nair (1).

Abstract

Context: Hyperphosphatemia is a common in stage 3-4 CKD and influences the progression and prognosis in CKD patients. The efficacy and tolerability of non-calcium phosphate binders has not been studied in any open-label RCT. This study tried to compare the efficacy of lanthanum carbonate with conventional calcium-based phosphate binders such as calcium acetate.

Aim:
1. Compare the efficacy of lanthanum carbonate vs calcium acetate as a phosphate binder
2. Compare the propensity of the above two drugs in producing/preventing hypercalcemia
3. Economic comparison between the two drugs
4.

Settings and Design: ‘Treat to Goal’ open-labeled randomized cross-over comparison study

Methods and Materials: Seventeen patients were randomized to receive either lanthanum carbonate or calcium acetate for 8 weeks. After a washout period of 2 weeks, patients were crossed to receive alternate drug for 8 weeks. For patients whose phosphorus was still not in target range, combination of the two drugs were given for 8 weeks. Serum calcium, serum phosphorus, Ca X P product and serum creatinine were estimated at frequent intervals. Paired ‘T’ test was used to compare the means of the two groups.

Results: In the 15 patients who completed the study both lanthanum and calcium acetate were equally good phosphate binders. Although rise in calcium and Ca X P product was more with calcium acetate, it was not statistically significant.

Conclusion: Both lanthanum carbonate and calcium acetate are equally effective phosphate binders and reduce phosphorus levels to a similar extent. Serum calcium and Ca X P products showed a rising trend with calcium acetate but it was not statistically significant. The cost of lanthanum carbonate was 17 times more than that of calcium acetate which is an important consideration in a developing country like ours.

Key-words: Hyperphosphatemia, phosphate binders, randomized cross over study, lanthanum carbonate, calcium acetate

Key messages: Although lanthanum carbonate was as effective as calcium acetate in lowering serum phosphorus levels, it was 17 times costlier than the latter.
The study had the following aims
1. To compare the efficacy of lanthanum carbonate and calcium acetate in reducing phosphorus levels in stage 3-4 CKD.
2. To compare the changes in serum calcium and Ca X P product of the patients while taking lanthanum carbonate or calcium acetate.
3. To find mean effective dose of these two drugs, to obtain levels of serum phosphorus, serum calcium and Ca X P product.
4. To find out whether fixed dose combination of these drugs in superior than maximum tolerated dose of either.

and no RCT has shown one is superior to another. Table 1 summarizes the oral phosphate binders.

Table 1: Comparison of oral phosphate binders
Table 3: Laboratory Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Drug</th>
<th>N</th>
<th>Pre-drug mean(SD)</th>
<th>Post drug mean(SD)</th>
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<tr>
<td>Serum Phosphorus (mg/dl)</td>
<td>Lanthanum carbonate</td>
<td>15</td>
<td>6.50 (0.27)</td>
<td>4.93 (0.97)</td>
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<tr>
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<td>Calcium acetate</td>
<td>15</td>
<td>6.87 (1.34)</td>
<td>5.40 (1.00)</td>
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<td>Combination</td>
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<td>6.45 (1.17)</td>
<td>5.00 (0.47)</td>
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<tr>
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<td>Lanthanum carbonate</td>
<td>15</td>
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<tr>
<td></td>
<td>Calcium acetate</td>
<td>15</td>
<td>8.00 (0.68)</td>
<td>8.22 (1.03)</td>
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<tr>
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<td>Combination</td>
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<td>7.56 (1.44)</td>
<td>7.76 (0.84)</td>
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<tr>
<td>Calcium X Phosphorus (mg^2/dl^2)</td>
<td>Lanthanum carbonate</td>
<td>15</td>
<td>45.48 (1.68)</td>
<td>38.07 (1.73)</td>
</tr>
<tr>
<td></td>
<td>Calcium acetate</td>
<td>15</td>
<td>52.42 (10.32)</td>
<td>48.63 (11.63)</td>
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<tr>
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<td>Combination</td>
<td>7</td>
<td>48.18 (1.51)</td>
<td>38.81 (1.23)</td>
</tr>
</tbody>
</table>

Subjects and Methods

An open-labeled randomized two-group crossover study was performed to evaluate the efficacy and safety of lanthanum carbonate vs calcium acetate at the Department of Nephrology, Medical College Hospital, Trivandrum. The study design is shown in Figure 1.

Figure 1: Study design

Inclusion criteria:
1. Age between 18 and 80 years
2. Stage 3-4 CKD
3. Serum phosphorus >5.5mg/dl at the time of recruitment
4. Serum calcium <10.5mg/dl at the time of recruitment

Exclusion criteria:
1. End stage renal disease requiring dialysis
2. Acute worsening of chronic renal failure
3. Massive edema and hypoproteinemia
4. Allergy and distressing symptoms to any of the medications
5. Women who are pregnant or lactating or not using appropriate birth control measures
6. Any life threatening malignancy
7. Any exposure to other investigational drugs within 30 days prior to the start of the study.

The total duration of the study for each patient was 18 weeks, which was divided into 2 stages of 8 weeks each with 2 weeks washout period in between. The patients were randomly allocated into two groups to receive either lanthanum carbonate or calcium acetate for 8 weeks. At the end of the first stage the respective drug was stopped and the patient entered a 2 week drug free washout period. After the 2 week washout period, the patients were crossed over to receive the alternate drug for 8 weeks. The patients served as their own controls. The patients were assessed at 2 weekly intervals. At the time of entry into the study and during each visit, a detailed history was taken. Physical examination including general examination, vital signs and relevant systemic examination were also carried out at baseline and during each visit. Serum phosphorus, serum calcium, serum alkaline phosphate and serum creatinine were the biochemical parameters that were estimated at baseline and at each visit. The doses of phosphate binders given were:

- Calcium acetate: 1 tablet containing 667mg of calcium acetate thrice daily. The tablet was swallowed along with the meals. Dose of calcium acetate was titrated by adding one tablet during each visit if target serum phosphorus is not achieved up to a maximum of 2 tablets three times daily.
- Lanthanum carbonate: 1 tablet containing 500mg of lanthanum carbonate thrice daily. The tablet was chewed along with the meals. Dose of lanthanum carbonate was titrated by adding one tablet during each visit if target serum phosphorus is not achieved up to a maximum of 2 tablets three times daily.

All the data collected were recorded in a specific case record form designed for this study. Compliance was estimated by pill count. The incidence of drug related adverse effects during the study period also were noted in the proforma. The costs of the 8-week treatments with lanthanum carbonate and calcium acetate were calculated from the MRP labels on the respective packages.

Statistical analyses

Data were fed into the statistical package 7 of Microsoft Excel and checked for data entry errors. The distribution of variables was noted. Data from the patients who completed the study was analyzed using SPSS software. For comparison of the means between the groups paired ‘t’ test was used. The level of significance was fixed at 5%.

Adverse effects
All adverse effects that occurred during the study were documented in the case record form. A Serious Adverse Event (SAE) was defined as any reaction requiring hospitalization.

RESULTS

A total of 17 patients who satisfied the inclusion criteria were enrolled for the study after obtaining written informed consent. Out of these, 15 patients completed the study. Out of 2 patients who did not complete the study, 1 patient was withdrawn during the phase 1 (pre-washout), due to worsening of their renal status while on lanthanum carbonate; 1 patient was withdrawn in phase 2 (post-washout) due to worsening of their renal status while on calcium acetate. The compliance of the patients during the study was found to be more than 90%. The demographic features of the treated patients are shown in Table 2. The important laboratory parameters are shown in Table 3.

Table 2: Demographic features of treated patients

Table 3: Laboratory parameters

Serum phosphorus

The mean serum phosphorus concentrations...
showed a declining trend during the period in which the phosphate binders were taken. The mean serum phosphorus levels during the intake of lanthanum carbonate decreased from 6.50±0.27mg/dl to 4.93±0.97mg/dl, while the mean serum phosphorus levels during calcium acetate decreased from 6.87±1.34mg/dl to 5.40±1.00mg/dl and combination of both reduced mean serum phosphorus level from 6.45±1.17 to 5.00±0.47. The reduction in serum phosphorus produced by lanthanum carbonate and calcium acetate was similar. The reduction in serum phosphorus produced by lanthanum carbonate and calcium acetate was similar to the reduction in serum phosphorus produced by the two drugs. The trends in serum phosphorus in the 3 groups are shown in Figure 2.

**Figure 2:** Trends in serum phosphorus in 3 groups

Serum calcium

The changes in mean serum calcium concentrations during treatment with lanthanum carbonate and calcium acetate showed opposing trends. Serum calcium increased from 8.00±0.68 to 8.22±1.03mg/dl with calcium acetate treatment, while it decreased from 8.21±0.70 to 7.80±1.29mg/dl with lanthanum carbonate. Fixed dose combination of both also produced trend towards hypercalcemia (7.56±1.44 to 7.76±0.84mg/dl). Changes in serum calcium produced by these drugs were not statistically significant. The trends in serum calcium in the 3 groups are shown in Figure 3.

**Figure 3:** Trends in serum calcium in 3 groups

Ca X P product

The mean calcium X phosphorus product showed a declining trend during treatment with both the phosphate binders. The mean Ca X P product during treatment with lanthanum carbonate decreased from 45.48±1.68 to 38.07±1.73mg2/dl2 and during treatment with calcium acetate decreased from 52.42±10.32 to 48.63±11.63mg2/dl2 and with fixed dose combination of both the figures were 48.18±1.51mg2/dl2 and 38.81±1.23mg2/dl2 pre drug and post drug respectively. A statistically significant difference was not seen while comparing the reduction in Ca X P product produced by lanthanum carbonate and calcium acetate. When fixed dose combination of both were compared with optimum dose of either, reduction in Ca X P product was not statistically significant. The trends in Ca X P in the 3 groups are shown in Figure 4.

**Figure 4:** Trends in Ca X P product in 3 groups

Serum creatinine

Mean creatinine levels were stable throughout the course of treatment.

Dose

Mean dose required for achieving target serum phosphorus concentration and Ca X P product was 2000mg for lanthanum carbonate and 2668mg for calcium acetate.

Adverse events

Over the entire course of the study, adverse events were reported by 3 out of 17 of our enrolled patients. All these adverse events occurred while the patient was on lan-
thanum carbonate. All these three had abdominal discomfort and burning sensation all over the body. No adverse event was reported during the intake of calcium acetate.

**Comparative cost of treatment**

An 8 week treatment with lanthanum carbonate (Fosbait) 500mg 4 tablets a day (mean dose) costs Rs 3584. One 500mg tablet costs Rs 16. A total of 4 X 56 = 224 tablets are needed for 8 weeks of treatment. So total cost was 16 X 224 = Rs 3584. When compared to this, treatment with calcium acetate (Hypophos) 667mg 4 tablets daily (mean dose) is cheaper. One 667mg tablet costs only Rs 0.95. A total of 4 X 56 = 224 tablets are needed for 8 weeks of treatment. So total cost was 0.95 X 84 = Rs 212.8. Fixed dose combination of both costs Rs 2847.6. Total cost of treatment with lanthanum carbonate is 17 times more than treatment with the conventional drug ie calcium acetate.

**DISCUSSION**

Our study attempted to compare the efficacy and tolerability of a calcium based phosphate binder such as calcium acetate with a non calcium containing phosphate binder like lanthanum carbonate. It was seen that both the drugs were equally good phosphate binders and lowered phosphorus levels to a similar extent. It is observed that adequate control of phosphorus levels may be achieved by using considerably lower doses of calcium acetate than prescribed for Western population.

The target serum calcium levels and Ca X P product in CKD patients is 9-10mg/dl and 55mg²/dl². A high calcium level directly correlates with degree of vascular and cardiac calcification10. We found out that calcium acetate use was associated with a statistically insignificant rise in serum calcium levels. Even though Ca X P product showed a falling trend with lanthanum, the difference in fall between the two drugs was not statistically significant.

The steady creatinine values observed during the study confirmed the stable condition of the 20 patients who completed the study. In a study by Hutchinson et al it was shown that lanthanum was superior in reducing Ca X P product and the incidence of hypercalcaemia is less with the drug11. This was similar to our study but we could also infer that rise in serum calcium with calcium acetate is not statistically significant.

There were no adverse effects with calcium acetate, but with lanthanum carbonate 3 patients had adverse gastrointestinal side effects. It could not be purely attributed to lanthanum as patients were on other drugs as well.

In a resource limited setting like ours where cost is an important consideration, a drug like lanthanum carbonate was found to be 17 times costlier than calcium acetate. The high cost of lanthanum takes it out of reach of majority of our patients.

**Limitations**

Dietary phosphorus intake is different in different groups and hence the lack of conformity in diet was a major issue. Sample size was also small and not adequate for achieving power of 80%. Observation period in each arm should desirably be longer to substantiate results. Further studies are required to establish whether there is a statistically significant decrease in efficacy between the two phosphate binders.

**CONCLUSION**

Lanthanum carbonate and calcium acetate are equally good phosphate binders with comparable efficacy in reducing phosphorus levels. Though lanthanum carbonate produced a falling trend in Ca X P product as well as serum calcium, the rise in above two parameters with calcium acetate was not significant either. This is very important in a resource limited setting like ours as lanthanum carbonate is 17 times costlier than calcium acetate. More studies are required in future to establish if there is any difference in efficacy between the two phosphate binders.

**REFERENCES**


ACKNOWLEDGEMENTS
Nil.
INTRODUCTION

Emphysematous pyelonephritis, a term coined by Schultz and Klorfein in 1962 is a necrotizing infection of the kidney. It is characterized by gas formation within the collecting system, renal parenchyma or perirenal tissues. Most common predisposing factor for EPN is diabetes mellitus with lesser contributions from immunosuppressive conditions and urinary tract obstruction. Nephrectomy was the treatment of choice for most patients with EPN in the past. With the advent of newer antibiotics, medical management is found to be effective. In this study, we are presenting the clinical profile and management outcomes of 24 cases of EPN at Government medical college Thiruvananthapuram.

MATERIALS AND METHODS

The present study was conducted between August 2012 to September 2016 Government medical college Thiruvananthapuram. 24 patients were included in the study after obtaining written informed consent.

Inclusion criteria were:
1. Pyuria with culture positivity
2. Radiological evidence of gas in the collecting system, renal parenchyma, or perinephric or pararenal space.

Detailed clinical history and physical examination were done for all patients. History pertaining to all comorbidities such as diabetes, hypertension, calculi, recurrent UTI were documented. History of present illness such as fever, abdominal pain, dysuria, oliguria and altered sensorium were recorded.

Laboratory investigations including renal function, routine blood examination, platelet count, coagulation profile, serum albumin, blood glucose and urine examination were done for all patients. Azotemia was defined as serum creatinine more than 2.5 mg%, thrombocytopenia as platelet count less than 1,000/mm3 and hypoalbuminemia as serum albumin less than 3.0 gm%. Urine culture and sen-
Stability and abdominal CT scan were performed for all. Staging of EPN was done using Huang et al’s 2000 criteria - class I: gas in the collecting system only; class II: gas in the renal parenchyma without extension to the extrarenal space; class IIIa: extension of gas or abscess to the perinephric space; class IIIb: extension of gas or abscess to the pararenal space; class IV: bilateral EPN or solitary kidney with EPN. All the patients were initiated on standard medical management with antibiotics. Surgical treatment was given only for those patients who failed to respond to initial medical therapy. The outcome of management including mortality was assessed.

RESULTS

Of the Twenty four patients nineteen were female and five were male (male/female ratio 3.8:1). Mean age of the study group was 50.04 ± 13.7 years. Clinical features of our patients at presentation is discussed in Table 1. Fever was the most common presenting symptoms (91.7%) followed by dysuria (41.6%), oliguria (25%), altered sensorium (20.8%), and hematuria (16.7%). Hypotension was detected in 16.7% of patients at admission.

Regarding co-morbid illnesses 87.5% patients had diabetes mellitus, 29.2% of patients had recurrent urinary tract infection and 16.7% had renal calculi.

Laboratory results of patients are given in Table 2. 33.3% of patients were anemic and 83.3% of patients had leukocytosis, Hyponatremia detected in 16.7% and thrombocytopenia in 20.8%. Seven patients had azotemia (29.2%) and out of which two patients required dialysis. On CT imaging 8.3% of patients belonged to class I, 62.5% were in class II, 16.7% were in class IIIa, 8.3% were in class IIIb and 4.2% belonged to class IV.

E. coli was the most common bacteria isolated from urine (75% of the patients). Klebsiella was present in 16.7% of patients and 8.3% of patients had mixed growth on culture. All patients received IV antibiotics for two weeks followed by oral antibiotics. One patient each in class IIIa, class IIIb and class IV underwent surgical management due to unresponsiveness with medical therapy. One patient in class IIIa presented with shock and succumbed to death before any surgical intervention could be planned. Another patient in class IIIa underwent surgical intervention (left nephrectomy) as there was no improvement with medical management and patient improved after nephrectomy. One patient each in class IIIb and class IV underwent surgical intervention but was unsuccessful and expired with in three days of surgery. Hence the overall mortality in our study was 8.3%.

On analyzing the risk factors for mortality we found that presence of shock, altered sensorium, thrombocytopenia, hyponatremia and class IIIb/class IV in CT scan were associated with increased mortality (P value = 0.013, 0.005, 0.01, 0.014 and < 0.001 respectively).

DISCUSSION

EPN is a very rare yet life threatening medical emergency. Many factors have been implicated but most importantly high level of glucose with in the tissue, gas forming organisms, impaired vascular supply and presence of obstruction are the culprits. Vascular compromise with high glucose levels is unique to diabetic population and it explains why the condition is more common in diabetic patients. Mixed acid fermentation of glucose to produce hydrogen (H2) and carbon dioxide (CO2) is the mechanism implicated. In our study 87.5% of patients were diabetic further underlining the association. From literature there is preponderance of EPN in females and in our study the ratio was 3.8:1, mostly due to their increased susceptibility to urinary tract infection. Clinical symptoms of EPN include fever, dysuria, hematuria, abdominal pain, vomiting, depressed levels of consciousness, and shock. Similar to the published series, fever and dysuria were the most common symptom in our study. Leucocytosis, thrombocytopenia, and renal dysfunction were the most common laboratory findings in our study which is consistent with the reported literature. In our cohort most common organism isolated from urine was E.Coli followed by Klebsiella (16.7%).

Definitive diagnosis of EPN is done by CT scan and in 2000 Huang and Tseng put forward four radiological classifications of EPN based on the extent of gas seen on CT. In our study most patients belonged to Class II (62.5%) followed by class IIIa (16.7%). In an Indian study by Kapoor et al. altered mental status, thrombocytopenia, renal failure, and severe hyponatremia were predictors of higher mortality. In our study shock, altered sensorium, thrombocytopenia, hyponatremia and class IIIb/class IV in CT scan were associated with increased mortality.

The choice of treatment for EPN still continues to be a matter of debate. Most of the earlier investigators were in favor of aggressive surgical treatment. In contrast to earlier reports recent series have voted in favor of initial conservative management with antibiotics and resorting to surgical therapy only when medical management fails. All our patients initially managed medically with intravenous antibiotics and one patient each in class IIIa, IIIb and class IV underwent surgical management.
as there is no improvement with medical therapy. Nephrectomy improved symptoms in one patient with Class IIIa but other two patients in Class IIIb and class IV succumbed to sepsis three days after surgery. A patient in Class IIIa already presented with septic shock and expired before any management could be planned. Overall mortality in our study was 8.3%.

**CONCLUSIONS**

EPN, a life-threatening infection commonly seen in diabetic patients is responsible for significant mortality if not managed promptly. With a good antibiotic policy most of the patients in Class I, II and IIIa were successfully managed conservatively. Patients with advanced CT stages or toxemic patients with shock and thrombocytopenia de-

**TABLE 1: CLINICAL FEATURES OF PATIENTS AT PRESENTATION**

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<tr>
<th>Feature</th>
<th>Count</th>
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<tbody>
<tr>
<td>Fever</td>
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<tr>
<td>Dysuria</td>
<td>10(41.6%)</td>
</tr>
<tr>
<td>Oliguria</td>
<td>6(25%)</td>
</tr>
<tr>
<td>Altered sensorium</td>
<td>5(20.8%)</td>
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<tr>
<td>Hematuria</td>
<td>4(16.7%)</td>
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<tr>
<td>Shock</td>
<td>4(16.7%)</td>
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**TABLE 2: LABORATORY CHARACTERISTICS AND CT IMAGING**

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<td>8(33%)</td>
</tr>
<tr>
<td>Leukocytosis (white cell count&gt;10000/mm³)</td>
<td>22(83.3%)</td>
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<tr>
<td>Thrombocytopenia (Platelet count&lt;100000/mm³)</td>
<td>5(20.8%)</td>
</tr>
<tr>
<td>Hyponatremia (sodium&lt;135 meq/L)</td>
<td>4(16.7%)</td>
</tr>
<tr>
<td>Azotemia (serum creatinine&gt;2.5mg%)</td>
<td>7(29.2%)</td>
</tr>
<tr>
<td>Hypoalbuminemia (serum albumin&lt;3 gm%)</td>
<td>4(16.7%)</td>
</tr>
</tbody>
</table>

**CT Classification**

<table>
<thead>
<tr>
<th>Class</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>2(8.3%)</td>
</tr>
<tr>
<td>Class II</td>
<td>15(62.5%)</td>
</tr>
<tr>
<td>Class IIIa</td>
<td>4(16.7%)</td>
</tr>
<tr>
<td>Class IIIb</td>
<td>2(8.3%)</td>
</tr>
<tr>
<td>Class IV</td>
<td>1(4.2%)</td>
</tr>
</tbody>
</table>

FIGURE 1: CT SHOWING EPN CLASS 3B RIGHT SIDE

FIGURE 2: CT SHOWING CLASS 4 EPN

FIGURE 3: CT SHOWING EPN WITH URETERIC CALCULI
spite antibiotics may need one form of surgical care.

REFERENCES

INTRODUCTION

Pneumonia is one of the leading causes of morbidity and mortality in the children in the age group 60 days – 60 months. It is found that pneumonia contributes to 1.9 million deaths every year (1).

WHO Statistics for the year 2000 estimates that about two thirds of the deaths due to pneumonia were seen in ten countries and was found to be maximum in India (2). About 20% of the pneumonia deaths in the world are found to occur in India, which amounts to 370,000 deaths in children in a year (3).

It is found that about 13% of deaths occur due to pneumonia in India. Pneumonia attributes to about 24% of the national burden of diseases in India. Previous hospital based studies have found that pneumonia constitutes 20-30% of admissions in the age group of under five years.

The burden and mortality due to pneumonia in referral hospitals might appear to be the “TIP OF THE ICEBERG” since most of the deaths may occur before they come to the hospitals. However, now with increasing health awareness among the people and improvement in 108 & referral services, more number of pneumonia cases tends to reach the tertiary care hospitals (4).

Hence, knowing the incidence, clinical profile of pneumonia in a tertiary care hospital will reflect the burden in the community and identifying the risk factors for mortality in the children aged 60 days to 60 months will help in optimal utilization of the resources and ensure adequate management of these children and will help in reducing the morbidity and mortality due to pneumonia.

MATERIAL AND METHODS:

1. Hospital based prospective observational study.
2. Case control study for analysis of risk factors for the mortality in pneumonia.

STUDY POPULATION:

All Children diagnosed as pneumonia in 60 days to 60 months admitted in Department of Pediatrics, Mahatma Gandhi Memorial Government Hospital & K.A.P. Viswanatham Government Medical College, Puthur, Tiruchirappalli - 620017

INCLUSION CRITERIA:

All Children in the age group 60 days – 60 months with...
pneumonia as defined by WHO i.e.,
* Fever < 5 days
* Age specific tachypnea with or without lung signs (wheeze / crepitations) i.e.
> 50 breaths / min in 2-11 months
>40 breaths / min in 12 – 60 months
Were diagnosed as pneumonia patients and followed up during the course of treatment.

**EXCLUSION CRITERIA:**
Those Children with
Hydrocarbon Pneumonia,
Tuberculosis pneumonia,
Aspiration Pneumonia,
Bronchial asthma,
WALRI – wheeze associated LRI,
Bronchiolitis
The children of those parents who did not give consent to undergo the study

**STUDY DESIGN:**
The study protocol was approved by Institutional research Committee including ethical clearance.

**DATA COLLECTED:**
Pro-forma was formulated and the following details were recorded. The host characteristics namely age ranging from 60 days to 60 months, sex was recorded thus excluding the young infants as per IMNCI Norms.

Details about birth weight and Dietary history was recorded. History regarding the initiation of breast feeding and addition of top feeds was noted. An infant who go only breast feeding till the age of 6 months was taken as exclusively Breast Feed. Lack of exclusive breast feeding was defined as addition of any top feed in the first 6 months of life. Bad child rearing practices like giving bottle feeding was noted. Immunization status was assessed by asking the patients about the immunization given before and verifying with the records they have. The contact history with tuberculosis was enquired and noted. Details like Family history of bronchitis, history of passive smoking, overcrowding, large family size and socio-economic status according to Modified Kuppusamy scale was noted.

Details regarding preceding history of Upper Respiratory Tract Infections, Otitis Media, pyoderma, duration of antibiotic therapy prior to admission – oral / parenter al and past history of Measles within last 3 months was recorded.

Clinical Features like Fever (inF) ,Respiratory Rate (RR) / min, Work of breathing noted by chest in drawing – both sub-costal and inter-costal retractions, grunting, flaring of alae nasi, presence of wheeze, crepitations, cyanosis, lethargy, irritability, refusal of feeds, altered level of consciousness (AVPU scale), dehydration, shock as defined by PALS guidelines [7], sepsis, meningitis, abdominal pain and convulsions were looked for and recorded. SpO2 was recorded in room air and the need for ventilation was noted.

Presence of co-morbid conditions like congenital heart disease confirmed by echocardiogram , muscle disorders, Anaemia, Vitamin A deficiency was noted. Nutritional status was assessed by recording the weight and assessing the Z score as per WHO reference charts. [8] Morbidity in the form of Duration of PICU (Pediatric Intensive care unit) stay and total duration of hospital stay was noted.

The study subjects were classified as Pneumonia, Severe pneumonia and Very severe pneumonia according to the severity of presentation at admission as per WHO classification.

They were given treatment as per F-IMNCI protocol [Annexure – F] and followed up till recovery or death.

Discharge was planned when the child showed improvement clinically with reduction in respiratory rate below the age specific cut-off for the age and showed absence of chest retractions or hypoxia and was afebrile for at least 24 hours. Outcomes measured were those recovered and discharged, those died and those with complications like empyema, lung abscess, septicemia and meningitis.

Duration of stay was noted in the death cases and the cause of death like presence of sepsis; hypoxia and respiratory failure were noted. The patients who were had complications like empyema were followed and their mode of treatment like intercostal drainage and the need for prolonged antibiotics were followed up.

Complications of empyema like lung abscess and pleural fibrosis and thickening necessitating the decortica tions were all followed up and noted. Final outcomes measured were those recovered and discharged and those died.

The whole set of study subjects were enrolled in three groups –Pneumonia, Severe Pneumonia, Very Severe Pneumonia as per WHO classification and their clinical profile and risk factors for mortality were analyzed for all the three study groups of pneumonia and compared.

**RESULTS:**
Total cases of pneumonia constituted about 4.9% of the hospital admissions in the study period. During the study period between August 2012 and September 2014,
FLOW CHART OF STUDY SUBJ ECTS

there were a total of 3600 hospital admissions.
Overall, 15 out of 178 total pneumonia cases died
with a case fatality rate of 8.47%. For the 15 deaths, 30 dis-
charged patients were taken as controls and risk factors for
mortality were analyzed.

OUTCOMES AND THE SEVERITY OF
PNEUMONIA:
The case fatality rate for total pneumonia cases was 8.42%.

Very severe pneumonia had a significant risk of
mortality of 20.31%
(P-Value <0.01). (table-2)

CASE FATALITY RATES AMONG VARIOUS
SEVERITY OF PNEUMONIA:
Kindly Refer to Table 2.

So, the case fatality rate was significantly high among the
very severe pneumonia
Group. (P-Value < 0.01)

RISK FACTORS FOR MORTALITY AMONG
PNEUMONIA CASES:

15 deaths were considered as cases with 2 controls
for each case. Every 5th case discharged was taken as their
controls – a total of 30 controls considered and statistically
analyzed.

It was found that the highly significant risk fac-
tors for mortality were age < 1 year especially 2-6 months,
female sex, presence of wheeze, grunting, chest retractions,
RR >70/ min, altered level of consciousness, hypoxia spo2
< 80% in room air at admission, presence of shock, sepsis,
TABLE: 1. PROFILE OF PNEUMONIA CASES

<table>
<thead>
<tr>
<th>S. No</th>
<th>Content</th>
<th>No. of Pneumonia</th>
<th>Severe</th>
<th>Very Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Preceding URI</td>
<td>25 (62.5)</td>
<td>32 (43.3)</td>
<td>45 (70.3)</td>
</tr>
<tr>
<td>2.</td>
<td>Preceding Pyoderma</td>
<td>0(0)</td>
<td>0(0)</td>
<td>4 (6.25)</td>
</tr>
<tr>
<td>3.</td>
<td>Preceding Measles</td>
<td>0(0)</td>
<td>2 (5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>4.</td>
<td>Prior Antibiotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Oral</td>
<td>5 (12.5)</td>
<td>8 (20)</td>
<td>15 (23.4)</td>
</tr>
<tr>
<td></td>
<td>b. Parenteral</td>
<td>0(0)</td>
<td>0(0)</td>
<td>4 (6.25)</td>
</tr>
<tr>
<td></td>
<td>c. None</td>
<td>35 (81.5)</td>
<td>66 (89.1)</td>
<td>45 (70.3)</td>
</tr>
<tr>
<td>5.</td>
<td>Lack of Breast feeding</td>
<td>7 (17.5)</td>
<td>26 (65)</td>
<td>40 (62.5)</td>
</tr>
<tr>
<td>6.</td>
<td>Exclusive Breast feed</td>
<td>33 (83.5)</td>
<td>48 (45)</td>
<td>24(38.5)</td>
</tr>
<tr>
<td>8.</td>
<td>Low Socio Economic Status Class (4 &amp; 5)</td>
<td>10(25)</td>
<td>34(46)</td>
<td>46(71.9)</td>
</tr>
<tr>
<td>7.</td>
<td>Not Fully Immunized</td>
<td>3(7.5)</td>
<td>12(16.2)</td>
<td>28(43.5)</td>
</tr>
<tr>
<td>8.</td>
<td>Preterm</td>
<td>1(2.5)</td>
<td>6(8.1)</td>
<td>18(28.1)</td>
</tr>
<tr>
<td>9.</td>
<td>IUGR</td>
<td>2(0.18)</td>
<td>3(4.1)</td>
<td>9(14)</td>
</tr>
<tr>
<td>10.</td>
<td>CXR Changes</td>
<td>28(70)</td>
<td>73(98.6)</td>
<td>64(100)</td>
</tr>
<tr>
<td>11.</td>
<td>CRP Positivity</td>
<td>28(70)</td>
<td>60(81)</td>
<td>62(96.87)</td>
</tr>
<tr>
<td>12.</td>
<td>Blood /Pus/C/S:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Staphylococcus aureus</td>
<td>0(0)</td>
<td>2(3.1)</td>
<td>8(9.4)</td>
</tr>
<tr>
<td></td>
<td>b. Streptococcus pneumonia</td>
<td>0(0)</td>
<td>0(0)</td>
<td>5(7.8)</td>
</tr>
<tr>
<td></td>
<td>c. Pseudomonas</td>
<td>0(0)</td>
<td>0(0)</td>
<td>2(3.1)</td>
</tr>
</tbody>
</table>

TABLE: 2. CASE FATALITY RATE AMONG PNEUMONIA CASES

<table>
<thead>
<tr>
<th>No. Of Pneumonia Patients</th>
<th>No. Of Severe Pneumonia Patients</th>
<th>No. Of Very Severe Pneumonia Patients</th>
<th>Total Pneumonia Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>Death (%)</td>
<td>Cases</td>
<td>Death (%)</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>74</td>
<td>2</td>
</tr>
<tr>
<td>64</td>
<td>13</td>
<td>178</td>
<td>15</td>
</tr>
</tbody>
</table>

\( t = 27.89, p = 0.001, SD = 38.36 \)

convulsions and weight for age <-2 Z score, WHO type very severe pneumonia at admission and the need for assisted ventilation. (P-Value<0.01)

Analysing the risk factors by univariate analysis and obtaining odds ratio and p-value it was seen that those with significant odds ratio risk in order were(table-3)

The need for ventilation (OR- 2.72), Presence of grunt (OR – 2.23), Altered level of consciousness (P / U) (OR- 2.17), Age 2-6 months (OR-2.12), Chest retractions (OR -2.12), Convulsions (OR - 2.12).

**DISCUSSION**

The main strength of the study is that it is done over a period of one year thus excluding the seasonal variations and it is done as a prospective study.
### Table: 3. Risk Factors for Mortality Among Pneumonia Cases

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>DISCHARGED (n=30)</th>
<th>DEATH (n=15)</th>
<th>P Value</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 2-6 m</td>
<td>No (%)</td>
<td>No (%)</td>
<td>P Value</td>
<td></td>
</tr>
<tr>
<td>Age ≤12 m</td>
<td>9 (30.00)</td>
<td>5 (33.33)</td>
<td>0.002</td>
<td>2.12</td>
</tr>
<tr>
<td>Female sex</td>
<td>9 (30.00)</td>
<td>9 (60.00)</td>
<td>0.001</td>
<td>1.78</td>
</tr>
<tr>
<td>Wheeze</td>
<td>11 (36.67)</td>
<td>13 (86.66)</td>
<td>0.001</td>
<td>1.78</td>
</tr>
<tr>
<td>Grunting</td>
<td>0 (00.00)</td>
<td>13 (86.66)</td>
<td>&lt;0.01</td>
<td>2.23</td>
</tr>
<tr>
<td>Chest retractions</td>
<td>25 (83.33)</td>
<td>15 (100.0)</td>
<td>0.002</td>
<td>2.12</td>
</tr>
<tr>
<td>RR ≥ 70 / min</td>
<td>2 (06.67)</td>
<td>13 (86.66)</td>
<td>0.003</td>
<td>1.97</td>
</tr>
<tr>
<td>Altered consciousness (p/u)</td>
<td>0 (00.00)</td>
<td>12 (80.00)</td>
<td>&lt;0.01</td>
<td>2.17</td>
</tr>
<tr>
<td>Sp O₂ IN ROOM AIR &lt; 80%</td>
<td>0 (00.00)</td>
<td>13 (86.66)</td>
<td>&lt;0.01</td>
<td>1.78</td>
</tr>
<tr>
<td>Shock</td>
<td>0 (00.00)</td>
<td>14 (93.33)</td>
<td>&lt;0.01</td>
<td>1.79</td>
</tr>
<tr>
<td>Sepsis</td>
<td>4 (13.33)</td>
<td>12 (80.00)</td>
<td>0.003</td>
<td>1.67</td>
</tr>
<tr>
<td>Convulsions</td>
<td>0 (00.00)</td>
<td>8 (53.33)</td>
<td>&lt;0.01</td>
<td>2.12</td>
</tr>
<tr>
<td>Need for assisted ventilation</td>
<td>0 (00.00)</td>
<td>14 (93.33)</td>
<td>&lt;0.01</td>
<td>2.72</td>
</tr>
<tr>
<td>C.H.D.</td>
<td>2 (06.67)</td>
<td>5 (33.33)</td>
<td>0.001</td>
<td>1.67</td>
</tr>
<tr>
<td>Weight for age &lt; -2 Z score</td>
<td>4 (13.33)</td>
<td>13 (86.66)</td>
<td>&lt;0.05</td>
<td>1.56</td>
</tr>
<tr>
<td>Very severe pneumo-</td>
<td>9 (30.00)</td>
<td>13 (86.66)</td>
<td>0.005</td>
<td>1.36</td>
</tr>
<tr>
<td>Measles</td>
<td>2 (01.22)</td>
<td>0 (00.00)</td>
<td>0.031</td>
<td>1.03</td>
</tr>
</tbody>
</table>

**Table: 3**  
Figures in ( ) represent percentage, CHD implies Congenital Heart Disease, m- month, p/u – pain or unresponsiveness in AVPU Scale.

Hence, the need for assisted ventilation was the single independent risk factor for mortality with highest odds ratio of 2.72, followed by grunt and altered consciousness.

**Risk factors for developing very severe pneumonia:**

Young age predisposes to very severe pneumonia. Both Pneumonia (47.5%) and severe pneumonia (48.7%) were found to be (statistically) significantly more in 24-60 months age and very severe pneumonia was found to be significantly more in the 2-6 months with increasing age (table-1), the severity of pneumonia also decreases as comparable to other studies [11].

Males were more prone for very severe pneumonia in our study. But, female sex increases risk of mortality due to pneumonia (table-1). 3. 70% of the very severe pneumonia group had history of preceding URTI and 6.25% had history of pyoderma in them. 30% of very severe pneumonia had history of prior antibiotics before admission. Lack of breast feeding, poor socioeconomic status, lack of immunization and preterm, intra uterine growth retardation had higher risk of developing very severe pneumonia (table-1).

CRP positivity, Blood culture positivity, Chest X-ray positivity was observed more in very severe pneumonia cases. The severity of pneumonia correlates with higher degree of raise in temperature.

The degree of tachypnea at admission correlates with the severity of pneumonia. Comparable to other stud-
ies [10]. The cut off for respiratory rate may vary with nutritional status and a malnourished child may show a very severe presentation even at a lower rate [14]. A study from a Gambhia suggested that “lowering the limiting values for respiratory rates by 5/min in malnourished children is needed than in well-nourished children” [14]

Severe degree of hypoxia<80% correlates with the very severe pneumonia. Some degree of altered level of consciousness as evidenced by Pain unresponsiveness is seen significantly high in very severe pneumonia cases comparable to other studies. [11]

Nutritional status does have role in contributing to the severity as well as mortality of pneumonia. Z score < -2 has a highly significant association with very severe pneumonia comparable to other Studies. [11]

Duration of hospital stay and its morbidity is increased with very severe pneumonia group. The complications like shock (95.45%), Sepsis (94.29%), convulsions (100%) and empyema (100%) and the need for ventilation (95%) were found more in the very severe pneumonia group as comparable to other studies.

The case fatality rate was significantly high among the very severe pneumonia group.

Sehgal et al [5] from Delhi have determined “the association of severity of pneumonia with case fatality rate which varied from 0-47% in children with pneumonia to the very severe group as per WHO classification.”

Mortality risk decreases with increasing age. The case fatality rate was (highly) significantly more in the infant<1yr especially 2-6 months age group.

Thougs males were prone to develop very severe pneumonia, female sex increased the risk of mortality comparable to other studies [11].

Most of deaths in a tertiary care hospital tend to occur within a short time after admission. 53.33% and 20% of total deaths died within 24 hrs and 24-48 hours of hospital stay respectively.

Poor Nutritional status has a correlation with pneumonia deaths. Z score had significantly high risk for mortality and Z <-2 S.D had highly significant risk for mortality due to pneumonia comparable to other studies which have found that “Malnutrition was a significant contributory factor for mortality in other studies and - Z score was strikingly associated with mortality in children <24 months age.” [5,6,9,11]

The need for assisted ventilation was the single independent risk factor for mortality with highest odds ratio of 2.72, followed by grunt and altered consciousness. The need for assisted ventilation was independent significant risk for mortality and 47-68% of the children who died required assisted ventilation much higher than the previous reported studies[12] [13]

It was found that the highly significant risk factors for mortality were age < 1year especially 2- 6 months, female sex, presence of wheeze, grunting, chest retractions, RR >70/mi, altered level of consciousness, hypoxia spo2 < 80% in room air at admission, presence of shock, sepsis, convulsions and weight for age <-2 Z score, and the need for assisted ventilation.

Hence Categorization of the patients into pneumonia, severe pneumonia and very severe pneumonia at the time of admission and identifying the at risk factors will help in anticipating the complications and tackling them and reducing the mortality. Recommendations of the study are that those at the primary health care level should pick up those pneumonia children with risk factors for developing very severe pneumonia and also those with risk factors for mortality and refer them to a tertiary care at the earliest.

Those at the tertiary care should anticipate complications in those with risk factors for mortality and aggressively treat them and hence shall reduce the mortality.

**CONCLUSION:**

Proper identification of the risk factors for pneumonia mortality will help in recognizing children at risk, triaging them and treating them aggressively with optimal utilization of limited resources.

This will help in reducing the morbidity and mortality due to pneumonia and help in achieving the “Millennium Development Goal 4 of reducing the under-five mortality”

**REFERENCES**

4. Djelantik IG, Gessner BD, Sutanto A, Steinhoff


INTRODUCTION

Cerebrovascular disorders ranks among the leading cause of death and disability. Stroke has been defined as a rapidly developing signs of focal (or global) disturbance of cerebral function with symptoms lasting for ≥ 24 hours, or leading to death with no apparent cause other than vascular origin. Of the entire stroke population, 20-30% are left with communication deficits – Aphasia. Knowledge of recovery and rehabilitation is needed to assess prognosis and selecting appropriate rehabilitation methods.

Knowledge of recovery and rehabilitation is based on studies in post traumatic patients in whom the outcome is more favourable than in patients whose aphasia is associated with vascular etiology. Studies on spontaneous recovery pattern of aphasia in stroke are limited. In this study conducted on acute cerebrovascular accident patients admitted to the institute of internal medicine, Rajiv Gandhi Government General Hospital, Chennai, the spontaneous recovery pattern in stroke was studied with Western Aphasia Battery method at repeated intervals over a period of 6 months.

METHODS AND MATERIALS

This is a descriptive, cross sectional prospective study design carried out on acute cerebrovascular accident patients admitted to the institute of internal medicine, Rajiv Gandhi Government General Hospital, Chennai during 2003-05. Right handed individuals fulfilling the standard criteria for handedness who sustained infarction in the left hemisphere as confirmed by a CT scan who have tamil as their mother tongue and who have normal hearing threshold and willing to come for regular follow up were included in the study. Patients with pre-existing language or speech disorder, psychiatric disease, previous cerebrovascular accident, aphasia secondary to head trauma, neoplasm or structural brain disease, equivocal handedness or with evidence of right hemisphere disease were excluded from the study. Detailed history was taken and clinical examination done. CT scan of brain was taken on the day of admission and after 4 weeks. Language function was assessed by tamil version of the modified western aphasia battery at the end of 4th week(T1) and repeated at 8th week (T2), 16th week (T3) and at 24th week (T4). In the test battery, four language parameters namely spontaneous speech (fluency and information content), auditory verbal comprehension, repetition and naming were tested to calculate the aphasia quotient (AQ) which had a maximum score of 100.

Statistical analysis used : SPSS software.

Results : Of the 30 subjects, 11 had global aphasia, 9 had Broca’s aphasia, 5 had Wernicke’s aphasia, 3 had conduction aphasia and 2 patients had transcortical motor aphasia. Out of the 11 patients with global aphasia, the recovery in 6 months was limited. 3 patients showed good improvement and evolved into Broca’s aphasia and this was statistically significant (p value<0.001) Patients with conduction aphasia and transcortical motor aphasia had excellent recovery.

Conclusion : There was good correlation between the anatomical location of the lesion and CT scan. Hypertension and diabetes is associated with larger infarcts (Global aphasia) and has poor recovery. Within the groups showing recovery, significant improvement was noted within 8th week of onset of stroke. Maximum recovery was noted in patients with transcortical motor and conduction aphasia.

Key words : Aphasia, Recovery pattern, Cerebrovascular accident.
tion done. CT scan of brain was taken on the day of admission and after 4 weeks. Language function was assessed by tamil version of the modified western aphasia battery at the end of 4th week (T1) and repeated at 8th week (T2), 16th week (T3) and at 24th week (T4). In the test battery, four language parameters namely spontaneous speech (fluency and information content), auditory verbal comprehension, repetition and naming were tested to calculate the aphasia quotient (AQ) which had a maximum score of 100. Subscores were divided into 20 points for spontaneous speech, 10 points for auditory verbal comprehension, 10 points for repetition, 10 points for naming to attained a maximum score of 50 which was then multiplied by two to get the aphasia quotient. Higher scores indicated better outcomes and normal speech.

Scoring for spontaneous speech – Fluency, grammatical competence and paraphasias

RESPONSE SCORE: TABLE 1:

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No response</td>
<td>0</td>
</tr>
<tr>
<td>Meaningless utterance</td>
<td>1</td>
</tr>
<tr>
<td>Utterance used with inflection of language</td>
<td>2</td>
</tr>
<tr>
<td>Occasional correct word</td>
<td>3</td>
</tr>
<tr>
<td>Telegraphic sentences</td>
<td>4</td>
</tr>
<tr>
<td>Moderate fluency, a few words together</td>
<td>5</td>
</tr>
<tr>
<td>Predominantly sentences</td>
<td>6</td>
</tr>
<tr>
<td>Fluent jargon</td>
<td>7</td>
</tr>
<tr>
<td>Circumlocutory fluent speech</td>
<td>8</td>
</tr>
<tr>
<td>Slight word finding difficulty</td>
<td>9</td>
</tr>
<tr>
<td>Normal fluency without hesitation or word finding</td>
<td>10</td>
</tr>
</tbody>
</table>

INFORMATION CONTENT: TABLE 2

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No information</td>
<td>0</td>
</tr>
<tr>
<td>Incomplete responses only</td>
<td>1</td>
</tr>
<tr>
<td>Correct response to any 1 item</td>
<td>2</td>
</tr>
<tr>
<td>Correct response to any 2 items</td>
<td>3</td>
</tr>
<tr>
<td>Correct response to any 3 items</td>
<td>4</td>
</tr>
<tr>
<td>Correct response to any 3 of the first 6 items plus some response to the picture</td>
<td>5</td>
</tr>
<tr>
<td>Correct response to any 4 of the first 6 item plus some response to the picture</td>
<td>6</td>
</tr>
</tbody>
</table>

Auditory verbal comprehension was measured in 3 ways. First, patient was asked yes or no questions of graded complexity involving personal matters and abstract relationships. If it is difficult, then eye closure for yes was established. 3 marks were given for each of the 20 questions making a total of 60 marks.

Patient was then asked to point 6 different real objects, drawn objects, forms, letters, numbers, furnitures, body parts, fingers and colours. Patient was told to identify 3 left and 3 right side parts. One mark was given to each making a total of sixty. Finally, the patient was then asked to perform sequentially ordered auditory commands with 3 objects pointing to each other or placing them in relation to each other. Total score of 8 was given and graded depending
on the complexity of commands. The total subscores were added to make 200 which was divided by 20 to translate it into a 10 point scale.

Repetition was tested with words, numbers and increasingly complex sentences of low and high probability. Marks were allotted to the words and sentences. Final score was adjusted to a 10 point scale.

Naming was tested by (i) asking the patient to name 20 objects (60 marks), (ii) asking the patient to name the animals he knew in an uninterrupted fashion for 1 minute (20 marks), (iii) asking the patient to complete a sentence. 5 sentences were given (10 marks), (iv) asking the patient to answer 5 questions in a single word response (10 marks). Final score was re-adjusted to a 10 point scale. Aphasia quotient was then calculated and then compared.

Reading, writing, spelling, calculation, drawing and block

<table>
<thead>
<tr>
<th>TABLE 1: CRITERIA FOR CLASSIFICATION OF APHASIA</th>
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</thead>
<tbody>
<tr>
<td>Fluency</td>
</tr>
<tr>
<td>Global</td>
</tr>
<tr>
<td>Broca</td>
</tr>
<tr>
<td>Wernicke</td>
</tr>
<tr>
<td>Conduction</td>
</tr>
<tr>
<td>Anomic</td>
</tr>
<tr>
<td>Transcortical Motor</td>
</tr>
<tr>
<td>Transcortical sensory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2 : PROGNOSTIC GRADING OF VARIOUS APHASIAS AND TEST SCORES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
</tr>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>TABLE 3 : AGE AND TYPE OF APHASIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>30-40</td>
</tr>
<tr>
<td>41-50</td>
</tr>
<tr>
<td>51-60</td>
</tr>
<tr>
<td>61-70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 4: SEX AND TYPE OF APHASIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
designing were not tested in the study. Prognostic grading of various aphasias were done using test scores (AQ).

CRITERIA FOR APHASIA:
Refer to Table 3.

Statistical analysis was done using SPSS software. Ethical committee approval was obtained. Written informed consent was obtained from the study subjects.

RESULTS
The total number of patients included in the study was 30. Out of this, 11 had global aphasia, 9 had Broca’s aphasia, 5 had Wernicke’s aphasia, 3 had conduction aphasia and 2 patients had transcortical motor aphasia. Mean age of the patients was 50.

1. Age and types of aphasia:
Refer to Table 3.

2. Sex and type of aphasia
Refer to Table 4.
Majority of patients with aphasia were smokers. 14 patient had hypertension and 10 had type 2 diabetes mellitus.

3. FACTORS OF STROKE AND TYPES OF APHASIA
Refer to Table 5.
Out of the 11 patients with global aphasia, the recovery in 6 months was limited.3 patients showed good improvement and evolved into Broca’s aphasia and this was statistically significant. (p value < 0.001) Patients with conduction aphasia and transcortical motor aphasia had excellent recovery. *TCM – Transcortical Motor

DISCUSSION
Several studies have focussed on recovery pattern of aphasia in stroke patients but there is no uniformity in these studies. For some people, aphasia will be temporary, resolving in the first few days or even hours after their stroke or brain injury. Others will have a long recovery of months or years. In our study, for patients with Broca’s aphasia, 2 out of 9 had excellent recovery, 5 out of 9 had good recovery and 2 out of 9 had poor recovery. Patients with conduction aphasia and patients with transcortical motor aphasia had excellent recovery. Wernicke’s aphasia recovery rate was fair whereas global aphasia showed poor recovery in general. Patients who had hypertension and diabetes developed larger infarcts (Global aphasia) and showed poor recovery. Within the groups showing recovery, significant improvement was noted within 8th week of onset of stroke. No distinction between aphasia type in different age group could be made as too few patients were present in each category to make a meaningful correlation.

Patients with global aphasia and Wernicke’s aphasia showed poor prognosis in overall aphasia quotient, but in the indi-

<table>
<thead>
<tr>
<th>RISK FACTOR</th>
<th>N</th>
<th>Global</th>
<th>Broca</th>
<th>Wernicke</th>
<th>Conduction</th>
<th>TCM</th>
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</thead>
<tbody>
<tr>
<td>HTN</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>DM</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
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<td>8</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Alcoholic</td>
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<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Case no.</td>
<td>T1(4weeks) (%)</td>
<td>T2(8weeks) (%)</td>
<td>T2(16weeks) (%)</td>
<td>T2(24weeks) (%)</td>
<td>Initial aphasia</td>
<td>Final Evolution</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1</td>
<td>2.8</td>
<td>3.6</td>
<td>4.2</td>
<td>4.2</td>
<td>Global</td>
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<tr>
<td>2</td>
<td>2.2</td>
<td>2.4</td>
<td>2.6</td>
<td>2.6</td>
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<td>Global</td>
</tr>
<tr>
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<td>2.2</td>
<td>3.6</td>
<td>4.0</td>
<td>4.0</td>
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<td>Global</td>
</tr>
<tr>
<td>4</td>
<td>3.0</td>
<td>8.0</td>
<td>16.0</td>
<td>18.0</td>
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<td>Global</td>
</tr>
<tr>
<td>5</td>
<td>4.8</td>
<td>5.6</td>
<td>8.6</td>
<td>10.0</td>
<td>Global</td>
<td>Global</td>
</tr>
<tr>
<td>6</td>
<td>2.6</td>
<td>3.8</td>
<td>6.2</td>
<td>9.8</td>
<td>Global</td>
<td>Global</td>
</tr>
<tr>
<td>7</td>
<td>8.8</td>
<td>36.4</td>
<td>48</td>
<td>62</td>
<td>Global</td>
<td>Broca</td>
</tr>
<tr>
<td>8</td>
<td>13.4</td>
<td>38.6</td>
<td>54</td>
<td>60</td>
<td>Global</td>
<td>Broca</td>
</tr>
<tr>
<td>9</td>
<td>13.6</td>
<td>38.8</td>
<td>56</td>
<td>64</td>
<td>Global</td>
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<td>4.8</td>
<td>5.8</td>
<td>8.8</td>
<td>12</td>
<td>Global</td>
<td>Global</td>
</tr>
<tr>
<td>11</td>
<td>4.8</td>
<td>5.6</td>
<td>8.6</td>
<td>12</td>
<td>Global</td>
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**TABLE 4.1 BROCA’S APHASIA**

<table>
<thead>
<tr>
<th>Case no.</th>
<th>T1(4weeks) (%)</th>
<th>T2(8weeks) (%)</th>
<th>T2(16weeks) (%)</th>
<th>T2(24weeks) (%)</th>
<th>Initial aphasia</th>
<th>Final Evolution</th>
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</thead>
<tbody>
<tr>
<td>12</td>
<td>60.2</td>
<td>70.4</td>
<td>70.8</td>
<td>95.2</td>
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<td>TCM</td>
</tr>
<tr>
<td>13</td>
<td>36</td>
<td>48</td>
<td>49</td>
<td>52</td>
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<td>Broca</td>
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<tr>
<td>14</td>
<td>26</td>
<td>33.2</td>
<td>42.2</td>
<td>50</td>
<td>Broca</td>
<td>Broca</td>
</tr>
<tr>
<td>15</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>28</td>
<td>Broca</td>
<td>Broca</td>
</tr>
<tr>
<td>16</td>
<td>56.4</td>
<td>65.2</td>
<td>70</td>
<td>90.4</td>
<td>Broca</td>
<td>TCM</td>
</tr>
<tr>
<td>17</td>
<td>22</td>
<td>31</td>
<td>40</td>
<td>50</td>
<td>Broca</td>
<td>Broca</td>
</tr>
<tr>
<td>18</td>
<td>21</td>
<td>23</td>
<td>25</td>
<td>28</td>
<td>Broca</td>
<td>Broca</td>
</tr>
<tr>
<td>19</td>
<td>22</td>
<td>31</td>
<td>42</td>
<td>52.2</td>
<td>Broca</td>
<td>Broca</td>
</tr>
<tr>
<td>20</td>
<td>22</td>
<td>33</td>
<td>46</td>
<td>54</td>
<td>Broca</td>
<td>Broca</td>
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</table>

**TABLE 4.2 CONDUCTION APHASIA**

<table>
<thead>
<tr>
<th>Case no.</th>
<th>T1(4weeks) (%)</th>
<th>T2(8weeks) (%)</th>
<th>T2(16weeks) (%)</th>
<th>T2(24weeks) (%)</th>
<th>Initial aphasia</th>
<th>Final Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>81.7</td>
<td>88</td>
<td>92.8</td>
<td>94</td>
<td>Conduction</td>
<td>Conduction</td>
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<tr>
<td>22</td>
<td>58.4</td>
<td>72</td>
<td>92</td>
<td>92</td>
<td>Conduction</td>
<td>Anomic</td>
</tr>
<tr>
<td>23</td>
<td>53.4</td>
<td>68</td>
<td>86</td>
<td>92</td>
<td>Conduction</td>
<td>Anomic</td>
</tr>
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</table>

**TABLE 4.3 WERNICKE’S APHASIA**

<table>
<thead>
<tr>
<th>Case no.</th>
<th>T1(4weeks) (%)</th>
<th>T2(8weeks) (%)</th>
<th>T2(16weeks) (%)</th>
<th>T2(24weeks) (%)</th>
<th>Initial aphasia</th>
<th>Final Evolution</th>
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</thead>
<tbody>
<tr>
<td>24</td>
<td>24.6</td>
<td>35</td>
<td>36</td>
<td>36</td>
<td>Wernicke</td>
<td>Wernicke</td>
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<td>25</td>
<td>20</td>
<td>26</td>
<td>26.8</td>
<td>34</td>
<td>Wernicke</td>
<td>Wernicke</td>
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<tr>
<td>26</td>
<td>20</td>
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<td>26.8</td>
<td>36</td>
<td>Wernicke</td>
<td>Wernicke</td>
</tr>
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<td>27</td>
<td>22</td>
<td>26</td>
<td>26</td>
<td>28</td>
<td>Wernicke</td>
<td>Wernicke</td>
</tr>
<tr>
<td>28</td>
<td>20</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>Wernicke</td>
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</table>
### TABLE 4.4 TRANSCORTICAL MOTOR APHASIA TEST SCORES

<table>
<thead>
<tr>
<th>Case no.</th>
<th>T1 (4 weeks)</th>
<th>T2 (8 weeks)</th>
<th>T2 (16 weeks)</th>
<th>T2 (24 weeks)</th>
<th>Initial aphasia</th>
<th>Final Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>50</td>
<td>64</td>
<td>78</td>
<td>92</td>
<td>TCM</td>
<td>Normal</td>
</tr>
<tr>
<td>30</td>
<td>50</td>
<td>66</td>
<td>80</td>
<td>94</td>
<td>TCM</td>
<td>Normal</td>
</tr>
</tbody>
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### TABLE 5 PROGNOSIS OF VARIOUS APHASIAS

<table>
<thead>
<tr>
<th>Aphasia type at presentation</th>
<th>N</th>
<th>Poor (0-25)</th>
<th>Fair (26-50)</th>
<th>Good (51-75)</th>
<th>Excellent (76-100)</th>
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</thead>
<tbody>
<tr>
<td>Global</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broca</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wernicke</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduction</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcortical Motor</td>
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</table>

### TABLE 6 INITIAL SEVERITY AND OUTCOME

<table>
<thead>
<tr>
<th>Type of aphasia</th>
<th>Initial AQ (%)</th>
<th>Final AQ (%)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1 (4 weeks)</td>
<td>T4 (24 weeks)</td>
<td></td>
</tr>
<tr>
<td>Global (n=11)</td>
<td>2.2 – 13.6</td>
<td>2.6-64</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>Mean 5.72</td>
<td>Mean 23.5</td>
<td></td>
</tr>
<tr>
<td>Broca (n=9)</td>
<td>21 – 60.2</td>
<td>25 – 95.2</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Mean 31</td>
<td>Mean 58</td>
<td></td>
</tr>
<tr>
<td>Wernicke (n=5)</td>
<td>26 – 24.6</td>
<td>28 – 36</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Mean 21</td>
<td>Mean 33</td>
<td></td>
</tr>
<tr>
<td>Conduction (n=3)</td>
<td>58.4 – 81.7</td>
<td>92 – 94</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>Mean 70</td>
<td>Mean 94</td>
<td></td>
</tr>
<tr>
<td>TCM (n=2)</td>
<td>50</td>
<td>92 – 94</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>Mean 50</td>
<td>Mean 94</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 7 EVOLUTION OF APHASIA

<table>
<thead>
<tr>
<th>INITIAL</th>
<th>END STAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global – 11</td>
<td>Global – 8</td>
</tr>
<tr>
<td>Broca – 9</td>
<td>Broca – 7</td>
</tr>
<tr>
<td>Wernicke – 5</td>
<td>Wernicke – 5</td>
</tr>
<tr>
<td>Conduction – 3</td>
<td>Conduction – 1</td>
</tr>
<tr>
<td>TCM – 2</td>
<td>Normal – 2</td>
</tr>
</tbody>
</table>
Individual subscores considerable recovery was noticed in auditory verbal comprehension especially in auditory word recognition for numbers, body parts and objects like coin. Vijayaraghavan and Natarajan et al5 in their study on 16 stroke patients with aphasia also noted this observation. Overall functional communication skill was noted to improve in successive tests.

There was good correlation between the anatomical location of the lesion and CT scan. Separate lesion sites were demonstrated on CT scan for Broca, Wernicke, Conduction and transcortical motor aphasias. The lesion sites were consistent with the Geschwind’s concept of aphasia.

Maximum recovery was noted in patients with transcortical motor and conduction aphasia. Out of the three patients with conduction aphasia, two transformed into anomaia at the end of six months period. Patients with transcortical motor aphasia became normal at the end of test period. Patients with broca’s aphasia showed a fair recovery in overall test period. Two patients out of nine evolved into transcortical motor aphasia. Even though global aphasia showed poor recovery, auditory word recognition was noted to improve to a considerable degree. Three out of eleven patients evolved into broca’s aphasia at the end of six months. Within recovery groups, significant improvement was noted from 8th week of stroke. The initial severity and final outcome correlated significantly.

There was good correlation with the clinic-anatomical location of lesion and computerised tomography scan. Over the past few years, behavioural and neuroimaging studies have shown that rehabilitation interventions can promote neuroplastic changes in aphasic patients that may be associated with the improvement of language functions. Following left hemisphere strokes, the functional reorganization of language in aphasic patients has been proposed to involve both intrahemispheric interactions between damaged left hemisphere and perilesional sites and transcallosal interhemispheric interactions between the lesioned left hemisphere language areas and homotopic regions in the right hemisphere. A growing body of evidence for such reorganization comes from studies using transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS), two safe and noninvasive procedures that can be applied clinically to modulate cortical excitability during post-stroke language recovery.6 Left hemisphere activation has been associated with better language improvement among nonfluent aphasic patients who undergo speech therapy.7 Predictive factors are highly variable making prognosis of aphasia recovery difficult. Recovery of language function in individuals with post-stroke aphasia is associated with a variety of patient and stroke-related indices. Lesion size and initial aphasia severity are the main predictors of aphasia recovery one week after thrombolysis.8 In a study by Pedersen et al. it was observed that stroke related aphasia usually evolves to a less severe form over time.9 Aphasia as the only manifestation of stroke has been reported in around 5.1% cases in a study by Fennis et al.10 Communication screening could also be seen as a part of a more comprehensive cognitive screen. Cognitive screening of all stroke survivors is recommended in some of the clinical guidelines.11,12 An effective communication screen needs to check whether the person is able to understand spoken and written material as well as gestures, facial expressions, and prosody; whether they can communicate their ideas effectively through speech, writing, facial expressions, and gestures; and whether or not their speech is easily understood or demands extra effort from the communication partner to decode. Stroke survivors who demonstrate impairment in the areas of attention and memory will frequently have concomitant communication involvement. The speech pathologist should work with the occupational therapist and the neuropsychologist to minimize the impact of these impairments on communication. In particular, areas such as verbal attention, divided attention, sustained attention, auditory memory, verbal memory, and visual neglect are likely to have a direct impact on communication. As yet, there is little evidence on the efficacy of clinical interventions in this area. Communication impairment occurs in 30-60% of stroke survivors. Despite the potential for improvement and recovery being high, communication impairment in stroke survivors is often related to poorer outcomes. Screening for cognitive and communication impairments is therefore critical to ensure that all patients with a communication impairment are referred to the Speech language pathologist for comprehensive assessment and management. Assessments chosen must be culturally appropriate and provide quantitative as well as qualitative information. Intense therapy over a short amount of time can improve outcomes of speech and language therapy for stroke patients with aphasia.

CONCLUSION

There was good correlation between the anatomical location of the lesion and CT scan. Hypertension and diabetes is associated with larger infarcts (Global aphasia) and has poor recovery. Within the groups showing recovery, significant improvement was noted within 8th week of onset of stroke. Maximum recovery was noted in patients with transcortical motor and conduction aphasia.
REFERENCES


ACKNOWLEDGEMENT

I acknowledge the contribution of Prof. Kamakshi Shanbogue and Prof. V. Natarajan from the Institute of Neurology, RGGH, Chennai for their able guidance in the completion of this study.
INTRODUCTION

Epilepsy and headache are common neurological problems seen in neurological practice. The relationship between headache and epilepsy remains unresolved. In the last century Gowers first advanced the clinical hypothesis of a relationship between epilepsy and migraine. Since the two conditions show a well-recognized clinical, pathophysiological and therapeutic overlap, Neuronal hyperexcitability might explain the comorbidity between headache and epilepsy, such as Na+/K+ ATPase pump impairment, converging on a common final pathway represented by neuronal membrane hyperexcitability, could manifest as either epilepsy or headache/migraine. Spreading depression postulated pathophysiological mechanism of migraine and epileptic seizures may be the link between these two autonomous disorders. An association between migraine and epilepsy has been demonstrated in several studies. But the data are complicated, and the studies have been limited by small numbers. As there are only few studies evaluating the characteristics of headache in patients with epilepsy we have done a study in our centre to analyse headache characteristics in patients with epilepsy.
MATERIALS AND METHODS

STUDY DESIGN: Cross Sectional Descriptive study.

STUDY POPULATION: Patients with epilepsy who have headache either interictally or periictally or both who attended Neurology O.P. Government General Hospital, Chennai during the study period (July 2003 to August 2005) were taken up for the study.

INCLUSION CRITERIA: Patients with epilepsy who have inter ictal headache of >3 months duration antecedent to or after the onset of seizures and Patients with epilepsy who have peri ictal headache

EXCLUSION CRITERIA : Patients with epilepsy who developed sudden onset severe headache, headache with systemic signs such as fever, neck stiffness, cutaneous rash, headache with papilloedema, headache triggered by cough, exertion or valsalva maneuver were excluded from the study. Patients with epilepsy who have either interictal or perictal headaches who did not have any features of exclusion criteria were selected for the study.

DEFINITIONS AND CLASSIFICATIONS

Headache were classified according to international headache society classification (IHS-2)8 and their duration noted in the study. The International classification of Headache disorders, 2nd edition, groups headache disorders into primary and secondary headaches. The four categories of primary headaches include migraine, Tension Type Headache (TTH), Cluster Headache (CH) other Trigeminal Autonomic Cephalalgias (TAC’s) and other primary headaches. There are also eight categories of secondary headache and a third group that includes central and primary causes of facial pain and other headaches. The criteria for primary headaches are clinical and descriptive with a few exceptions not based on etiology.

The classification is hierarchical, allowing diagnosis with varying degrees of specificity, using up to four digits for coding at subordinate levels. The first digit specifies the major diagnostic type e.g. migraine (1). The second digit indicates a subtype within the category, e.g., migraine with aura (1.2) subsequent digits permit more specific diagnosis for some subtypes of headache according to circumstantial requirements, FHM for example could be coded as 1.2.4. In clinical practice patients should receive a diagnosis for each headache type or subtype they currently have. Multiple diagnostic codes should be listed in their order of importance to the patient. For headaches that meet all but one of a set of diagnostic criteria without fulfilling those of another headache disorder there are “probable” subcategories for e.g.: probable migraine (1.6). Headache was categorised into inter ictal, icctal or perictal headache (seizure associated headache) on the basis of its relationship with epilepsy. Patients with interictal headache, who have structural lesions or other recognisable causes such as sinusitis, cervical spine disease were classified as secondary headache as recommended in the International Headache society classification and those without a recognisable cause as having primary headache. All patients in the study were examined clinically for focal neurological deficit. Otorhinolaryngologist and dentist opinion were sought whenever necessary. Patients who had headaches along with the onset of seizures and continued throughout the ictus which resolves with subsidence of seizure activity were classified as ictal headaches or hemiconia epilepta. Peri ictal headaches were subdivided into postictal headache and pre ictal headache based on their relationship with seizures. Patients who have headache just preceding the onset of seizures were classified as preictal headache. Patients who had headaches with varying characteristics and severity which develops within 3 hours of seizure and lasts for less than 72 hours are classified as postictal headaches. Patients who initially had seizures and in whom seizures got controlled with drugs with new onset headache or persistence of precedent headache which are of short duration lasting for 5-10 minutes, severe in intensity stabbing or bounding in nature associated with transient unawareness or incontinence were classified as headache not classified elsewhere. Primary headaches were further analysed based on the frequency and duration of headache episodes. On the basis of frequency they were subdivided into low to moderate frequency headaches. On the basis of duration they were subdivided into shorter duration or longer duration headaches. Headaches were classified according to the predominant headache type if the patient had multiple headache types.

RESULTS AND ANALYSIS

The total number of patients studied were 124. Out of this, the age of patients ranged from 9 to 54 years. The age range and sex distribution of patients within each age range is shown in Table No.1. Males comprised 33% (n=42) and females 66% (n= 82) of the total study population.

SEIZURE TYPES: The most common type of seizures seen were generalised tonic clonic seizures. 42% of patients (n=52) had primary generalised tonic- clonic seizures and 38.7% of patients (n=48) have secondary generalised tonic-clonic seizures. Among 48 patients with 2*GTCS, 27 cases were of simple partial seizures with secondary generalisation and 21 were of complex partial in nature with secondary generalisation (See Table 2). Simple partial seizures were seen in 9 cases and complex partial seizures seen in 14 cases.
### TABLE 1: SHOWING AGE AND SEX DISTRIBUTION OF PATIENTS IN EACH AGE RANGE

<table>
<thead>
<tr>
<th>Age</th>
<th>SEX</th>
<th>No of patients</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>-</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>11-20</td>
<td>10</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>21-30</td>
<td>19</td>
<td>39</td>
<td>46</td>
</tr>
<tr>
<td>31-40</td>
<td>8</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>41-50</td>
<td>4</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>&gt;50 yrs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### TABLE 2: SHOWING TYPE OF SEIZURES SEEN IN HEADACHE PATIENTS

<table>
<thead>
<tr>
<th>Seizure type</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary GTCS</td>
<td>15</td>
<td>37</td>
</tr>
<tr>
<td>Secondary GTCS</td>
<td>19</td>
<td>29</td>
</tr>
<tr>
<td>SPS with 2&quot; GTCS</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>CPS with 2&quot; GTCS</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Simple partial seizure</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Complex partial seizure</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Absence seizure</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 4: SHOWING INTERICTAL HEADACHE SUBTYPES IN EPILEPSY PATIENTS

<table>
<thead>
<tr>
<th>Headache Type</th>
<th>No. of Patients</th>
<th>Male</th>
<th>Female</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>77</td>
<td></td>
<td></td>
<td>94%</td>
</tr>
<tr>
<td>MIGRAINE</td>
<td>45/82</td>
<td></td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>1.1: Migraine without aura</td>
<td>19/45</td>
<td>6</td>
<td>13</td>
<td>42%</td>
</tr>
<tr>
<td>1.2: Migraine with aura</td>
<td>10/45</td>
<td>2</td>
<td>8</td>
<td>22.2%</td>
</tr>
<tr>
<td>1.2.6: Basilar type migraine</td>
<td>1/45</td>
<td>1</td>
<td></td>
<td>2.2%</td>
</tr>
<tr>
<td>1.5.1: Chronic migraine</td>
<td>12/45</td>
<td>3</td>
<td>9</td>
<td>26%</td>
</tr>
<tr>
<td>1.6: Probable migraine</td>
<td>3/45</td>
<td>1</td>
<td>2</td>
<td>6.6%</td>
</tr>
<tr>
<td>TENSION TYPE HEADACHE</td>
<td>25/82</td>
<td></td>
<td></td>
<td>30.4%</td>
</tr>
<tr>
<td>2.1: Infrequent Episodic TTH</td>
<td>9/25</td>
<td>3</td>
<td>6</td>
<td>36%</td>
</tr>
<tr>
<td>2.2: Frequent Episodic TTH</td>
<td>14/25</td>
<td>4</td>
<td>10</td>
<td>56%</td>
</tr>
<tr>
<td>2.3: Chronic TTH</td>
<td>2/25</td>
<td>2</td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td>3.1: Episodic cluster headache</td>
<td>1/82</td>
<td>1</td>
<td></td>
<td>1.2%</td>
</tr>
<tr>
<td>4.1: Primary stabbing Headache</td>
<td>6/82</td>
<td>2</td>
<td>4</td>
<td>7.3%</td>
</tr>
<tr>
<td>MULTIPLE HEADACHE TYPES</td>
<td>11</td>
<td></td>
<td></td>
<td>13.4%</td>
</tr>
<tr>
<td>Primarily migraine type</td>
<td>7/11</td>
<td></td>
<td></td>
<td>63.6%</td>
</tr>
<tr>
<td>Primarily tension type</td>
<td>4/11</td>
<td></td>
<td></td>
<td>36.3%</td>
</tr>
<tr>
<td>SECONDARY HEADACHE</td>
<td>5/82</td>
<td></td>
<td></td>
<td>6%</td>
</tr>
<tr>
<td>5. Headache with neck trauma</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Headache with intracranial infn</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Headache with ear, sinus or tooth disease</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 5: TABLE SHOWING NO.OF PATIENT WITH SEIZURE ASSOCIATED HEADACHE

<table>
<thead>
<tr>
<th>Headache type</th>
<th>No. of Patients</th>
<th>Male</th>
<th>Female</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEIZURE ASSOCIATED HEADACHE</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preictal Headache</td>
<td>4/18</td>
<td>2</td>
<td>2</td>
<td>22.2%</td>
</tr>
<tr>
<td>7.6.1: Hemicrania epileptica</td>
<td>1/18</td>
<td>1</td>
<td></td>
<td>5.5%</td>
</tr>
<tr>
<td>7.6.2: Postictal headache</td>
<td>13/18</td>
<td>8</td>
<td>5</td>
<td>72.2%</td>
</tr>
<tr>
<td>14.1: Headache not elsewhere classified</td>
<td>24/124</td>
<td>16</td>
<td>8</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

TABLE 6: SHOWING SEIZURE TYPE IN PATIENTS WITH SEIZURE ASSOCIATED HEADACHE

<table>
<thead>
<tr>
<th>Seizure Type</th>
<th>Preictal Aura</th>
<th>Epileptic hemicrania</th>
<th>Post ictal headache</th>
<th>Headache not Elsewhere Classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary GTCS</td>
<td></td>
<td></td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Secondary GTCS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPS with 2(^0) GTS</td>
<td></td>
<td></td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>CPS with 2(^0) GTS</td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Simple partial seizure</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complex Partial Seizure</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Absence seizure was seen in one patient and tonic seizure in 1 patient.

HEADACHE TYPE:

Interictal headache was present in 82 patients (66.6%) and seizure associated headache in 42 patients (33.4%) with epilepsy. Seizure associated headache include preictal, ictal and post ictal headaches. Among 77 patients with primary headache (see table 4) migraine type headache was seen in 54% (n=45) of patients. Among these 45 patients, 19 of them satisfied the criteria for migraine without aura. (1.1) 10 of them had features of migraine with aura (1.2). Basilar type migraine (1.2.6) was seen in one and chronic migraine 1.5.1 was seen in 12 patients with epilepsy. Among them 10 of them were transformed from migraine without aura and two from migraine with aura. Probable migraine (1.6) is seen in 3 patients with epilepsy. Tension type headache occurred interictally in 30.4% (n=25) of patients with epilepsy. Among these 25 patients nine had infrequent episodic tension type headache (2.1), 14 have frequent episodic tension type headache (2.2) and 2 had chronic tension type headache (2.3). Episodic cluster headache (3.1.1) was seen in one patient and primary stabbing headache (4.1) was seen in 6 patients with epilepsy. Secondary headache was seen in 6% (n=5) of patients with epilepsy. Of them headache associated with neck trauma (5) was seen in one patient and intracranial infection (9) in one patient with epilepsy (CT scan Brain showed tuberculoma). The remaining three patients had sinus disease (11) along with seizures. 11 patients with epilepsy had multiple headache types. Among them 7 patients had primarily migraine type of headache along with infrequent episodic tension type headache. One patient had migraine without aura with dental caries. One patient with migraine had frontal sinus disease. Four patients had frequent episodic tension type headache along with dental caries.

Seizure associated headache (Pre ictal, ictal & post ictal headache)

Among 42 patients with seizure associated headache, 24 (19.3%) had headache which might be an ictus without accompanying seizure activity classified as headache which could not be elsewhere classified (14.1) and 18 had (14.5%) pre ictal, ictal or post ictal headache (table 5). Pre ictal Headache was seen in (4/18) of cases with epilepsy of whom 3 is seen in complex partial seizures and 1 in simple partial seizures. Pre ictal headache occurs equally in both sexes and the seizures were >10 years in duration. EEG was abnormal in one and CT scan brain showed old infarct in right parietal region in one patient. Post ictal headache
was seen in 72.2% (13/18) of patients with epilepsy. The headache lasted for <6hrs in 8/13 of patients, 6-12 hrs in 3 patients and >12hrs in two patients.

Headache fitted into the criteria for probable migraine in 3 out of 13 (23%) and were of tension type in 2 patients and could not be classified 8 in patients.

Majority of Post ictal headache occurred in relation to GTCS (n=12/13) (10 GTCS in 9 & SPS with 20 GTCS in 3) (table 6). However the headache recurred post ictally only with a third of such seizures. Only patient with complex partial seizure had post ictal headache occurring 20% of the time. The two patients with post ictal headache of tension type also have tension type headache inter ictally. Patients with post ictal headache of probable migraine and unclassified type of headache did not have interictal headache. The characteristics of post ictal headache remained the same, each time it occurred in patients with epilepsy.

**Headache as ictus:**

Headache which could not be elsewhere classified (14.1) occurred in 19% (n=24) of patients with epilepsy. The age group of these patients ranged from 16 years to 46 years. Twelve patients were in the age group 21-30 years followed by seven patients in the age group of 31-40 years. Three patients are in the age group 41-50 years and 2 in 11-20 years age group. Females comprise 75% of the population (n=18) of patients with headache whereas males make 25% of the population (n=6). The duration of the seizure was mostly 6-10 years as seen in 11 of patients followed by 11-20 yrs seen in 9 patients and <6 years in 4 patients.

Secondary GTCS was the most common type of seizure seen in this group of patients which comprise 83% of them (n=20/24). Most common type of seizure type seen was CPS with secondary generalisation seen in 11 patients. Simple partial seizures with secondary generalisation was seen in 9 patients and primary GTCS was seen in 4 patients. The duration of headache was 5-10 min in all the patients (24/24) and severe in intensity, frequency varied from 1-2 episodes per day to once in few days, character of headache was stabbing or pulsating in nature, associated with transient unawareness in all (100%) of patients. Incontinence is present in 5 of these patients occasionally. CT scan brain was abnormal in 3 out of 24 patients and they show old healed calcification in two patients and old infarct in one of them. EEG was normal in 25% and abnormal in 75% of patients.

Among these 24 patients, had headache as ictal event along with seizures, seizures has got subsided with treatment however the patients continued to suffer headaches which could not be classified and are probably ictus in nature.

Headache was present antecedent to the onset of seizures in 6 of these patients (25%), Episodic migraine being present in 4 of them and frequent episodic tension type headache in 2 of them.

**DISCUSSION**

In this study, the most common type of seizures seen were primary generalized tonic-clonic seizures seen in 52 patients followed by secondary generalized tonic clonic seizures seen in 48 patients. Females out number males in all seizure types except for absence and tonic seizures both of whom were male patients.

The seizures were more frequently seen between 21-30 years of age present in 48% of cases (n=47) followed by 11-20 years of age present in 21% of cases (n=27). Primary headache contributed to the maximum number of cases of interictal headache seen in patients with epilepsy noted in 94% of cases (n=77/82) and secondary headache in 6% (5/82) of patients. Seizure associated headache was seen in 42 patients among whom peri ictal headache contributed to 42.8% (18/42) of patients. In patients with seizure associated headache there was a sub-group of patients with epilepsy who had headache which could not be elsewhere classified (14.1) and probably ictus which comprised 19% (n=24) of the total population.

The most common type of primary headache seen in our study was migraine seen in 54% of cases (n=45). migraine without aura was more common seen in 19 of them than migraine with aura which was present in 10 patients. The findings in the present study also correlated with the study done by Velio Flu et al9 which showed migraine without aura as the common. Neuronal hyper excitability might explain the comorbidily of migraine and epilepsy.

In this study all the headache sub types were more common in primary generalized tonic-clonic seizures than in other seizure types. This is not in accordance with the study done by Guidetti V et al9 and by Savoldi F et al1 who noted that the frequency of epilepsy was uniform across various types of headache, migrainous or not. The discrepancy may be due to high frequency of generalized tonic-clonic seizures in our study which forms 42% of the total study population.

There was no specific correlation between seizure type and migraine subtype seen in this study. Females were noted to be more commonly affected with migraine seen in 32 patients than males which is in agreement with the study done by Leniger et al2 in whom proposition of females were more than males5. The next common form of primary head-
ache seen in this study was Tension type headache which was present in 30.4% (n=25) of cases among which frequent episodic tension type headache was the most common type seen in 14 out of 25 patients if frequent episodic tension type headache is seen in 36% of cases (9/25) and chronic tension type headache in 2 patients. This is in agreement with the study made by Yamane et al 10 one case (1.2%) had episodic cluster type headache which was seen in a patient with complex partial seizures. Primary stabbing headache occurred in 7.3% (n=6) of our patients. Precordial headache occurred in 4 patients in this series. Of these 4 patients 3 (75%) had complex partial motor seizures and one (25%) was of simple partial motor type. One patient with simple partial seizure had headache throughout the seizures which recedes with subsidence of seizures and was classified as epileptic hemicrania. His CT scan brain showed old infarct in left parietooccipital region. The same degree of involvement has been noted in other study done by Karaali et al 11, Leniger et al al5 and Founderreuther S et al12. The headache also has lateralizing value as seen by its location which occurred ipsilateral to seizure onset in our patients with both secondary generalized seizures and complex partial seizures of temporal lobe origin which corroborates with the study done by Bernasconi A et al13 who showed that peri ictal headache occurred ipsilateral to seizure.

Post ictal headache occurred in 72.2% (n=13) of patients with seizure associated headache. Among our patients with post ictal headache, duration of headache is <6 hours in 61% (n=8) of patients, 6-12 hours in 23% of patients (n=3) and >12 hours in 15% of patients (n=2). The diagnosis of headache was probable migraine in 23% (n=3), tension type headache in 15% (n=2) and could not be classified in 61.5% of cases (n=8). Majority of post ictal headache occurred in relation to GTCS, seen in 12/13 patients. Primary GTCS occurred in 9 patients and SPS with 2 GTCS is seen in 3 patients with post ictal headache. Postictal headache followed GTCS one third of the time i.e. 33.3%.

The type of headache remained the same with each episode of post ictal headache. Patients who had tension type of headache postictally also had tension type of headache interictally whereas patients with post ictal headache of probable migraine or unclassified type did not have interictal headache.

Headache which could not be elsewhere classified occurred in 19% of patients (24). Most of these patients were in the age group of 21-30 yrs (45.8%) followed by 31-40 yrs (29.16%), duration of seizures is between 6-10yrs in 45.8% of patients and 11-20 year in 37.5% of patients. Most of the cases were of secondary generalized tonic-clonic type (20/24). CPS with 2 GTCS occurred in 11 patients followed by SPS with 20 GTCS which occurred in 9 patients. Primary generalized tonic-clonic seizure were seen in 16.6% (n=4) of patients. The headache seen in these patients was of short duration lasting for 5-10 minutes severe in intensity, stabbing or pulsating in nature, associated with impaired awareness in all the patients and urinary incontinence was seen in 20% of these patients. CT scan brain was normal in 87.5% of patients. EEG was abnormal in 75% of these patients, showing diffuse epileptiform activity. 30% of these patients also had headache along with seizures initially with persistence of headache alone after control of seizures.

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10. Yamane LE, Montenegro MA, Guerreiro MM. Co-


INTRODUCTION

Head and neck cancers is one of the top five cancers in the world particularly in men, the most common etiology being smoking and tobacco chewing. Unresectability means the disease is advanced and has a poor prognosis which needs immediate treatment. Radiation therapy is the main modality of treatment in these patients, although over all survival after radiotherapy is usually less than 25% 1, 2, 3

A number of studies have been performed and still a number of studies are ongoing to improve the results. Hyper fractionated radiotherapy, Hypo fractionated radiotherapy, various fractionated schedules, concurrent chemotherapy, weekly chemotherapy, induction chemotherapy etc. have been experimented for these patients 4, 5, 6. Of all the modalities, it is the concurrent chemo radiotherapy schedule which has attracted world wide interest 2, 10.

MATERIAL AND METHODS

This is a prospective study conducted in 2012 and 2013 with a sample size of 30 (15 patients in each arm) and the patient population are reviewed up to October 2016.

The eligibility of the study population was based on some inclusion criteria like.
1. Consent for treatment
2. Age less than 60 years
3. No comorbidity
4. Good performance status
5. Unresectable cancer
6. Confirmed histology
7. No prior treatment

About 15 patients were enrolled in each Arm. In Arm A, the patients were given only conventional radiotherapy – 2 Gy, 5 days in a week up to 66 Gy for a period of 6.3 weeks. In Arm B, the patients were given conventional radiotherapy (66 Gy for 6.3 weeks) along with concurrent chemotherapy - cisplatin 100 mg / m2 on days 1, 22 and 43. The tumour stages were stage III and IV. The tumour sites include Oral Cavity, Oropharynx, Hypopharynx and Larynx. All patients had regional lymph node metastasis. The pre treatment staging evaluation included.
1. Detailed medical history
2. Complete clinical examination
3. ENT evaluation (IDL scopy, VL scopy)
4. Chest X ray
5. Echocardiogram
6. Bronchoscopy, Esophagoscopy, Nasopharyngoscopy, If
necessary
7. Blood examinations
8. CT scan
9. Dental prophylaxis
10. HIV testing

The aim of the radiation treatment was to include in the radiation field the gross primary tumour with a generous margin (2-3cm) with bilateral neck. Field reductions at approximately 44 Gy was done to protect the spinal cord from the large field. All the patients were treated in Telecobalt machine. Mostly opposing lateral fields were used to treat the primary and regional nodes. During treatment, adequate nutritional support, aggressive hydration, antiemetic therapy, colony stimulating factors, psychological support were given. All patients were encouraged to complete full treatment schedule in the allotted time period. Some patients had minor interruption due to toxicity. Common Toxicities encountered were nausea, vomiting, anemia, mucositis, skin reactions, febrile neutropenia. These toxicities were managed immediately.

RESULTS

Study population, clinical characteristics, toxicities, staging, survival rates are given in the following tables and charts. A complete response was identified in 74% of arm A and 82% of arm B. Three year survival rate was identified as 54% in arm A and 67% in arm B. Grade III toxicity occurred in 48% of patients in arm A and 76% in arm B. No differences were identified between the treatment arms in age, sex, performance status, primary tumour site, tumour differentiation. Recurrence occurred in 7 patients after 1.3 years in arm A (Posterior Tongue – 2, Pyriform Fossa – 2, Posterior pharyngeal wall – 2, Post Cricoid – 1). In arm B recurrence occurred in 3 patients after 2.2 years (Posterior tongue - 1, posterior pharyngeal wall - 2). Two patients were subjected for nodal dissection in arm A.

Survival data

A complete response means no residual growth immediately at the end of treatment. It was identified in 74% of arm A patients and 82% of Arm B.

Disease free survival means the period during which there is no evidence of disease, that means up to the time of recurrence of the growth. Recurrence occurred in 7 patients after 1.3 years of the treatment in Arm A. In the Arm B recurrence occurred in 3 patients after 2.2 years.

Three years survival rate means no evidence of recurrence of the growth after 3 years. It was 54% in Arm A and 67% in Arm B.

Five years disease free survival rate has to be decided on the follow up of patients.

DISCUSSION

The addition of concurrent High dose, single agent Cisplatin to conventional single daily fractioned radiation significantly improves survival, although it also increases toxicity. But the Toxicity was manageable. This study demonstrates the superiority of concurrent chemo Radiotherapy over radiotherapy alone in patients with advanced unresectable squamous cell head and neck cancers. Survival and disease specific survival are also better. So concurrent chemo radiotherapy is becoming the treatment of choice and is showing more consistent successful treatment results.

Expected advantages of this study:
- Cancer management is in the era of organ preservation. The main advantage of this particular study is preservation of the malignancy affected organ and its functions from surgery.
- Improving the quality of life is another advantage like post treatment cosmetic effects which are grossly minimized.

LIMITATIONS OF THE STUDY

- The sample size of the study was minimal.
- Head and Neck cancer management is a field of Multidisciplinary approach including Oncology, ENT, Plastic Surgery etc. Hence during treatment decisions had to be taken randomly at times.

ACKNOWLEDGEMENTS

I would like to thank my Head of the Department, Colleagues, Nursing Community and Subordinate staff from the department of Radiotherapy, Thanjavur Medical College Hospital for their excellent support without which this extensive study could not have been possible.

REFERENCES

### TOXICITY CRITERIA AND GRADING

<table>
<thead>
<tr>
<th></th>
<th>GRADE 1</th>
<th>GRADE 2</th>
<th>GRADE 3</th>
<th>GRADE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAUSEA</td>
<td>Loss of appetite</td>
<td>Decreased oral intake</td>
<td>In adequate fluid intake Tube feeding.</td>
<td>Intensive care</td>
</tr>
<tr>
<td>VOMITING</td>
<td>1 – 2 Episodes in 24 Hours</td>
<td>3 – 5 in 24 hours</td>
<td>More than 6 in 24 hours</td>
<td>Intensive care</td>
</tr>
<tr>
<td>ORAL MUCOSITIS</td>
<td>Minimal symptoms</td>
<td>Moderate pain</td>
<td>Severe pain interfering with oral intake</td>
<td>Intensive care</td>
</tr>
<tr>
<td>ANEMIA</td>
<td>Hb &lt; 10 g%</td>
<td>8.0 – 9.99</td>
<td>6.5 – 7.9</td>
<td>Intensive care</td>
</tr>
<tr>
<td>THROMBOCYTOPENIA</td>
<td>Platelets 75000</td>
<td>50000 – 74000</td>
<td>25000 – 49000</td>
<td>&lt; 25000 µL</td>
</tr>
<tr>
<td>FEVRILENEUTROPENIA</td>
<td>1500</td>
<td>1000 – 1400</td>
<td>500 -900</td>
<td>&lt; 500 µL</td>
</tr>
<tr>
<td>SKIN</td>
<td>Discolouration</td>
<td>Hyperpigmentation with peeling</td>
<td>Ulceration</td>
<td>Intensive care</td>
</tr>
</tbody>
</table>

### TABLE 1. STUDY POPULATION

<table>
<thead>
<tr>
<th></th>
<th>ARM A</th>
<th>ARM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients entered</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>Ineligible</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Analyzable</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

### TABLE 2. CLINICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>ARM A</th>
<th>ARM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Years</td>
<td>55.2</td>
<td>54.3</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

### PERFORMANCE STATUS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

### TABLE 3: TUMOUR STATUS

<table>
<thead>
<tr>
<th>Primary Tumour site</th>
<th>ARM A</th>
<th>ARM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral cavity</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Larynx</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
Tumour Differentiation | ARM A | ARM B
--- | --- | ---
Well differentiated | 4 | 3
Moderately differentiated | 6 | 7
Poorly differentiated | 5 | 3
Undifferentiated | 0 | 2

TUMOUR STAGE

<table>
<thead>
<tr>
<th>Stage</th>
<th>ARM A</th>
<th>ARM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>IV</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

TABLE - 4 TOXICITY

<table>
<thead>
<tr>
<th></th>
<th>ARM A</th>
<th>ARM B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Vomiting</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Mucositis</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Leucopenia</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Anemia</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Renal</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Skin</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Ryle’s tube</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

FIG 1: COMPLETE RESPONSE (ABOVE)
FIG 2: THREE YEARS SURVIVAL (BELOW)
FIG 3: RECURRENCE (DISEASE SPECIFIC SURVIVAL)

FOR MOST DIAGNOSES ALL THAT IS NEEDED IS AN OUNCE OF KNOWLEDGE, AN OUNCE OF INTELLIGENCE, AND A POUND OF THOROUGHNESS
HEMOPTYSIS
-“EFFORT INDUCED THROMBOSIS”

S.Anu (1), A.Ramalingam (1), Ashokkumar (1).

Abstract

A 30 year old male, photographer presented with the complaints of swelling and continuous throbbing pain in the right upper limb on the medial aspect for 2 weeks, cough with haemoptysis 3-4 episodes, each time 3-5 ml in the past 3 days and breathlessness for 3 days MRC grade 2. On examination, the breath sounds were diminished on right infrascapular and interscapular areas and on percussion stony dull note was seen on same areas. Chest X-Ray PA view showed homogenous peripheral wedge shaped opacities in both lower zones, on both sides. CT chest revealed round wedge shaped opacities with convexity noted bilaterally in posterior basal segments. Patient’s right upper limb Doppler revealed thrombus in the right subclavian vein which extended into the right axillary vein. His coagulation profile was normal. The serum Homocysteine levels were increased to about 50 mmol/l, other prothrombotic factors being normal. Hence a provisional diagnosis of PAGET SHROTTER SYNDROME, secondary to hyperhomocystinemia, with pulmonary embolism and bilateral pulmonary infarcts was made. This syndrome is also called “EFFORT INDUCED THROMBOSIS” because it has been reported in sports person who does vigorous activity. The patient was anticoagulated with heparin and started on T.Folic acid and discharged with the latter and T.Acenocoumarol 2 mg.

Key-words: photographer, hemoptysis, upper limb venous thrombus, effort induced, paget shrotter syndrome, pulmonary embolism

Key Messages: Paget shrotter syndrome is a rare condition causing upper limb DVT induced by vigorous effort involving upper limb usually, can present as pain, swelling of upper limb and may go into complications like pulmonary embolism in nature and it was not radiating. The patient had breathlessness of MMRC grading 2 with no history of PND or Orthopnea. The patient had no history of wheeze. The patient had no history of fever, loss of weight, loss of appetite and no history of travel. The patient had no similar history in the past. He is not a known case of Diabetes mellitus, asthma, jaundice, epilepsy, hypertension. He had no surgery in the past. He had no history of tuberculosis in the past. He is not an alcoholic or smoker or tobacco chewer. He had no relevant family/treatment history.

INTRODUCTION:

Paget–Schrotter disease, also known as Paget–von Schrötter disease, is a form of upper extremity deep vein thrombosis (DVT). The condition is named after two men. James Paget first proposed the idea of venous thrombosis causing upper extremity pain and swelling, and Leopold von Schrötter, who later linked the clinical syndrome to thrombosis of the axillary and subclavian veins. Upper limb DVT may be primary-20%(idiopathic, inherited thrombophilia, thoracic outlet obstruction, paget schrotter syndrome) or secondary-80%(central venous catheter, pacemaker, malignancy, arm or neck surgery/truma, immobilisation, pregnancy, oral contraceptive pill use). Thrombus of the upper extremities accounts for 1-4% of all cases of deep vein thrombosis (DVT) and primary axillary thrombosis accounts for only 10-20% of this already small proportion of cases, making Paget–Schroetter syndrome a rare and unusual condition(2)

Case History: A 30 year old professional photographer came with the complaints of swelling and pain in the right upper limb for 2 weeks, cough with Haemoptysis for 3 days and breathlessness for 3 days. The patient had 3-4 episodes of haemoptysis each day with the quantity of about 3-5ml for each episode. The Pain in the right upper limb was on the medial aspect of the limb, which was continuous throbbing in nature and it was not radiating. The patient had breathlessness of MMRC grading 2 with no history of PND or Orthopnea. The patient had no history of wheeze. The patient had no history of fever, loss of weight, loss of appetite and no history of travel. The patient had no similar history in the past. He is not a known case of Diabetes mellitus, asthma, jaundice, epilepsy, hypertension. He had no surgery in the past. He had no history of tuberculosis in the past. He is not an alcoholic or smoker or tobacco chewer. He had no relevant family/treatment history.

On examination the patient was conscious, oriented, a febrile and comfortable at rest. There was no pallor, icterus, cyanosis, clubbing, lymphadenopathy or pedal edema. CVS s1 and s2 were normal. In respiratory system examination, the breath sounds were diminished on right infrascapular and interscapular areas and on percussion dull note was seen on right infrascapular and interscapular areas. Other systems were normal.

Investigations:

Please Scan this QR Code to View this Article Online
DOI: 11th October 2016
Article ID: 2016:03:03:20:176
CBC, RFT, LFT, ECG-Normal.

- Sputum: Negative for Acid fast bacilli and there
- Sputum culture: No growth
- Chest X-Ray: PA view- homogenous peripheral wedge shaped opacities in the lower zones, on both sides.
- CT chest revealed: Round wedge shaped opacities with convexity noted bilaterally in posterior basal segments.

Right upper limb Doppler revealed thrombus in the right subclavian vein which extended into the right axillary vein.

- Coagulation profile: Bleeding time, clotting time, Prothrombin time, Partial thromboplastin time normal
- Antinuclear antibodies negative
- Prothrombotic workup: Protein C, protein S and lupus anticoagulants levels normal, serum Homocysteine levels were increased to about 50 mmol/l.

- CT CHEST SHOWING PULMONARY INFARCTS

DISCUSSION

Paget schrotter syndrome usually presents in young and otherwise healthy patients, occurs more often in males than females. Though it can also occur due to anatomic abnormality such as clavicle impingement or spontaneously.

It may develop as a sequela of thoracic outlet syndrome. It must be differentiated from secondary causes of upper extremity DVT caused by intravascular catheters. Effort thrombosis usually follows sporting activities, such as wrestling, playing ball, gymnastics and swimming, which involve vigorous and sustained upper extremity movements. It is believed that retroversion, hyperabduction and extension of the arm involved with these activities impose undue strain on the subclavian vein leading to micro-trauma of the endothelium and activation of the coagulation cascade. Substantial evidence now supports the role of anatomical abnormalities involving the thoracic outlet (cervical rib, congenital bands, hypertrophy of scalenus tendons and abnormal insertion of the costoclavicular ligament) in the pathogenesis of effort thrombosis. The narrow costoclavicular space leads to compression of the vein and to stasis in the flow. More importantly, it restricts the mobility of the subclavian vein, making it more susceptible to trauma from arm use. These lead to a self-perpetuating cycle of endothelial trauma, thrombosis and recanalization. The repetitive endothelial trauma leads to intimal hyperplasia, inflammation and fibrosis, resulting in venous webs, extensive collateral formation and perivenular fibrosis. This in turn worsens the stasis and costoclavicular crowding. Effort thrombosis has therefore been rightfully categorized as a venous variant of thoracic outlet syndrome.

Symptoms may include sudden onset of pain, warmth, redness, blueness and swelling in the arm. Other symptoms include heaviness, redness of arm, cyanosis and dilated, visible veins across the shoulder and upper arm (Urschel’s sign).

Complications include pulmonary embolism, recurrent thrombosis and post-thrombotic syndrome. Post-thrombotic syndrome manifests as chronic arm swelling, heaviness, pain and early
exercise fatigue. Thrombolysis is a key component of the treatment, it results in early venous recanalisation and thus prevention of chronic side effects including post-thrombotic syndrome.

Catheter directed thrombolysis has been illustrated to be an invaluable method of thrombolysis achieving good results and simultaneously minimising systemic side effects.

We proceeded with prothrombotic work up for our patient to establish the cause for DVT and found that the patient has hyperhomocysteinemia. Hence patient was anticoagulated with heparin later converted to acitrome and also treated with folic acid and is in our follow up.

REFERENCES:
(1),(2)- BMJ CASE REP. 2011; 2011: BCR0420114115. published online 2011 jun 22

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4. Dr. PRAKASH, ASSISTANT PROFESSOR, DEPT OF INTERNAL MEDICINE, GSH
5. Dr. V. SANTOSH KUMAR, Final yr MD PG in medicine, GSH
6. Dr. K. RAJSANTAN, final yr MD PG in medicine, GSH
INTRODUCTION

Hemophilia A is a X-linked recessive disorder of deficiency in factor VIII factor occurring 1 in 10,000 male births. The deficiency is the result of mutations of the respective clotting factor genes. Estimations based on the WFH’s annual global surveys indicate that the number of people with hemophilia in the world is approximately 400,000 [1]. Hemophilia A is more common than hemophilia B, representing 80-85% of the total hemophilia population. Factor VIII concentration less than 1% are considered to have severe disease with risk of spontaneous bleeding. Here we like to discuss management of a boy with severe hemophilia coming for emergency closed reduction and tens nailing of fracture femur.

Case History: A 9yr old boy came to our hospital, SRM medical college and research centre kattangulathur with fracture shaft of right femur following a RTA in immobilised state. Patient is a known case of severe hemophilia since childhood. Patient had previous history of factor VIII transfusion required for tooth fall. Patient had positive family history as his maternal uncle died due to intracranial bleed. Viral screening negative. haematological evaluation revealed that platelet count and prothrombin time were normal, APTT was prolonged (patient 54seconds;control 25.1-36.7seconds) Factor VIII assay showed <1% indicating severe disease requiring transfusion of 3 injections of 250 units factor VIII as major surgery requires factor VIII to increase to100%. (Required Units = body mass (kg) x 0.5 x desired factor VIII increase (% of normal). Factor VIII level came up to 26%, patient required further 1400 units to be transfused 30 min prior to surgery. Surgery was done under general anaesthesia with universal precautions and close monitoring of intraoperative bleed. Transfusion of factor VIII continued in the postoperative period at the rate of 50units/kg after 12hrs and 25units/kg 12hrly for 2-7days followed by 10-15 units/kg 12hrly for next 3-7days. This emphasis on the importance of continous monitoring of the factor levels.

DISCUSSION

Hemophilia has incidence about 1 in 5000-10,000 males. disease is classified as mild, moderate and severe based on the coagulation factor VIII levels. 1, 2, 3, 4 Normal factor VIII plasma levels vary 0.5 U/mL to 1.5U/Ml and each U/mL corresponds to 100% factor VIII found in 1 mL of plasma.

Spontaneous bleeding into joints are more common in severe hemophilia, but any other part of the body, including central nervous system (CNS), may be subject to spontaneous hemorrhage.

The goal in preoperative Period is to correct factor VIII deficiency before the procedure. patients need 100% correction of their factor VIII before any surgical procedure,
Severities of Clotting factor levels and Bleeding episodes:

<table>
<thead>
<tr>
<th>Severity</th>
<th>Clotting factor levels</th>
<th>Bleeding episodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>&lt;1IU/dl or &lt;1% of normal</td>
<td>Spontaneous bleeding into the joints and muscles</td>
</tr>
<tr>
<td>Moderate</td>
<td>1-5IU/dl or 1-5% of normal</td>
<td>Occasional spontaneous bleeding</td>
</tr>
<tr>
<td>Mild</td>
<td>5-40IU/dl or 5-&lt;40% of normal</td>
<td>Severe bleeding with major trauma, spontaneous bleeding is rare</td>
</tr>
</tbody>
</table>

Laboratory diagnosis of hemophilia A is based on prolonged TTPa and factor VIII deficiency, normal factor IX and vonWillebrand factor levels.

<table>
<thead>
<tr>
<th></th>
<th>PT</th>
<th>aPTT</th>
<th>BT</th>
<th>PLATELET COUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Hemophilia A or B</td>
<td>Normal</td>
<td>prolonged</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>vWD</td>
<td>Normal</td>
<td>Normal or prolonged</td>
<td>Normal or prolonged</td>
<td>Normal or reduced</td>
</tr>
<tr>
<td>Platelet defect</td>
<td>Normal</td>
<td>Normal or prolonged</td>
<td>Normal or prolonged</td>
<td>Normal or reduced</td>
</tr>
</tbody>
</table>

and this must be confirmed before surgery. For every UI/kg of infused factor VIII concentrate, there is 2% increase in its respective plasma level. Rule out the presence of factor VIII inhibiting antibodies, avoid use of anti-platelet drugs one week prior to surgery and assure the presence of adequate amounts of factor VIII concentrate available in the perioperative period. During preanesthetic evaluation, the anesthesiologist should evaluate the status of joints, look for spontaneous hematomas, check tracheal intubation conditions and the presence of oral injuries. Patients should receive concentrate before minor invasive procedures, such as lumbar puncture, arterial blood gases collection or bronchoscopy with lavage material and biopsy.

Surgery should be scheduled early in the week and early in the day for optimal laboratory and blood bank support, if needed. Adequate quantities of clotting factor concentrates should be available for the surgery itself and to maintain adequate coverage post-operatively for the length of time required for healing and/or rehabilitation.

a) Positioning: monitoring patients position on the operating table observing their articular limitations; b) Induction: allowing for a relaxed induction, in a timing necessary for drugs action and effect. Avoiding superficial anesthesia or drugs such as succinylcholine to prevent muscle shakes which may worsen muscle and joints hemorrhagic state; c) Intubation and airway handling: gentle to decrease attrition with the mucosa and nasotracheal intubation should be avoided. Care is also needed with the insertion of probes and thermometers, preventing trauma injuries by manipulation because tongue and airway muscles bleeding may rapidly lead to airway obstruction.

It is necessary to maintain hemodynamic conditions as close as possible to normal. Pharyngeal aspiration should be extremely careful and delicate. Anesthetic blocks are contraindicated as well as muscular injections. There are however reports of successful anesthetic blocks (axillary, epidural and spinal) in hemophilic patients, provided factor VIII levels were maintained above 30% throughout the perioperative period. These levels should be maintained for up to 6 weeks after orthopedic procedures and 1 to 2 weeks for other procedures. Monitoring should be achieved by dosing factor VIII levels once or twice a day. Patients with mild hemophilia A, as well as patients receiving intensive factor replacement for the first time, are at particular risk of inhibitor development and should be re-screened 4-12 weeks post-operatively. Hemophilic patients need special postoperative hemostatic therapy. So far, there are no precise values determined for the level of factor VIII activity and for the period of time they should be postoperatively maintained. It is recommended that factor VIII should be continuous to maintain its postoperative levels in approximately 50% (11,12).

**PHARMACOLOGICAL THERAPY**

Factor VIII concentrate: purified factor VIII concentrate (dry frozen) is the product of choice for replacement therapy. It is preferred because it is stable, easy to handle and store, and contains standardized amounts of coagulating factor, with lower probability of transmitting viral diseases as compared to cryoprecipitate or plasma. Concentrates are prepared as a plasma pool of a large number of donors or, as it is done more recently, through the use of recombinant DNA technology, and may be classified according to their degree of purity. For example: intermediate-high purity concentrate or ultrapure products obtained through techniques using chromatography by immune affinity with monoclonal concentrate is commer-
DDAVP is particularly useful in the treatment of bleeding in carrier of hemophilia. Antifibrinolytics: Epsilon aminocaproic acid may be orally or intravenously administered in the doses of 200 mg/kg-1, followed by 100 mg/kg-1 every 6 hours (maximum 5 g/dose). Tranexamic acid may be administered in the oral dose of 25 mg/kg-1 (maximum 1.5g) or in the intravenous dose of 10 mg/kg-1 (maximum 1g) every 8 hours. Both drugs are contraindicated in the presence of hematuria and in patients with factor VIII inhibitors being treated with prothrombin complex concentrate, due to the risk of thromboembolism. Thromboembolism is less likely when tranexamic acid is used in combination with rFVIIa to enhance hemostasis. Porcine factor VIII concentrate (7) used in patients with human factor VIII inhibitors. After treatment some patients may develop porcine factor VIII inhibitors.

Prothrombin concentrate complex: made up of prothrombin concentrate, factors IX and X and variable factor VIII amounts. Used in hemophilia A in patients with factor VIII inhibitors, in the doses of 75 to 100 U/kg. It is associated to thromboembolic problems.

CONCLUSION

Hemophilic patients for emergency surgery requires team work involving hematologist, surgeon and anesthetist with good laboratory support. Principle aim is to actively monitoring of factor VIII levels and maintaining levels 100%.

References:
7. Giangrande PL, Wilde JT, Madan B, et al. Consensus pro-


INTRODUCTION

Under maternal hyperglycemic condition foetus is exposed to stressful environment due to altered maternal metabolism and hence structural abnormalities can occur. The incidence of fetal congenital anomalies is 2 to 3 times more frequent in infant of diabetic mother than the general population affecting almost all organ system in the body. Defects in cell migration lead to craniofacial defects. Agenesis or hypoplasia of depressor anguli oris is a congenital anomaly which is one of the cause for asymmetric crying faces which is rarely reported in infant of diabetic mother.

Case report:

Here we report a 1 year old female child with asymmetric crying faces since birth. Child was born to 24 year old primigravida mother with antenatal history of gestational diabetes mellitus. She had a prenatal fetal sonogram at 16 weeks that did not show any evidence of anatomical anomalies. There was no history of trauma during birth. On examination the face was symmetrical while the infant was sleeping (figure 1), but on crying the right corner of the mouth drew right and downward. The left corner did not move. (Figure 2). Forehead was broad and slopping but its movement was not affected. Eye closure was normal and facial nerve conduction study was normal in our case suggesting congenital absence of depressor anguli oris. Caksen et al 4 reviewed 35 cases of asymmetric crying face out of which one was infant of diabetic mother. Similar case was reported by Zahouani et al 5. Coexisting anomalies 6 occur in 20 to 60% of the children like Cayler cardiofacial syndrome (asymmetric crying faces with congenital heart disease), CATCH 22 (cardiac defect, abnormal facies, thymic hypoplasia, cleft palate, and hypocalcemia), genitourinary tract anomalies, central nervous system defects (agenesis of corpus callosum, microcephaly)7 and Tri-somy 18. Hence one should rule out major anomaly in a child with congenital absence of depressor anguli oris. Our patient did not have any major anomalies. To date, subclinical viral infection, intrauterine moulding during pregnancy, dysmorphogenesis in infant of diabetic mother and heredity have been suggested as causative factors for hypoplasia of depressor angularis oris 8.

CONCLUSION

Infant of diabetic mother should be assessed for major and minor anomalies as maternal diabetes mellitus is known to have teratogenic effects. This case is reported for its rare association of congenital absence of depressor angularis in infant of diabetic mother.
REFERENCE:


INTRODUCTION

Benign GSFT of Pleura is relatively rare and constitutes only 5% of all pleural tumors. Only about 800 cases reported worldwide till 2002. Its association with DPS reported only in 3-4% of cases. Only very few cases are reported in India so far. Here we present another such rare case of DPS associated with GSFT of pleura.

Case History:

A 48 years old man, building construction worker, was admitted with history of dyspnoea on exertion for 6 months and frequent episodes of sweating followed by giddiness for 3 months. No significant past medical and surgical history. He is a known smoker and occasional alcoholic.

On physical examination, he had pan-digital clubbing (Fig. 1), engorged subcutaneous veins over the chest wall, diminished breath sounds with dullness over right mid and lower hemi thorax. His other systems were normal.

On investigation, digital chest x-ray (Fig. 2) showed a homogenous space occupying lesion in the right hemi thorax with mild mediastinal shift to left. Contrast enhanced computed tomography (CECT) of chest (Fig. 3) revealed a large homogenous mass occupying right hemi thorax with branching calcification, collapse of rest of right lung, mediastinal shift to left with intact mediastinal fat plane and chest wall contact with no extra-thoracic extension or bony erosion. Azygos vein dilated and supra hepatic portion of inferior vena cava compressed. His blood glucose levels were ranging between 30 to 90 mg/dl at various instances even after transfusing intravenous dextrose solutions. His routine blood investigations, ultrasound and CECT abdomen, electro/echo cardiograms and bronchoscopy findings were normal. Histology of ultrasound-guided trucut biopsy of the mass reported as solitary fibrous tumor of pleura. Specific investigation like serum levels of insulin like growth factor II was not done due to non-availability at our institution. Clinical diagnosis of GSFT of pleura with DPS was made and excision of the mass by right thoracotomy was planned.

With single lung ventilation under general anesthesia, by right thoracotomy through 5th intercostal space pleural cavity entered. A huge firm encapsulated tumor with surface vascularity arising from visceral pleura between middle and lower lobe compressing the right lung with no mediastinal/chest wall/lung invasion except minimal adhesions over the dome of right diaphragm was noted and excised in-Toto by dividing 6th and 7th ribs to get access and way for tumor removal. The tumor measured 29x20x15 cms (Fig.4) and weighed 3 kg (Fig.5). It resembled like delivering a newborn baby by caesarian section. Patient went in for hypotension on table due to blood loss and revived with 9 units of compatible blood transfusion. Right lung expanded well after tumor removal. Thoracotomy wound closed after haemostasis and aerostasis. Postoperatively, patient recovered well and discharged on 9th day. No episodes of hypoglycemic attacks and his blood sugar levels were within normal limits after tumor removal. Histopathology of specimen reported as solitary fibrous tumor of pleura showing well encapsulated, homogenous mass with uniform spindle cell pattern, low mi-
totic and no necrotic areas (Fig.6). Immuno histochemistry marker CD 34 found to be positive, confirms solitary fibrous tumour of pleura. At 6 months follow up, image studies showed no evidence of any recurrence of tumor (Fig.7)

DISCUSSION

GSFT of pleura constitutes the most common benign and 5% of all pleural tumors. Sexual preponderance equal with peak incidence at 5th decade. Hypertrophic pulmonary osteo-arthropathy with clubbing was noted in 22% and DPS (hypoglycemic paraneoplastic syndrome due to the secretion of insulin like growth factor II by the tumor) in 3-4% of cases3. They are mostly asymptomatic and picked as incidentallomas in early stage. They arise from pleuripotent mesenchymal cells, 80% from visceral and 20% from parietal pleura. Those from visceral origin are mostly pedunculated and attain giant size. Sessile forms arise from parietal pleura. CD-34 antigen a definite serum marker and the cells stain positive with vimentin and negative with cytokeratin/CEA. It usually presents like a lobulated circumscribed mass with no necrosis, low mitotic spindle cell pattern, with or without psammoma bodies. Complete surgical excision (R0) is curative and hypoglycemic episodes (DPS) disappear after tumor removal. Recurrence rate in visceral origin is 2% and parietal origin is 8%. Re-excision required for rare recurrences. Other benign tumors of identical nature and histopathological similarities are to be ruled out by immune-histochemical studies1, 2.

REFERENCES


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HOD, professor & faculties of Cardiothoracic surgery
Department of Pathology, Radiology, Microbiology, Biochemistry for investigations & evaluation
Last but not least, our patient without whom this article is not possible.
FIGURE 3 ABOVE AND FIGURE 4 BELOW

FIGURE 5

FIGURE 6 ABOVE AND FIGURE 7 BELOW

Follow up Digital CXR and CT Scan Chest at 6 months
INTRODUCTION

The impact of blindness is high in children because they live longer without vision when compared to adults (1). Childhood blindness is relatively rare and its influence can extend beyond the children themselves into their family and society (2). The etiology of childhood blindness is multi-factorial. It is also influenced by socioeconomic status and availability of healthcare (3). The most common causes of ocular morbidity seen in school children worldwide were uncorrected refractive error and allergic conjunctivitis (4-6). Other common eye conditions contributing to blindness in India were vitamin A deficiency, strabismus, ambyopia and conjunctivitis (7-10). With effective primary healthcare, reduction in infections and an improvement in nutrition have resulted in a change of pattern of childhood blindness. With the emergence of congenital anomalies of the globe and retinal diseases as the leading cause of childhood blindness in the industrialised world, the management of the same has become bit complicated (11-14).

It is interesting to note that, majority of causes of blindness in the developing world are unavoidable, such as retinal dystrophies, corneal dystrophies, microphthalmos and cortical visual impairment (15). Clouding of the cornea could result due to genetic, metabolic, developmental, and idiopathic causes (16). The mucopolysaccharidoses (MPS) are a group of disorders characterised by accumulation of glycosaminoglycans (GAG) within a wide variety of tissues, including those of the eye (17). These features may not be apparent at birth but progress as storage of glycosaminoglycans affects bone, skeletal structure, connective tissues, and organs (18-19). This study aimed to determine the severity of ophthalmic complications in a patient with MPS seen at the Eye Hospital.

Case History: A 12 year old female patient presented to the department of ophthalmology at the medical college hospital with complaints of progressive loss of vision and...
defective night vision for the past 10 years. There was history of consanguinity in the family (uncle and niece). She was born through normal delivery with no instrumentation used and her neonatal period was uneventful. There was no exposure to any virus before or after birth. The patient had progressive diminished vision from the age of three. On ocular examination the eyebrows were heavy, lids coarse, lashes were bushy and external ocular movements were full. Slit lamp examination showed cloudy, white, ground glass deposits in the central stromal and deep stromal region (Figure 1). The epithelium, decemets membrane and Endothelium were free of deposits. The anterior - chamber, iris, pupil, lens and fundus details were not made out. Visual acuity was 6/24 for both eyes. Intra ocular pressure was normal.

During systemic examination, her facial appearance showed dysmorphic features, saddle shaped nose, large tongue, high arched palate and noisy mouth breathing (Figure 2). On skeletal survey she had short neck, lumbar gibbus, chest deformity, stubby fingers and stiff joints. On abdominal examination there was umbilical hernia. Cardiac work up showed mild mitral stenosis (MS), moderate mitral regurgitation (MR) with pulmonary hypertension (PHT). On detailed mental state and psychosocial examination the patient had moderate retardation. Biochemical and enzyme assays confirmed the mucopolysaccharidoses. Considering the ocular and systemic features a clinical diagnosis Hurle-Schie subtype was made.

She was provided appropriate rehabilitative and low vision services. Taking into consideration of systemic co-morbidities patient was advised regular follow up by the multidisciplinary team.

DISCUSSION
A variety of scenarios are described for clouding of the cornea (16). The mnemonic STUMPED is helpful for remembering the differential diagnosis for congenital corneal opacities: Sclerocornea, Tears in Descemet membrane (usually due to forceps trauma or congenital glaucoma), Ulcers (infection), Metabolic (eg, mucopolysaccharidosis), Peters anomaly, Edema (eg, congenital hereditary endothelial dystrophy [CHED], Posterior polymorphous dystrophy, congenital hereditary stromal dystrophy [CHSD] and Dermoid (21).

A milky quality of the cornea may be noted at birth, with a decreased responsiveness to light. The neonate may be completely asymptomatic, or may have other ocular or systemic anomalies. The obstetrician or the paediatrician may be the first to observe these ocular properties. The mother might have a history of prenatal exposure to a viral pathogen such as herpes or rubella which can result in a cloudy cornea in the newborn (21,22). Microphthalmus may be associated with congenital rubella (22). Forceps-induced obstetric trauma usually results in descemet membrane tears leading to corneal edema and clouding (23,24). This is differentiated from primary congenital glaucoma (PCG) by the presence of periorbital soft tissue trauma, normal intraocular pressure (IOP), the frequently vertical orientation of the descemet membrane tears, and the absence of corneal enlargement, an abnormal deep anterior chamber, and an abnormal filtration angle (23,25). This is quite unlikely in our scenario as there was no exposure or obstetric trauma. An uncommon developmental abnormality of the anterior segment due to mesenchymal dysgenesis is sclerocornea (26). It usually manifests as a stationary congenital anomaly and usually seen as an isolated ocular abnormality involving both eyes, although it can occur unilaterally. Patients with partial sclerocornea have a peripheral, white, vascularized, 1- to 2-mm corneal rim that blends with the sclera, obliterating the limbus (26). The central cornea is generally normal. In total type the entire cornea is involved, but the centre of the cornea is clearer than the periphery (26,27). Corneal dystrophy like CHED is uncommon (28). The cornea is diffusely and uniformly
ers is associated with severe mental retardation and death. Hurler atrophy is associated with MPS I- VI (41-43). Mental retardation and MPS VII (Beta glucuronidase deficiency)(37-40). Optic atrophy is associated with many except MPS IV (Moriquios), MPS VI (Maroteaux-Lamy) Moriquios syndrome. Pigmentary retinopathy present in certain MPS disease, Sheie’s syndrome, Hurler’s-Schie’s subtype and Sheie’s disease. There are nine types of mucopolysaccharidosis. Corneal deposits are found in all nine types of MPS except in MPS II (Hunters) and MPS III (Sanfillipos disease)(36). Clouding of cornea is usually more common with Huler’s disease, Sheie’s syndrome, Hurler’s-Schie’s subtype and Moriquios syndrome. Pigmentary retinopathy present in all except MPS IV (Moriquios), MPS VI (Maroteaux-Lamy) and MPS VII (Beta glucuronidase deficiency)(37-40). Optic atrophy is associated with MPS I- VI (41-43). Mental retardation usually associated with retinitis pigmentosa. Hurlers is associated with severe mental retardation and death occurs within ten years of age(34,35). In Moriquios there is no mental retardation (43). Since there is an overlap of clinical features of Hurler’s & Schies syndrome in this case, a clinical diagnosis of Hurle-Schie subtype was considered (38).

There is no definitive treatment available for patients with MPS. Patients are best treated by a multidisciplinary team(45,46). Treatments consist of supportive care, hematopoietic stem cell transplantation, and enzyme replacement therapy(45-49). With consideration to specific therapy enzyme replacement of plasma fibroblast and amino transplant have been tried (45). Bone marrow transplant has resulted in significant clinical resolution of somatic features (47,48). Recombinant enzyme technology cultured from mammalian cells is a potential method to treat somatic features of MPS but less significant effect on the cloudy cornea or retinopathy (49).

The profound effect of poor vision on a young patient, who may also be suffering multiple physical and intellectual problems, suggests that the ocular management is a crucial part of the multidisciplinary team. Diagnosis and monitoring of ocular hypertension and glaucoma is often difficult in patients with MPS due to their intellectual difficulties hampering assessment of IOP and visual fields. In addition, the presence of corneal opacity may cause difficulties in visualisation of the optic disc, and assessment of disc cupping may also be made more difficult due to coexistent disc abnormalities. Corneal thickening due to GAG deposition may also lead to falsely high IOP readings. Night blindness may make a person not want to walk in a dark area and the use of a night-light or lamp may help. Appropriate rehabilitative and low vision services should be provided. Genetic counselling with health education has been found to be corner stone in preventing recessive diseases and to increase the awareness of the role of consanguineous marriage practices in the transmission of genetically inherited disease. Genetic studies should be undertaken to find genetic inheritance and genes involved.

REFERENCES

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