Effectiveness of Progressive Muscle Relaxation on Hypertension

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Original Article

3 Effectiveness of Jacobson’s Progressive Muscle Relaxation (JPMR) on Hypertension among School going Adolescents
Manjushambika Rajagopal, Prasanna Baby, R Vijayaraghavan, Sushama Bai

9 Procalcitonin Levels in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease Admitted to the Hospital
Mohamed Shafiq U, Rajesh V, Gopinathan V P, Asmita Mehta, Sundaram K R

16 A Study of Psychiatric Comorbidities and Executive Function- Deficits in First Degree Relatives of Alcoholics
Subhashini M, Kesavankutty Nayar, Bindu Thomas, Sandhya Cherkil

21 Evaluation of Mid-trimester Amniocentesis Markers with Obstetric Outcomes
Sujatha Narayanamoorthy, Laxmi Padmanabhan, Radhamany K

27 Establishment of Reference Ranges of Hematological Parameters In a Tertiary Care Center
Arya B, Shiva Mathur, Geeta Vidyadharan, Anu Catherine Jacob

30 To Study The Prevalence of Various Risk Factors for OSA and Their Correlation With Severity of OSA in Indian Urban Population
Cdr Anuj Singhal, Lt Col Brahamjit Singh, Col CDS Ka-toch

33 The study of incidence of post operative delirium in sensory impaired patients undergoing coronary artery bypass grafting procedure in a tertiary care hospital
Aswin Rajeev, Sunil K S, Priya Vijayakumar, George Paul

37 Common Errors of Insulin Injection in Patients with Diabetes
Amrithesh A, Harish Kumar, Ashfan Azeez, Akhila M

Case Report

42 Organic or Steroid-induced Mania with Psychotic Symptoms
Rahul Savalgi, Kesavan Kutty Nayar, Chitra Venkateshwaran

Quiz

42 Unrecognised Transfixion of Colon During Percutaneous Endoscopic Gastrostomy
Zubair Mohamed, Syed Sameer Ahmed
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Effectiveness of Jacobson’s Progressive Muscle Relaxation (JPMR) on Hypertension among School going Adolescents

Manjushambika Rajagopal*, Prasanna Baby**, R Vijayaraghavan*, Sushama Bai***

ABSTRACT

Objective: To determine the effectiveness of JPMR on selected biophysiological variables like Blood Pressure (BP) and Heart Rate (HR) among school going adolescents.

Methods: The study was conducted among 145 school going adolescents in Kerala, India. In the first phase of the study, a descriptive Survey design was used to identify adolescents with hypertension. Anthropometry, HR and BP were assessed. Data on background variables, physical activity and eating habits were also collected. In the second phase, Experimental approach with before and after with control design was used. The subjects belonging to pre hypertension, stage-I hypertension and stage-II hypertension according to NHBPEP (National High Blood Pressure Education Programme) guidelines were classified into experimental and control groups. The experimental group was taught and practiced JPMR for a period of 3 weeks.

Results: The prevalence of pre hypertension and hypertension among adolescents was found to be 28.97% (27.87 % among males and 29.76 % among females). The study result showed strong association between hypertension and selected variables like BMI (chi-square value 6.95 (P<0.05); age of study participants chi-square value 6.97 (P<0.05) and the class they were studying chi-square value 8.4 (P<0.05). There was significant reduction in mean HR, Systolic BP and Diastolic BP after practicing JPMR for three weeks P<0.001.

Conclusions: The results showed that JPMR is effective in reducing hypertension among adolescents. The increasing prevalence of hypertension among adolescents recommends need for periodic checking of blood pressure of adolescents at schools, and to implement appropriate measures to control or prevent hypertension among them.

Keywords: Effectiveness, Jacobson’s Progressive Muscle Relaxation, Hypertension and School going Adolescents.

Corresponding Author: Prasanna Baby

INTRODUCTION

Studies have reported increasing incidence of hypertension among adolescents worldwide. WHO (World Health Organization) fact sheet recommends population wide and individual interventions for early detection, prevention and management of hypertension. Cardiovascular diseases (CVD) are one of the causes of death globally. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. An estimated 1.5 million deaths due to CVD per year were reported in India. Prehypertension (PHT) leads to hypertension (HT) and CVD risk. Identification of CVD risk factors in PHT will reduce the burden of HT and CVD in the population. Death from CVD is expected to grow more than 23.6 million by 2030.

The global prevalence of raised blood pressure (defined as systolic and/or diastolic blood pressure ≥140/90 mmHg) in adults aged 18 years and over was around 22% in 2014. The sixth target in the Global NCD action plan calls for 25% reduction in this global prevalence of raised blood pressure. Most cardiovascular diseases can be prevented by addressing behavioral risk factors such as tobacco use, unhealthy diet, obesity, physical inactivity and harmful use of alcohol using population-wide strategies. People with cardiovascular disease or who are at high cardiovascular risk (due to the presence of one or more risk factors such as hypertension, diabetes, hyperlipidaemia or already established disease) need early detection and management.

Hypertension in adolescents is a growing health problem. With globalization bringing more lifestyle modifications, adolescents are exposed to multiple risk factors. It goes unnoticed most of the time, until they reach adulthood. Early identification and appropriate measures to prevent and or control hypertension in childhood is very essential to have a healthy adult population. BP measured in adolescents predicts future BP. Adolescents with BP levels in the higher portion of the BP distribution curve tend to maintain that position over time, which is indicative of BP tracking. The current practice of periodic health assessment in Indian schools include only measurement of height and weight. Blood pressure and heart rate also to be included in periodic assessment for early detection of hypertension, that is to be done by the school health nurses. One important function of nurses is to provide health education. The identified hypertensive children and parents could be given health education on its management.

Hypothesis H1: There will be significant reduction in the mean HR and mean BP of the experimental group.
METHODS
This was a pilot study. The study was conducted in two phases. In the first phase, a descriptive survey design was carried out among 145 adolescents from classes 6th to 12th in two randomly selected schools. Multistage stratified random sampling technique was used. From each school one division was selected randomly from each class. The study subjects were selected randomly from the selected divisions. Ethical committee approval was obtained from the Institutional Ethical Committee of Saveetha University (002/08/2015/IEC/SU). The study was conducted after obtaining written permission from District Director of Education (DDE) and Head Mistress of the selected schools. Assent was obtained from adolescents and informed consent was obtained from their parents. The study was carried out over a period of two months from September 1st to October 30th 2015. The data was collected by the principal investigator. The conceptual framework for this study is based on Betty Neuman’s system’s theory.

Anthropometry
Anthropometry like height, weight, Body Mass Index (BMI), Waist Hip Ratio (WHR) were measured. Height was measured to the nearest centimeter using a tape measure and noted in meters. Weight was measured using a standard balance scale and noted in kilograms. Both the measurements were done while participants standing without shoes. BMI was calculated as a ratio of weight in kilogram by the square of height in meters. BMI interpretation by WHO was used for classification. WC was measured using a flexible tape over the abdomen, with measurements made halfway between the lower border of the ribs and the highest point of iliac crest, while standing. The measurements were made at the end of normal expiration. HC was measured at the widest point over the buttocks when viewed from the side. WHR was calculated by dividing the WC by the HC. WHR 0.80; also the last line 0.85 was classified as obesity.

Blood Pressure and Heart Rate
HR was counted for one full minute by right radial approach. BP was measured using a calibrated mercury sphygmomanometer. Measurements were taken on the right arm of the subjects supported at heart level. Both HR and BP were measured after sitting at rest for five minutes. Measurements were taken on three different occasions in those subjects in whom BP was more than normal during the first reading. Average of all three readings was taken as final observation. The subjects were classified according to the NHBPEP classification.

<table>
<thead>
<tr>
<th>Prehypertension</th>
<th>90th to &lt; 95th percentile or ≥ 120/80 mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 hypertension</td>
<td>95th to &lt; 99th percentile plus 5 mm Hg</td>
</tr>
<tr>
<td>Stage 2 hypertension</td>
<td>&gt; 99th percentile plus 5 mm Hg</td>
</tr>
</tbody>
</table>

Table 1: Prevalence of hypertension among Experimental group and control group

Physical Activity and Eating habits
Questionnaire on background data, Physical Activity and Eating Habits were used for data collection. The questionnaire was designed to collect information on frequency, duration and intensity of a variety of light, moderate and vigorous-intensity physical activities during a typical week. Physical activities were assigned metabolic equivalent of task (MET) values based on the compendium of physical activity and the compendium of physical activity for youth. Questionnaire on eating habits was used to analyze if the participants were following a healthy eating pattern or not. Content validity was established by submitting the tools to experts from the respective fields; and their suggestions were incorporated while finalizing the tools. Reliability of both tools was established by test-retest method. The reliability of physical activity questionnaire was 0.80 and that of eating habits questionnaire was 0.81.

Biochemical profile
Serum creatinine levels were measured for all identified hypertensive cases to rule out any renal cause for hypertension. None of the subjects had abnormal serum creatinine level.

In the second phase experimental approach with before and after with control design was used. The subjects belonging to pre hypertension, stage-I hypertension and stage-II hypertension from both the schools were identified. In order to avoid contamination, cases from one school (32/101) were taken as experimental group, and cases from the second school (10/44) were considered control. The experimental group was taught and practiced JPMR for a period of 3 weeks; daily 20 minutes from Monday to Friday. Saturday and Sunday subjects were advised to continue practice at home. A phone call was made to make sure about the practice.

Jacobson’s Progressive Muscle relaxation (JPMR)
JPMR is a simple relaxation technique including progressive contraction and release of entire muscle groups of the body. The subjects were made sitting comfortably on chair, with closed eyes. The JPMR started with deep
breathing practice, followed by contraction and relaxation of same muscles following an audio commentary, under the supervision of the investigator. First, the facial muscles were contracted for 10 seconds, felt the contraction; then released the muscles for 20 seconds. Continued the process with muscles of neck, chest, abdomen, pelvic muscles, right hand, left hand, right leg, and completed with contraction and relaxation of left leg. Then the subjects experienced the complete relaxation of the body and gradually opened the eyes. The entire practice took about 20 min daily26.

Chi square test of significance was used to test the difference in proportions. A p value of <0.05 was considered as statistically significant. Statistical analysis was done using SPSS version 17.

Figure 1: Class wise distribution of study participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Difference</th>
<th>Standard Deviation</th>
<th>Standard Error of mean</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>7.714</td>
<td>4.413</td>
<td>.834</td>
<td>9.251</td>
</tr>
<tr>
<td>Posttest</td>
<td>89.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>5.357</td>
<td>4.621</td>
<td>.873</td>
<td>6.135</td>
</tr>
<tr>
<td>Posttest</td>
<td>110.64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic BP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>6.179</td>
<td>3.244</td>
<td>.613</td>
<td>10.079</td>
</tr>
<tr>
<td>Posttest</td>
<td>72.64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Effectiveness of JPMR on heart rate, Systolic BP and Diastolic BP
The study findings showed significant association between hypertension and selected variables like age $x^2$ 6.97 ($p<0.05$), class of study $c^2$ 8.4 ($p<0.05$) and BMI $x^2$ 6.95 ($p<0.05$). The other variables like WHR, gender, physical activity and eating habits showed no association with blood pressure among study subjects.

Out of the 32 identified cases in the experimental group, four subjects withheld during the intervention, so excluded in the post test. The remaining 28 adolescents, who completed the three weeks practice of JPMR, were included for analysis. The pretest HR, SBP and DBP of control and experimental groups were compared and were not significant ($p=0.16$, $p=0.48$ and $p=0.04$ respectively) suggesting the homogeneity of the sample. The experimental mean pre-test mean HR was 97.43 as compared to experimental post-test mean HR 89.71. The difference in the mean values (7.71) was statistically significant, $t=9.251$ ($p<0.001$). Similarly, the experimental mean pre-test systolic BP was 116, whereas experimental mean post- test systolic BP was 110.64. The mean difference 5.357 was statistically significant, $t=6.135$ ($p<0.001$). The experimental mean pre test diastolic BP was 78.82, and the experimental mean post test diastolic BP was 72.64. The mean difference 6.179 was statistically significant, $t=10.079$ ($p<0.001$). However, comparison of the post test values of control and experimental groups showed statistically significant difference ($p<0.001$) only for SBP; whereas for HR and DBP there was no significant difference ($p=0.31$ and 0.38 respectively). This showed that the practice of JPMR among adolescents was effective in reducing the HR and BP (Table-2).

**DISCUSSION**

In the present study, the prevalence of pre hypertension and hypertension among adolescents was 28.97%. Studies have reported similar or fewer prevalence. A cross sectional survey conducted among 400 adolescents from government and private schools in Chennai revealed that 86 out of 400 participants (21.5%) were hypertensive. Another study among 410 mid adolescent school children in Nagpur revealed 65 (15.9%) were pre hypertensive and 57 (13.9%) were hypertensive. The percentage of pre hypertension was highest among age group 15 (25%) and least among age 11 (0%). Stage-I hypertension was higher among age 15 years. Pre hypertension (17.9%) and Stage-II hypertension (3.5%) was highest among female, than males 14.3% and 1.7% respectively. A total of 237 (57.8%) children were male and 173 (42.40%) were female. In the present study, 61 (42%) were male and 84 (58%) were female. The prevalence of hypertension among age group 11-13 years was 40% (26/65); compared to 20% (16/80) among adolescents aged 14-17 years.

A trend study conducted in Kerala during 2003-2005 also reported prevalence of hypertension among urban adolescents. Among 20263 students, incident hypertension was seen in 10.58% of total children. Systolic hypertension was seen in 5.84% of children and diastolic hypertension in 6.61%. Among the total children, 10.65% had systolic pre-hypertension and 14.75% had diastolic pre-hypertension. Present study had similar prevalence of diastolic hypertension (6.21%) and lower prevalence of systolic PHTN (8.28%). Systolic hypertension (6.99%) and diastolic pre hypertension (4.83%). Another study among 400 adolescents reported 24.4% prevalence of high blood pressure, which is slightly lower than the present study findings (28.97%).

Present study result showed strong association between BMI and hypertension, chi-square value 6.95 ($p<0.05$). In the present study 35 (26.12%) out of 134 normal weight adolescents were hypertensive. Seven out of 11 (63.63%) overweight adolescents were hypertensive. A trend study conducted among adolescents aged 5-16 years during 2003-2005 in Kerala reported increased incidence of hypertension with obesity. The study findings also show an increasing trend of childhood obesity in a period of 2 years. In 2003, out of 24, 842 students overweight including obesity was found in 4.94%, whereas in 2005 among 20,263 students it had increased to 6.57%. This showed a statistically significant increase (OR: 1.36; 95% CI: 1.25 – 1.47; $p<0.0001$) and was seen in both sexes. The prevalence of incident hypertension in normal weight, overweight and obese groups was 10.1%, 17.34% and 18.32 % respectively. In another study conducted among 400 adolescents, out of 321 normal weight children, 53 (16.51%) were hypertensive; out of 46 overweight children 24 (52.17%) and out of 15 obese children 9 (56.25%) were hypertensive. The study findings showed that being overweight and obese; the chance of becoming hypertensive is more. Comparing the present study findings with the above mentioned study results show that the prevalence of hypertension among normal and obese groups have almost tripled during the past 12 years. This is really an alarming situation.

In the present study, the prevalence of HTN was associated with age of study participants, chi-square value 6.97 ($p<0.05$); and the class they were studying chi-square value 8.4 ($p<0.05$). Similar findings were reported by another study conducted among 400 adolescents in Chennai. In the present study no association was found between hypertension and variables like waist Hip Ratio, physical activity, and food habits. Though relationship between hypertension and these variables have been reported in other studies, in the current study no such significant relationship was shown. Similar findings were reported by another study conducted among 400 adolescents in Chennai.

There is no literature available on effectiveness of JPMR.
among adolescents for hypertension. Relaxation technique is one of the most powerful tools in controlling a number of diseases such as hypertension and insomnia\textsuperscript{21}. Progressive Muscle Relaxation is reported to be an effective psychotherapeutic technique for insomnia and for reducing depression\textsuperscript{22}. JPMR is proven as effective for hypertension among adults. A study among 105 hypertensive college and school teachers was done in 2013 in Maharashtra, India. After the trial session every subject performed supervised JPMR for 30 min. Immediately after which outcome measures were reassessed. There was statistically significant difference in systolic BP (p<0.01), diastolic BP (p=0.05) and Heart rate (p<0.05) in post session\textsuperscript{23}. The study findings showed that there was significant reduction in mean HR (Mean Difference=7.714), systolic BP (Mean Difference=5.357) and diastolic BP (Mean Difference=6.179) after practicing JPMR for three weeks, P<0.001.

The present study findings show an increased prevalence of hypertension among adolescents, which is an alarming situation, necessitating appropriate measures for control and or prevention of HTN among adolescents. The study finding strongly recommends the need for preventive measures focused on adolescents and their parents, so as to avoid hypertensive epidemic in younger population.

Strength and weakness of the study
The researchers employed a well defined methodology. The study can be done among a large sample to generalize the findings; comparison of parameters could be done among rural and urban adolescents.

CONCLUSIONS
Hypertension among adolescents is an emerging trend. Since it is a pilot study, in order to generalize the study findings, the study can be done among a large sample. Nursing implication of the study finding is that; it needs periodic checking of blood pressure at the school level by the school health nurse for early identification and to take appropriate measures\textsuperscript{19, 24}. Controlling hypertension among adolescents shall help in reducing or preventing cardiovascular and other related complications in their adulthood. Keeping in view the increasing prevalence of hypertension, nursing students are to be educated about the importance of monitoring blood pressure of school children. Usually for children during routine hospital visit, only temperature pulse and respiration are recorded; but not the blood pressure. Blood pressure also to be measured during routine hospital visits and also in schools so that any incidence of hypertension among children can be identified early and appropriate measures taken.

Conflict of Interest
The authors declare no conflict of interest. Acknowledgement: The authors are thankful to the study participants, Deputy Director of Education and Head of the schools for granting permission to conduct the study.

REFERENCES
Effectiveness of Jacobson’s Progressive Muscle Relaxation (JPMR) on Hypertension among School going Adolescents


Procalcitonin Levels in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease Admitted to the Hospital


ABSTRACT
Background: Serum procalcitonin (PCT) is considered useful in predicting the likelihood of developing bacterial infections in emergency settings. In this study, we describe PCT levels over time and their relationship with bacterial infection in acute exacerbation of chronic obstructive pulmonary disease (AECOPD) admitted to our hospital.

Methods: It was a cross-sectional study conducted in a tertiary care centre between December 2011 to December 2013. All consecutive patients admitted to our hospital with acute exacerbation of COPD were included. Respiratory samples were tested for the presence of bacteria. Procalcitonin was sequentially assessed and patients classified according to the probability of the presence of a bacterial infection based on the highest PCT (PCT max) levels.

Results: Seventy-six patients were included. Mean PCT max was 0.567 mcg/l with 95% CI(0.361-0.772). Mean PCT max for bacteria, fungi and no growth were 1.002 mcg/l with 95% CI(0.599-1.406), 0.275 mcg/l with CI(0.031-0.519) and 0.187 mcg/l with 95% CI(0.048-0.325) respectively. PCT max levels were less than 0.1 mcg/l in 33(43.42%), >0.1 mcg/l to <0.25 mcg/l in 14(18.42%) and >0.25 mcg/l in 29(38.15%) patients respectively. Total of 33 bacterial and 22 fungal isolates were detected. Out of 33 bacterial isolates, fungi and no growth were 1.002 mcg/l with 95% CI(0.599-1.406), 0.275 mcg/l with CI(0.031-0.519) and 0.187 mcg/l with 95% CI(0.048-0.325) respectively. PCT max levels were less than 0.1 mcg/l in 33(43.42%), >0.1 mcg/l to <0.25 mcg/l in 14(18.42%) and >0.25 mcg/l in 29(38.15%) patients respectively. Total of 33 bacterial and 22 fungal isolates were detected. Out of 33 bacterial isolates, 9 had PCT max levels <0.1 mcg/l, while in 24 (55.8%) had a PCT max levels >0.1 mcg/l.

Conclusions: The study concludes that a PCT level cut off of 0.165 mcg/l with a sensitivity of 69.7% and a specificity of 67.4% in predicting bacterial infection in patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD).

Corresponding Author: Asmita Mehta

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) constitutes a major health problem. Acute exacerbations of COPD (AECOPD) have considerable impact on morbidity, mortality and quality of life. Common triggers for AECOPD include viral and/or bacterial infection of the tracheobronchial tree and air pollution, but the cause of approximately one-third of severe exacerbations cannot be identified.

Patients with signs of bacterial infection and more severe exacerbations seem to benefit from antibiotics. Prescribing antibiotics for viral infections or non-infectious causes of AECOPD is ineffective and increases the risk of toxicity and development of bacterial resistance.

Acute exacerbations are a leading cause of severe respiratory failure in chronic obstructive pulmonary disease (COPD) patients. In this setting, the use of antibiotics is recommended by the recent guidelines. However, bacteria are isolated from the respiratory tract of only approximately 50% of patients with severe acute exacerbation of COPD (AECOPD).

Whether this finding represents colonization or infection is controversial. In contrast, a high prevalence of respiratory viruses has been reported in severe AECOPD requiring ventilation. In this context, a rapid, specific test to identify lower respiratory bacterial infections would be a major advancement, limiting the inappropriate use of antibiotics which is considered to be a main cause of the spread of antibiotic-resistant bacteria.

METHODOLOGY

It was a cross-sectional study. All consecutive COPD patients with acute exacerbation admitted to our hospital between Dec 2011 and Dec 2013 were included in the study. The ethical board approval and informed consent as per guidelines were taken. A clinical questionnaire was prepared and following information were noted: Severity of COPD according to GOLD guidelines, use of home oxygen or non-invasive ventilator, co-morbidities, use of antibiotic therapy and oral steroids during the previous 30 day period, use of antibiotics within 24 hours of admission, physical examination and chest radiograph findings. All the patients were subjected to complete blood count, C-reactive protein (CRP), urine routine, arterial blood gas analysis, ECG, cardiac enzymes, scoring of the disease severity the first day is assessed by Simplified acute physiology score type II (SAPS II). Severity of pneumonia was assessed by pneumonia severity index. All patients were treated according Global initiative for chronic obstructive lung disease (GOLD) guidelines.

STATISTICAL ANALYSIS

Percentage incidence rate of chronic obstructive pulmonary disease with sputum or tracheal aspirate culture positive was computed. To test the statistical significance of the association between procalcitonin value and culture positivity, severity of chronic obstructive pulmonary disease and mortality, CHI SQUARE TEST

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was used. Quantitative variables were compared using the Student t-test or the Mann-Whitney non parametric test, as appropriate.

RESULTS

During the study period, 76 AECOPD patients were admitted. Baseline characteristics of the AECOPD patients are shown in Table 1. Fifty six (73.6%) had severe COPD. Out of 76 patients, 43 had pneumonia. Most of them except 3 belonged to severe pneumonia (PSI class IV and V). ICU admission was required in 59 (77.63%) patients, out of them 24 (31.58%) patients required mechanical ventilation and 42 (55.26%) were started on NIV. The mean length of ICU stay was 4.86 ±2.75 days. The mean length of non-invasive ventilation and invasive mechanical ventilation, during the ICU stay were 3.12 ±1.4 days, 4.46 ±2.37 days, respectively. 56 (73.68%) patients were discharged from the hospital. 20 (26.31%) patients died.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All (n=76)</th>
<th>PCT &lt; 0.1 n=33</th>
<th>PCT 0.1-0.25 n=14</th>
<th>PCT &gt; 0.25 n=29</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>67±8.4</td>
<td>66±8.6</td>
<td>68±8.7</td>
<td>67±8.3</td>
<td>0.769</td>
</tr>
<tr>
<td>Male sex no(%)</td>
<td>72(94.7%)</td>
<td>32(96.9%)</td>
<td>14(100%)</td>
<td>26(89.65%)</td>
<td>0.271</td>
</tr>
<tr>
<td>SAPS II Score</td>
<td>42±11.9</td>
<td>38±13.9</td>
<td>41±9.7</td>
<td>47±8.3</td>
<td>0.007</td>
</tr>
<tr>
<td>Comorbidities no(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smokers</td>
<td>63(82.9%)</td>
<td>28(84.8%)</td>
<td>12(85.71%)</td>
<td>23(79.31%)</td>
<td>0.807</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>39(51.3%)</td>
<td>13(39.39%)</td>
<td>12(85.71%)</td>
<td>14(48.27%)</td>
<td>0.013</td>
</tr>
<tr>
<td>HTN</td>
<td>45(59.21%)</td>
<td>18(54.5%)</td>
<td>6(42.8%)</td>
<td>21(72.4%)</td>
<td>0.139</td>
</tr>
<tr>
<td>CAD</td>
<td>19(25%)</td>
<td>7(21.2%)</td>
<td>4(28.5%)</td>
<td>8(27.5%)</td>
<td>0.798</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>29(38.15%)</td>
<td>12(36.3%)</td>
<td>6(42.8%)</td>
<td>11(37.93%)</td>
<td>0.915</td>
</tr>
<tr>
<td>Severity of COPD no(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>20(26.31%)</td>
<td>2(6.06%)</td>
<td>6(42.8%)</td>
<td>12(41.3%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Severe</td>
<td>56(73.6)</td>
<td>31(93.9%)</td>
<td>8(57.14%)</td>
<td>17(58.62%)</td>
<td></td>
</tr>
<tr>
<td>Home oxygen</td>
<td>13(17.1%)</td>
<td>3(9.09%)</td>
<td>3(21.4%)</td>
<td>7(24.13%)</td>
<td>0.260</td>
</tr>
<tr>
<td>Home NIV</td>
<td>1(1.31%)</td>
<td>1(3.03%)</td>
<td>0</td>
<td>0</td>
<td>0.517</td>
</tr>
<tr>
<td>Fever</td>
<td>31(40.78%)</td>
<td>8(24.24%)</td>
<td>5(35.7%)</td>
<td>18(62.06%)</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Table1: Baseline characteristics of all patients based on PCT max levels

PCT measurements and clinical correlates

The mean PCT max was 0.567mcg/l with 95%CI(0.361-0.772). The mean PCT max for bacteria, fungi and no growth were 1.002 mcg/l [95% CI 0.599- 1.406], 0.275 mcg/l [95% CI 0.031-0.519] and 0.187 mcg/l [95% CI 0.048- 0.325] respectively. The highest PCT (PCTmax) levels were less than 0.1 mcg/l in 33(43.42%) patients, >0.1mcg/l to<0.25 mcg/l in 14(18.42%)patients and >0.25 mcg/l in 29(38.15%) patients.

The mean PCT values at admission was higher in patients who presented with fever than in those patients who did not have fever (p<0.001).

The mean PCT max values were higher in patients with moderate COPD. There is no correlation between isolates and severity of COPD(p=0.785). The PCT max is directly related to the severity of infection and not to the severity of COPD.

The mean PCT max value were correlated with SAPS II score, length of ICU stay, duration of NIV and Mechanical ventilation. The following were the findings.
1. Significant mild positive correlation with SAPS II score (p<0.01) and NIV duration (p=0.003)
2. Significant low positive correlation with length of ICU stay (p=0.028)
3. There was low positive correlation with mechanical ventilation duration but did not show any statistical significance (p=0.111).

Among the 76 patients studied, 43 had pneumonia. The mean PCT max values were higher in patients with higher grades of pneumonia severity index, but there was no statistically significant difference (p=0.122).

### Table 2: Correlation between PCT max and severity of COPD

<table>
<thead>
<tr>
<th>Parameters</th>
<th>No(76)</th>
<th>Mean PCT max</th>
<th>Std deviation</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>20</td>
<td>0.779</td>
<td>0.903</td>
<td>0.007</td>
</tr>
<tr>
<td>Severe</td>
<td>56</td>
<td>0.491</td>
<td>0.895</td>
<td></td>
</tr>
</tbody>
</table>

**PCTmax levels and bacterial findings**

Among the 76 patients, 33 (43.4%) of them had bacterial growth and 22 (28.9%) had fungal isolates. 21 (27.6%) patients had no growth when their sputum/tracheal aspirates were cultured.

### Table 3: Correlation between severity of COPD and isolates

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Bacteria</th>
<th>Fungi</th>
<th>No growth</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>10(50%)</td>
<td>5(25%)</td>
<td>5(25%)</td>
<td>20(100%)</td>
<td>0.785</td>
</tr>
<tr>
<td>Severe</td>
<td>23(41.1%)</td>
<td>17(30.4%)</td>
<td>16(28.6%)</td>
<td>56(100.1%)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Organisms isolated by sputum or tracheal aspirate

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>33</td>
<td>43.4</td>
</tr>
<tr>
<td>Fungi</td>
<td>22</td>
<td>28.9</td>
</tr>
<tr>
<td>No Growth</td>
<td>31</td>
<td>27.6</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>99.9</td>
</tr>
</tbody>
</table>

Thirty three bacteria (14 Pseudomonas aeruginosa, 11 Klebsiella pneumonia, Acinetobacter species and Staphylococcus aureus) were detected. 9 (27.3%) bacteria were detected in patients with PCT max level < 0.1 mcg/l. In contrast, bacteria were detected in 24 (55.8%) patients with a PCT max level > 0.1 mcg/l. The mean PCT max values were higher in patients with bacterial infection. The mean PCT max values between patients who had bacterial infection when compared with patients who had fungal infection and no growth was statistically significant (p<0.001).

However even though patients with fungal infections had higher PCT max value when compared with patients with no growth in culture but the difference was not statistically significant (p 0.679).

### Table 5: Correlation between PCT max and organisms isolated

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Number</th>
<th>Mean PCT max</th>
<th>Std deviation</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>33</td>
<td>1.0029</td>
<td>1.1374</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fungi</td>
<td>22</td>
<td>0.2751</td>
<td>0.5498</td>
<td></td>
</tr>
<tr>
<td>No growth</td>
<td>21</td>
<td>0.1869</td>
<td>0.3032</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>0.5667</td>
<td>0.9001</td>
<td></td>
</tr>
</tbody>
</table>
There is a significant overall low positive correlation between PCT and CRP on admission, third and fifth day. 56(73.68%) patients were discharged from the hospital. 20(26.31%) patients died. The mean PCT max value was higher in patients who died when compared with patients who got discharged. But the difference was not statistically significant.

### Laboratory measurements

<table>
<thead>
<tr>
<th>Days</th>
<th>r (rho) value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>At admission</td>
<td>0.303</td>
<td>0.008</td>
</tr>
<tr>
<td>3rd day</td>
<td>0.427</td>
<td>0.001</td>
</tr>
<tr>
<td>5th day</td>
<td>0.354</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Table 7: Association between PCT and CRP levels at admission, 3rd and 5th day

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number(76)</th>
<th>Mean PCT max</th>
<th>Std deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>20</td>
<td>0.9593</td>
<td>1.2161</td>
<td>0.32</td>
</tr>
<tr>
<td>Discharge</td>
<td>56</td>
<td>0.4265</td>
<td>0.7195</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Correlation between PCT max and outcome.
This study examined microbiological findings and PCT levels in COPD patients admitted with acute exacerbation with or without pneumonia. The distribution of patients according to PCT max levels (ie < 0.1 mcg/L, 0.1 to 0.25 mcg/L, and > 0.25 mcg/L) was similar to those previously reported studies. In previous studies, PCT level < 0.1 mcg/L could indicate a low probability of bacterial infection in approximately 10% of patients. In contrast, in the present study, bacteria were detected in 27.3% and fungi in 36.4% of patients with a mean PCT max value of < 0.1 mcg/l. However, 55.8% of patients had bacterial isolates when the mean PCT max was > 0.1 mcg/l. Thus higher PCT values can predict bacterial infections in patients who present with acute exacerbation of COPD.

In patients with PCT max levels < 0.1 mcg/L, bacteria were detected in 27.3% of cases, suggesting that there can be still infection even if PCT values are in the normal range. However, 55.8% of patients had bacterial isolates when the mean PCT max was > 0.1 mcg/l. Hence we can predict that there is a high chance of bacterial infection if the PCT max value was higher than 0.1 mcg/l but with low PCT max value of < 0.1 mcg/l cannot rule out infection.

Further in the group in which PCT max was < 0.1 mcg/l, 36.4% did not have any growth when their sputum or tracheal aspirate was cultured. When the PCT max was > 0.1 mcg/l only 20.9% had no growth on their culture. Hence subjects with higher PCT max value yielded culture positive isolates.

The mean PCT max values were higher in patients with moderate COPD and the difference was also statistically significant. This may be due to patients with moderate COPD who presented to us would have got more severe infection leading to increased PCT levels in them and also because of small sample size. There is no correlation between isolates and severity of COPD.

We found a statistically significant association between PCT levels on admission and clinical symptoms like fever. The mean PCT max values were also correlated with SAPS II score, length of ICU stay, duration of NIV and Mechanical ventilation. If the PCT max values were high then SAPS II score tend to increase as well the duration of Non invasive ventilation, a significant low positive correlation with length of ICU stay. The correlation of PCTmax with mechanical ventilation duration was not having statistical significance.

A randomized controlled trial comparing Procalcitonin-Guidance With Standard Therapy published earlier showed that procalcitonin guidance reduced antibiotic prescription by 44%, its use did not result in an increase in the relapse of COPD, a decrease in the length time before the next exacerbation, or a more rapid decline in lung function. Patients who were assigned to the procalcitonin group, who received antibiotics, had greater improvement in FEV1 compared to the patients who received antibiotics in the standard-therapy group. Thus, it is tempting to speculate that procalcitonin levels at hospital admission identifies patients who present with more severe or tissue-invasive bacterial infection and hence would most likely to benefit from antibiotic therapy.

It was hence concluded that the results suggest that procalcitonin could be a suitable biomarker of exacerbations of COPD, which may be used to target management for each patient and episode more specifically.

### DISCUSSION

This study examined microbiological findings and PCT levels in COPD patients admitted with acute exacerbation with or without pneumonia. The distribution of patients according to PCT max levels (ie < 0.1 mcg/L, 0.1 to 0.25 mcg/L, and > 0.25 mcg/L) was similar to those previously reported studies. In previous studies, PCT level < 0.1 mcg/L could indicate a low probability of bacterial infection in approximately 10% of patients. In contrast, in the present study, bacteria were detected in 27.3% and fungi in 36.4% of patients with a mean PCT max value of < 0.1 mcg/l. However, 55.8% of patients had bacterial isolates when the mean PCT max was > 0.1 mcg/l. Thus higher PCT values can predict bacterial infections in patients who present with acute exacerbation of COPD.

In patients with PCT max levels < 0.1 mcg/L, bacteria were detected in 27.3% of cases, suggesting that there can be still infection even if PCT values are in the normal range. However, 55.8% of patients had bacterial isolates when the mean PCT max was > 0.1 mcg/l. Hence we can predict that there is a high chance of bacterial infection if the PCT max value was higher than 0.1 mcg/l but with low PCT max value of < 0.1 mcg/l cannot rule out infection.

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It was hence concluded that the results suggest that procalcitonin could be a suitable biomarker of exacerbations of COPD, which may be used to target management for each patient and episode more specifically.
allowing a sustained reduction in antibiotic use for the treatment of COPD both at short-term and long term follow-up.

Prognostic value of procalcitonin in community-acquired pneumonia study published earlier in 2011 concludes that PCT has emerged as a diagnostic biomarker for estimating the likelihood of a bacterial infection requiring immediate antibiotic therapy in CAP and suspected sepsis. In the present analysis, we found a mean PCT max level of 0.625 mcg/L in COPD patients admitted to the ICU for pneumonia, this finding is consistent with previous studies focusing on Community-Acquired Pneumonia (CAP) the mean PCT max values between patients who had bacterial infection when compared with patients who had fungal infection and no growth was statistically significant. The mean PCT max values were higher in patients with higher grades of Pneumonia severity index but their difference was not statistically significant.

Interestingly the mean PCT max value was higher in patients who died (20 patients of the 76 studied) when compared with patients who got discharged. But the difference however was not statistically significant. Six of the 20 patients (30%) who died had a PCT max of < 0.1 mcg/L. Hence deaths were also seen in patients who had low PCT max levels. PCT cannot be used as a prognostic marker in patients with acute exacerbation of COPD. However, 14 of the 20 patients (70%) who died had higher PCT max levels suggesting that death was more common in patients who had high mean PCT max values (0.9593 mcg/L).

One potential drawback in this study is that viral culture was not done in any of the patients who presented to us with COPD exacerbation. Hence in those patients who had no growth in their sputum or tracheal aspirates, we are not sure it was really no isolates or a viral infection.

The area under the curve is 0.764 (95% CI 0.655 to 0.873) with a p value of < 0.001. We found out the cut of value of PCT max is 0.165 mcg/l with a sensitivity of 69.7% and a specificity of 67.4%.

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A Study of Psychiatric Comorbidities and Executive Function-Deficits in First Degree Relatives of Alcoholics

Subhashini M*, Kesavankutty Nayar*, Bindu Thomas*, Sandhya Cherkil*

ABSTRACT
Background and aims: Psychiatric co morbidities and executive function deficits are more commonly seen among the individuals prone to alcoholism. Though environmental factors play a role, the recent technological advances in genetics highlight the possibility of genetic vulnerability that the children of alcoholics are exposed to the same as well. Existing literature reports an upheaval in the prevalence of psychiatric disorders among first degree relatives of alcoholics than the same in non-alcoholics. Our study aims to screen the first degree relatives of alcoholics with the use of a validated screening tool. We also aim at studying the executive function deficits among the first degree relatives of alcoholics.

Methodology: A case-Control analysis of 30 consecutive first degree relatives of alcoholics who satisfied the inclusion and exclusion criteria was done in Amrita Institute of Medical Sciences and Research Center. The patients were studied from September 2012 to March 2014. Details of the selected participants in the study were collected with the help of a Patient in formation sheet. Patients were then screened for psychiatric disorders using M.I.N.I screen 6.0 and executive function deficits were assessed with Trail making tests and the scores were duly noted on the subscales respectively.

Results: As per the distribution of sex, among the cases, 19(63%) were males and 11(37%) were females. In the control group, 15(50%) were males and females respectively. Among the males, 13(43%) were sons, 4(13%) were brothers, 2(7%) were fathers of alcoholic patients. Among the females who were first degree relatives of alcoholics, 8(27%) were daughters, 3(19%) were sisters. Whereas in control groups, 12(40%) were daughters, 9(30%) were sons and 6(20%) were brothers and 13(3%) were mothers of non-alcoholics. The predominant age group among males and females were 31- 42 years. In cases, they were 40% and in controls 37%. People in the age group 18-30 years were 27% among cases, 33% among controls, 27% belonged to age group between 43-55 years in both cases and controls respectively. Only 6% of the cases belonged to the age group 56-65 years among the cases and 3% among the controls.

Conclusion: The first degree relatives of alcoholics are more prone to psychiatric disorders and executive function deficits when compared to the respective control group. They must be given proper psychosocial and psychopharmacological intervention if required. The need to abstain from alcoholism should be strictly advised. A combination of (a) a population-based approach reducing overall consumption and (b) a high-risk approach targeting high-risk behaviour is essential to reduce the impact of the signature pattern of hazardous alcohol use in the country.

Corresponding Author: Kesavankutty Nayar

INTRODUCTION
Alcoholism has been a major problem in India for over a few decades. The “Global status report on alcohol and health 2014” provides country profiles for alcohol consumption in the 194 WHO (World Health Organization) Member States and likewise its impact on public health and policy responses. Today, across the globe, around 3.3 million people die every year due to harmful use of alcohol and presents 5.9% of all deaths. In general, 3.5% of the global burden of diseases is attributed to alcohol, which accounts for as much death and disability as tobacco and hypertension.

The psychiatric co morbidities in alcoholics have been cited in various studies. A recent research has identified the risk of Personality disorder5 in children of alcoholics. Anxiety disorders and long-term adjustment difficulties are also common among the children of alcoholics. It has been observed that amongst anxiety disorders, the life-time risk for panic disorder in close biological family members of alcoholics is 3.4%; for agoraphobia, 1.4%; for social phobia, 2.3%; and for obsessive-compulsive disease, 1.4%. The possibilities of other psychiatric co morbidities have also been researched widely.

METHODOLOGY
A case-Control analysis of 30 consecutive first degree relatives of alcoholics who satisfied the inclusion and exclusion criteria was done in Amrita Institute of Medical Sciences and Research Centre. The patients were studied from September 2012 to March 2014. Details of the selected participants in the study were collected with the help of a Patient in formation sheet. Patients were then screened for psychiatric disorders using M.I.N.I screen 6.0 and executive function deficits were assessed with Trail making tests and the scores were duly noted on the subscales respectively.

Based on the available data, no study covering all the psychiatric co morbidities (as per M.I.N.I screen 6) in first degree relatives of only alcoholics and executive function deficits in first degree relatives of alcoholics above the age of 18 years could be located in the existing lit-
RESULTS

As per the distribution of sex, among the cases, 19(63%) were males and 11(37%) were females. In the control group, 15(50%) were males and females respectively. Among the males, 13(43%) were sons, 4(13%) were brothers, 2(7%) were fathers of alcoholic patients. Among the females who were first degree relatives of alcoholic, 8(27%) were daughters, 3(19%) were sisters. Whereas in control groups, 12(40%) were daughters, 9(30%) were sons and 6(20%) were brothers and 1(3%) were mothers of non-alcoholics. The predominant age group among males and females were 31-42 years. In cases, they were 40% and in controls 37%. People in the age group 18-30 years were 27% among cases, 33% among controls, 27% belonged to age group between 43-55 years in both cases and controls respectively. Only 6% of the cases belonged to the age group 56-65 years among the cases and 3% among the controls.

As per the distribution of religion, Hindus were 21(70%) and 27(90%) in cases and controls respectively. Christians were 9(30%) and 3(10%) in cases and controls respectively. As per the distribution of education, 16(54%) of the cases had completed their pre-degree and 13(43%) had completed their graduation and above (post graduation as well) and 1(3%) had completed SSLC. In control group, graduates were more (28(93%)) common and 2(7%) had completed pre-degree. Kerala being the state with the highest literacy rate, none of the individuals included in the study were illiterate. 14(47%) of the cases were unemployed, 11(37%) were professional, 4(13%) were clerks and 1 (3%) was labourer. In the controls, 28(93%) were professionals and 2(7%) were clerks. It was observed that most of the cases were unemployed and this may be because most of the daughters included in the study were housewives and students belonging to the age group 18-30 years. This variation between the controls and cases could be because many of the individuals were graduates and professionals. The family income of most of the cases and controls ranged between 30000-50000 rupees. Majority of the study population belonged to Nuclear family type with 23(76%) and 22(37%) in cases and controls respectively. Care giving of the alcoholic dependent was predominantly not shared in most of the cases (22(73%)).

The number of years a patient remained an alcoholic for an estimated duration of 3-4 years predominantly (50%) and the average number of hospitalization were more than 4 years (47%). The average expenditure on medicines and hospitalization was more than 2000 rupees (53%). Subsequently, financial stress was an inevitable burden (60%) within these families. Both in 30 cases and controls, there was no history of psychiatric illness and no history of any neurological illness which may contribute to significant neurological deficits. Eg. History of traumatic brain injury, epilepsy etc in both cases and controls. All these were statistically insignificant.

We administered M.I.N.I screen to all the first degree relatives of alcoholics and non-alcoholics. Out of the 30 cases, 8(26.7%) of them had screened positive for mania and 22(73.3%) did not screen positive for it. None of the controls screened positive for mania, indicating higher prevalence of mood disorder in first degree relatives of alcoholics compared to first degree relatives of alcoholics. This is observed to be statistically significant.

It was also observed that 8(26.7%) of 30, the first degree relatives of alcoholics had Post-traumatic Stress Disorder (PTSD). Whereas, none of the first degree relatives of non-alcoholics had the same. This observed data was statistically significant (p<0.05). This indicates that the first degree relatives of alcoholics are at a higher risk of developing PTSD when compared to the first degree relatives of non-alcoholics.

In the study, 15(50%) of the first degree relatives of alcoholics had alcohol dependence and 4(13%) of the first degree relatives of non-alcoholics had alcohol dependence. The observations were statistically significant (p value<0.05). This indicates that the first degree relatives of alcoholics are more prone to developing alcohol addiction than the controls.

As per the screening tool used in the study, substance abuse other than alcohol was included under drug use. Out of the 30 first degree relatives of alcoholics, 3(10%) were reported as using psychoactive substances other than alcohol. Whereas such a practice was not seen in any of the first degree relatives of non-alcoholics. The observed data was found to be statistically significant (p <0.05). This indicates that first degree relatives of alcoholics are more prone to other illicit drug use as well. In the study population, 7(23.3%) of the first degree relatives of alcoholics reported of having somatoform disorder, out of the 30 individuals. Somatoform complaints were not reported by any of the first degree relatives of alcoholics. The result observed was statistically significant (p <0.05). This indicates that first degree relatives of alcoholics have higher risk of acquiring somatoform disorder when compared to the non-alcoholics.

It was found that Major depressive disorder was seen in 15(50%), suicidality in 5(6.7%), Panic disorder in 2(6.7%), Agoraphobia in 41(13.3%), Social phobia in 5(16.7%), obsessions in 2(6.7%). Psychotic disorder in 3(10.0%), Anorexia in 2(6.7%), Bulimia in 4(13.3%).
DISCUSSION

This study was undertaken in the background of the wide difference in the prevalence of psychiatric co morbidities and executive function deficits in first degree relatives of alcoholics when compared to controls. The statistical significance was present when Trail A of both the first degree relatives of alcoholics and non-alcoholics were compared. However, no statistical significance was observed for Trail B when executive functions of first degree relatives of alcoholics and non-alcoholics were compared. Thus, summarizing the results, Mania, Post-traumatic Stress Disorder (PTSD), Alcohol dependence, Drug Abuse, Somatoform disorder were found to be commonly seen in first degree relatives of alcoholics than non-alcoholic controls. This was found to be statistically significant. Social phobia and ASPD had a borderline statistical significance. There was a higher percentage of other psychiatric disorders, as mentioned above, seen among first degree relatives of alcoholics when compared to nonalcoholics but were not statistically significant.

Major depressive disorder was screened positive for 15(50%) out of the 30 cases and it was not seen in the controls of non-alcoholic first degree relatives. The observed result was not statistically significant with a p value of 0.08. The prevalence of co morbid mania does seem to be elevated in alcoholic subjects themselves in Collaborative Study on the Genetics of Alcoholism data set. Co morbid alcoholism and mania were also more likely to appear in relatives of co morbid (alcohol dependent and manic) probands, as suggested by the study. This may also suggest that first degree alcoholics are more prone to developing Mania than the control groups.

Panic disorder was screened positive in 2(6.7%) out of the 30 cases and it was not seen in the controls of non-alcoholic first degree relatives. This was found to be statistically significant (p value=0.472). Schuckit MA described the rates of four major anxiety disorders in 591 interviewed first degree relatives of alcohol dependent men and women. They proposed that the relationship between alcohol dependence and lifelong major anxiety disorders were complex. The lifetime risk for panic disorder in close biological family members of alcoholics is 3.4%; for agoraphobia, 1.4% for social phobia, 2.3%; and for obsessive compulsive disease, 1.4%. These data
did not indicate an exceptionally high rate of anxiety disorders among close relatives of alcoholics, according to their study.

More results were studied to analyze the prevalence of psychiatric co-morbidities such as Agoraphobia (13.3%), Social phobia (16.7%), Obsessive compulsive disorder (6.7%), anorexia (6.7%), bulimia (13.3%), somatoform (23.3%) etc. See chart (1)

Antisocial personality disorder were observed in 5(16.7%) first degree relatives of alcoholics and none of the controls had reported similar observations, suggesting a higher percentage of antisocial personality disorders in them. It was observed that this data was statistically significant with a p value of 0.062 (<0.05). This observed statistical significance is consistent with other studies which have looked into the antisocial personality disorder. One such study was conducted by Mathew et al11 who used data from the National Institute of Mental Health Epidemiologic Catchment Area (ECA) project, specifically from the Piedmont of North Carolina. The prevalence of psychiatric disorders was estimated in 408 ECA participants who reported drinking problems in their mother, father, or both and in 1,477 age and sex-matched subjects who did not report having alcoholic parents. They found that the adult children of alcoholics showed significantly higher current (6-month) prevalence rates of simple phobia and agoraphobia and lifetime rates of dysthemia, generalized anxiety disorder, panic disorder, simple phobia and agoraphobia. They also found that adult children of alcoholics had significantly more antisocial problems. These male children of alcoholics had a significantly higher rate of lifetime diagnoses of alcohol and drug abuse than men who were not children of alcoholics. More female children of alcoholics had generalized anxiety disorder than women who were not children of alcoholics. Both male and female children of alcoholics had significantly more antisocial symptoms than their matched comparison subjects. Sons of alcoholic fathers had a higher rate of substance abuse and more antisocial symptoms than the daughters of alcoholic fathers. Daughters of alcoholic fathers had a higher rate of generalized anxiety disorder.

Executive Function deficits were prevalent in higher rates in first degree relatives of alcoholics when compared to the same in non-alcoholic. There was a significant statistical difference in observed results were not statistically significant. This was consistent with the study on a family study of alcohol as well13. They proposed that their data did not indicate an exceptionally high rate of anxiety disorders among close relatives of alcoholics and that other mechanisms might contribute to relationship between alcoholism and major anxiety disorders, the results do not support evidence of a genetic overlap.

Post-traumatic stress disorder was reported in 8(26.7%) out of 30 subjects and not seen in any of the controls and it was found to be statistically significant with p value of 0.08 (p<0.05). This indicated that Post-traumatic stress disorder may be more commonly seen in first degree relatives of alcoholics when compared to those of non-alcoholics. This was different from that observed in a family study of alcohol dependence12.

Alcohol use amounting to addiction was seen in almost all the men in the study sample. 15(50%) out of 30 individuals reported consuming and being dependent on alcohol. This result was considered to be statistically significant with p value of 0.06. This was consistent with many other studies which proposed that off springs of alcoholics were at an increased risk of alcohol abuse. (Marmorstein et al 2009; Colniger et al14 reported that the 2 sexes are equivalent in genetic load for alcohol dependence and that differential expression of the illness in the 2 sexes is related to non-genetic factors. But such difference in sex was not reported in the cases of the study sample. This suggests that first degree relatives of alcoholics are more vulnerable in developing alcohol dependence when compared to the respective controls (13.3%). The more prevalence of alcohol dependence among control group could be explained by the higher rate of alcohol dependence in the state of Kerala as mentioned earlier in this study.

Drug abuse, other than alcohol was reported in 6(20%) subjects out of the 30 cases. A list of various psychoactive substances has been mentioned in the M.I.N.I screen and the results suggest that the first degree relatives of alcoholics are more prone to drug abuse, excluding alcohol. This observation was statistically significant with p value of 0.031(p<0.05). This is consistent with studies showing evidence for a generalized genetic predisposition to substance dependence15-18 as well as specific factors related to alcohol dependence. Many studies have proposed the preponderance to the use of other illicit substances (Marmorstein et al 2009; Chassin et al, 199919). Support for genetic factors for substance dependence other than alcohol would require probands with other forms of substance dependence (which is beyond the scope of this study).

Generalized anxiety disorders were screened positive for 6(20%) cases out of 30. Indicating a higher percentage of these disorders being more in first degree relatives of alcoholics than non-alcoholic relatives but statistical significance was not found. This was not consistent with other studies. A study was conducted by El-Guebalyz et al20 on adult children of alcoholics in treatment programs for anxiety disorders and substance abuse and they found that first degree relatives of patients with alcoholism and anxiety disorders had a Trail A between the cases and controls with p value<0.001. There was no statistical difference seen in Trail B between the first degree relatives of alcoholics and non-alcoholics. The Mean difference between the cases and controls is beyond the scope of this study.

Executive Function deficits were prevalent in higher rates in first degree relatives of alcoholics when compared to the same in non-alcoholic. There was a significant statistical difference in observed results were not statistically significant. This was consistent with the study on a family study of alcohol as well13. They proposed that their data did not indicate an exceptionally high rate of anxiety disorders among close relatives of alcoholics and that other mechanisms might contribute to relationship between alcoholism and major anxiety disorders, the results do not support evidence of a genetic overlap.

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alcoholics were more prone to executive function deficits when compared to those of the nonalcoholics. The findings reiterate the observation by Spadoni et al; Norman et al, Schweinsburg et al, & Tapert et al, 2008 that working memory deficits are found in the adolescent children of alcoholics. This cognitive dysfunction seen in first degree relatives of alcoholics can be established as the endophenotypes.

The study has its own limitations. The study population consisted of the first degree relatives of those whose sole addiction is to alcohol other than substances like tobacco etc. The sample size taken would not represent the entire population. Alcoholic females were absent because in a traditional society like in India, it is impossible to monopolize the generic social stigma associated with females drinking. The availability of the first degree relatives was also limited, especially those above the age of 18. The study involved screening of first degree relatives of alcoholics only. While using the tests for executive function deficits, a test battery was not used and other confounding variables (psychiatric co morbidities) were not adjusted. The alcoholic patients, whose first degree relatives were taken into the study, were not screened for any psychiatric disorders other than alcohol dependence and were not screened for any executive function deficits.

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Evaluation of Mid-trimester Amniocentesis Markers with Obstetric Outcomes

Sujatha Narayanamoorthy*, Laxmi Padmanabhan*, Radhamany K*

ABSTRACT

Background: Pre-term delivery, intrauterine growth restriction and hypersensitive disorder in pregnancy are serious problems in obstetrics.

Aim: Our aim is to compare the concentrations of C-reactive protein (CRP), glucose and lactate dehydrogenase (LDH) in mid-trimester amniotic fluid of patients with obstetric outcomes such as Pre-term delivery, intrauterine growth and hypersensitive disorder in pregnancy.

Materials and Methods: The study was conducted among 55 pregnant women who underwent genetic amniocentesis between the 15th and the 20th weeks of gestation. The samples were carried immediately to the laboratory for cytogenesis and biochemical examination. Results were reported as mean ± standard deviation (SD). Mc Nemar’s Chisquare test was employed to test the statistical significance of the disagreement in the test with the outcome. Association of these markers with Intrauterine Growth (IUGR) and gestational hypertension were tested applying Chi square test. For non-normally distributed variable, the Student’s test or non-parametric Mann-Whitney U-test was used for the comparison of continuous variables. Whereas, the categorical variable was compared using the chi squared or Fisher’s exact test, between the two groups. Receiver-Operating Characteristic curve analysis was used for finding an adequate cut-off of these markers with preterm and term labor.

Results: It was observed that the CRP and LDH level in Amniotic Fluid (AF) were high among those patients with obstetric outcomes such as preterm delivery and IUGR respectively. CRP value was found to be higher among hypersensitive group due to the difference in variation in the value making hypertensive and normotensive groups.

Conclusion: This study shows that CRP and LDH levels in AF could be a conspicuous symptom which would help detect preterm delivery and pre-existing intrauterine growth.

Key words: Amniocentesis, preterm labour, hypersensitive disorder of pregnancy, intrauterine growth.

INTRODUCTION

Preterm delivery accounts to 70% of perinatal mortality and is a key contributing factor to long-term neurological morbidity. The two most important pathologies indicated are acute inflammation and placental ischemia. Placental dysfunctioning has been associated with intrauterine growth restriction and hypertensive disorder of pregnancy. Placental dysfunction happens in about 3% of pregnancies.

C-reactive protein (CRP) is an acute-phase protein that is synthesized in the liver after the onset of inflammation or acute tissue injury. Elevated concentrations of CRP in peripheral circulation have been associated with the presence of intrauterine infection. Literature states that elevated fluid CRP concentrations have been noted among women with intrauterine infections and PPROM.

Lactate dehydrogenase (LDH) catalyzes the reversible oxidations of lactate to pyruvate in the final step of glycolytic pathway. It is a marker of acute inflammation in body fluids. Its elevated level in amniotic fluid may indicate subclinical chorioamnionitis which is responsible for preterm labour.

Moreover, Low glucose concentration is used as a marker for detecting infection in cerebrospinal fluid. Recently, the evaluation of amniotic fluid glucose concentration in the amniotic fluid has been reported in the detection of microbial invasion of the amniotic cavity in patients with PTL and PPROM.

MATERIALS AND METHOD

This was a prospective study conducted in the departments of Obstetrics and Gynecology and Division of Perinatology at Amrita Institute of Medical Science between January 2013 and October 2014. The sample size was chosen based on the accuracy of AF CRP, LDH and glucose with respect to the obstetric outcome from earlier scientific publications.

Primary Aim: To correlate the AFC- Reactive Protein (CRP), Lactate Dehydrogenase (LDH) and glucose taken at the time of mid trimester amniocentesis with term and preterm labour.

Secondary Aim: To evaluate the relation between the above mentioned markers and IUGR and gestational hypertension.

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With 95% confidence and 80% power, the minimal sample size was deduced to be 40. A total of 60 pregnant women were included in this study. All patients were evaluated on the basis of strict inclusion criteria. Women above 18 years of age with singleton pregnancy between 15 to 20 weeks of gestation were preferred. Moreover, screen positive mothers (first trimester, second trimester, triple or quadruple screening test) with absence of congenital malformations and chromosomal abnormalities were chosen. The study also had strict exclusion criterion based on the congenital anomaly in foetus and H/o medical disorders in mothers. Written informed consent was obtained from all patients. Following the amniocentesis all the pregnancies were inspected until delivery. Among the 60 pregnancies which were observed and followed, 5 of them were eliminated from the study group as the babies were detected to have congenital anomalies later. The rest were followed up and watched for IUGR, gestational hypertension and PTL.

RESULTS
Results were reported as mean ± standard deviation (SD). McNemar’s Chi square test was applied to test the statistical significance of the disagreement in the test with the outcome. Association of these markers with IUGR, gestational hypertension was tested applying Chi square test with the outcome. Continuous variables were compared using the student’s test or Non-parametric Mann-Whitney U-test for non-normally distributed variable, and categorical variable were compared using the Chi squared or Fisher’s exact test, between the two groups. For statistical analysis, the SPSS version 20.0 was used. All P-values were two-tailed, with statistical significance defined by P <0.05.

During the study period 60 pregnant women were prospectively followed up after undergoing genetic amniocentesis. (Out of which, 5 patients were eliminated as their pregnancy was terminated for diagnosed congenital anomalies). Indications for amniocentesis included abnormal first trimester or triple test in 28 patients (51%), unossified nasal bone in 7 patients (12%), advanced maternal age in 3 patients (5%), previous history of foetus with spinal muscular atrophy or congenital anomalies in 7 patients (12%) and history of previous pregnancies with chromosomal abnormalities 10 patients (20%), see Figure 1.

Three groups were considered in this study namely preterm delivery versus term delivery, IUGR versus normal fetal growth and gestational hypertension versus normotensive pregnancy. There was no statistical difference noted in the three groups with respect to maternal age, indication for amniocentesis, gestational age at amniocentesis, parity, location of placenta and history of preterm delivery.

Figure 2 shows the percentage of preterm and term deliveries involved in this study. The preterm deliveries were between 32 weeks and 37 weeks of gestation. 5 patients, out of those 6 who underwent pre-term delivery, had developed premature prelabour rupture of membrane (PPROM) and one had spontaneous preterm delivery.

Table 1 shows the age of patients, values of CRP, LDH and glucose between term and term and preterm de-
livery. It is inferred that though the above mentioned values did not show a statistical significance, CRP values showed an increasing trend among women who underwent preterm delivery.

Receiver-operator characteristic (ROC) curve analysis was performed to evaluate the screening efficiency of AF LDH, CRP and glucose in predicting preterm delivery. The cut point of 0.16 mg/L, 58 ng/mL and 78 IU/L was considered for CRP, glucose and LDH, respectively from the ROC curve analysis.

Table 5 shows the sensitivities, specificities, positive predictive value (PPV), negative predictive value (NPV) for AF CRP, glucose and LDH in the identification of preterm delivery at the time of genetic amniocentesis.

The growth of foetus in this study is shown in Figure 4. Table 6 presents the age and AF markers among the IUGR complicating pregnancy and pregnancies of normal growth of foetus.

It is observed from Table 6 that though the values of CRP, LDH and glucose did not show a statistical significance, it was noted that LDH values were higher among the pregnancies with IUGR.

It was noted that AF CRP value was higher among the hypertensive group. However, this finding was due to the difference of variation in the value making the two groups heterogeneous. In this analysis the heterogeneity was taken care of. This is shown in Table 7: Comparison of age and AF markers with blood pressure.
It was found from this study that there was an increasing trend in concentrations of midtrimester AF CRP among the women who underwent preterm. While the mean of AF CRP in this study was noted to be 0.23 mg/L in preterm delivery, the study by Ghezzi et al. showed a mean value of AF CRP to be 0.11 mg/L. The optimum cut-off value of CRP based on the ROC curve analysis in the present study, the study by Ghezzi [6] and Ozer [7] were noted to be 0.16 mg/L, 0.11 mg/L and 0.65 mg/L respectively. The table depicting the validity parameters of the three studies is shown in table 8.

A contradicting report was given by Borna et al. who though found the cut-off of CRP of 0.1 mg/L having sensitivity of 30% and specificity of 80%, was incapable of suggesting a reliable marker for predicting preterm labour. CRP is an acute-phase reactant protein that is synthesized by the liver cells in response to pro-inflammatory cytokines. Endothelial dysfunction has been postulated as an exaggerated maternal inflammatory response to pregnancy. Yudkin et al. indicated that CRP is strongly associated with markers of endothelial activation and dysfunction. Therefore, this study supports the theory that a pre-existing intrauterine inflammation in the first half gestation may be a possible condition for preterm delivery.

This study showed a higher value of midtrimester AF CRP among women who developed gestational hyper
tension. Gestational hypertension is a dreadful disorder of pregnancy. The aetiology of endothelial dysfunction in hypertensive disorder of pregnancy is not known, but it has been postulated to be a part of an exaggerated maternal inflammatory response to pregnancy. Systemic maternal inflammatory response is responsible for endothelial dysfunction which leads to abnormal vaso-motor regulation, increased vascular permeability and thrombosis which are the features of hypertensive disorders in pregnancy. Batashi et al\(^6\) concluded that the value of CRP was higher in women with preeclampsia compared to women with normal pregnancy. Hawang et al\(^11\) proved that the CRP level was positively correlated with pregnancy duration in healthy women and could be used as a severity marker in women with hypertension in pregnancy. Myles et al\(^12\) reported higher level of CRP compared with control in first trimester pregnancy that subsequently developed preeclampsia. Cytokines are released by vascular endothelium, leucocytes, lymphocytes and macrophages at the trophoblastic decidua interface elevated in preeclampsia. A cascade of markers including IL and TNF alpha including CRP rise as a consequence of these reactions and elevation of their levels has been suggested as predictors of gestational hypertension and preeclampsia. However in contrary to the present study which showed a rising trend of AF CRP in hypertensive group, AF CRP did not show any correlation with gestational hypertension\(^13, 14\).

In this current study, LDH was found to be at an increasing level among patients with IUGR. Comparable to the current study, Borna et al\(^14\) found AF LDH to be effective in predicting growth restricted foetus. Mid-trimester AF LDH concentration>140 IU/l was found out to be an optimal cut-off value for prediction of IUGR with a sensitivity of 87.5% and a specificity of 82%. The positive predictive value of IUGR was 22.7% in these women. While the mean value of AF LDH among the IUGR patients was found to be 73.6 IU/l, the mean of AF LDH concentration in the study by Borna et al. was 99 IU/L with a range of 63-120 IU/l.

L. LDH has a key role in the interconversion of pyruvate and lactate when oxygen is absent or in short supply. It is involved in carbohydrate metabolism by the anaerobic pathway for ATP production. Increased LDH level is associated with ketone metabolism (by placental cells) which is a major source of methylglyoxal in growth retarded babies\(^15\). Cellular damage causes an elevation in tissue levels of ALP; implying that when there is an injury like sepsis, hypoxia or ischemia, the cells increase in LDH levels. LDH is then released into the blood stream and AF where it is identified in higher level than normal. It reflects on the changes in the vascular endothelium. Elevated AF LDH levels therefore reflect on activated host defense mechanisms. Stefanoviae et al\(^11\) found that elevated LDH levels in AF of women with IUGR.

<table>
<thead>
<tr>
<th>Study</th>
<th>Cut-off CRP (mg/dL)</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present study</td>
<td>0.16</td>
<td>65.00%</td>
<td>33.00%</td>
</tr>
<tr>
<td>Ghezzi et al</td>
<td>0.11</td>
<td>80.80%</td>
<td>69.50%</td>
</tr>
<tr>
<td>Ozer et al</td>
<td>0.65</td>
<td>92.90%</td>
<td>72.20%</td>
</tr>
<tr>
<td>Borna et al</td>
<td>0.1</td>
<td>30.00%</td>
<td>80.00%</td>
</tr>
</tbody>
</table>

Table 4: Correlation of glucose values with term and preterm deliveries

CONCLUSION

This study shows that CRP and LDH levels in AF could be a conspicuous symptom which would help detect preterm delivery and IUGR in advance. Evaluation of mid-trimester LDH was found to be quite effective in the prediction of preterm delivery and pre-existing intrauterine.

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Evaluation of Mid-trimester Amniocentesis Markers with Obstetric Outcomes


Establishment of Reference Ranges of Hematological Parameters In a Tertiary Care Center

Arya B*, Shiva Mathur*, Geeta Vidyadharan*, Anu Catherine Jacob*

ABSTRACT
Objective: This study has been conducted to establish the reference ranges of hematological parameters in a tertiary care center.
Methods: The study is based on blood samples collected from a total of 180 male and female individuals of ages between 22-54 years. The study population consisted of 90 males and 90 females from various districts of Kerala. Analyzers COULTER LH 780 and CELL DYN RUBY used for hematological parameters.
Conclusion: RBC count, HGB and HCT showed statistically significant difference between males and females in three age group, the MONO count in males was seen to be significantly higher than females within the age group of 44-54 years, the EOS count showed that the female was significantly higher values than males of age group 22-32 years. PLT count in females was seen to be significantly higher than male within the age group of 33-43 years.

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INTRODUCTION
Reference ranges are sets of values by the health professionals to interpret patient test values and are considered as the most authoritative tools in laboratory science, to assist in decision making phase, hence useful for patient care. They are defined as the prediction interval between which 95% of values of a reference group fall into, in such a way that only infrequently 2.5% of the time a sample value will be less than the lower limit of this interval, and 2.5% of the time it will be larger than the upper limit of this interval, whatever the distribution of these values. The concept of reference values was introduced in 1969 by Grasbeck and Saris to describe fluctuations of blood analyte concentrations in well-characterized groups of individuals. Reference ranges for the same methods or instruments may differ between laboratories and in accordance to different geographic areas. A number of factors affect hematological values in apparently healthy individuals. The factors could influence these values due to demographic variables such as gender, ethnic origin and age, as also the technique and timing of blood collection, transport and storage of specimens, differences in the subjects posture when the sample is taken, prior physical activity.

Hematological values for the normal and abnormal may overlap, and a value within the recognized normal range may be definitely pathological in a particular subject. For these reasons the concept “normal values” and “reference range” has been replaced by reference values and hence reference range is defined by reference limits and obtained from measurements on the reference population for a particular test.

A measured or observed laboratory test result from a person (usually a patient) is compared with a reference interval for the purpose of making a medical diagnosis, therapeutic management decision or physiological assessment. For example, a high WBC count (leukocytosis) may signify an infection (bacterial or viral) somewhere in the body or, less commonly, it may signify an underlying malignancy and also in pregnancy. Therefore, each laboratory should establish a data bank of reference values that take account of the variables mentioned earlier.

METHODS
The data presented in this study is based on hematological parameters collected from male and female population of age between 22 – 54 years and is further divided into three groups (22 – 32, 33 – 43, 44 – 54) years. It consists of 90 males and 90 females, all hailing from various districts within Kerala state. The study was conducted at Amrita Institute of Medical Science and Research Centre from October 2015 to April 2016.

INCLUSION CRITERIA
Patients visiting out – patient department of our tertiary care hospital for routine evaluation under health check up category were included for this study. All patients selected were clinically asymptomatic and apparently healthy. Only patients who showed a completely normal CBC with no flags and normal values (machine specified) for all hematological parameters were further evaluated for the study. The blood samples were drawn into EDTA BD Vacutainer®. Na citrate 0.109M, 3.2%; subsequent mixing of blood with anticoagulant .

Analyzers Coulter LH 780 and CELL DYN RUBY were used for whole – blood analysis of hematological parameters and sample listing was carried out within 2 hours of sample collection.

This automated instrument gives result for White Blood Cell (WBC), Red Blood Cell (RBC), Hemoglobin (HGB), Hematocrit (HCT), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpus-
cicular Hemoglobin Concentration (MCHC), Red cell Distribution Width (RDW), Neutrophil (NEU), Lymphocyte (LEU), Monocyte (MONO), Eosinophil (EOS), Basophil (BASO), Platelets (PLT), Mean Platelet Volume (MPV). The hematology analyzers were calibrated by standardized commercially prepared calibrators. The manufacturer’s stabilized whole blood controls, third party controls provided by BIO RAD were used to monitor the analyzers performance.

STATISTICAL ANALYSIS

The data were collected, organized, and tabulated using the statistical package for the Social Sciences Version 20 (SPSS). A P value <0.05 was considered to be statistically significant and P<0.01 to be highly significant.

RESULT

A total of 180 healthy volunteers (90 males, 90 females) were evaluated for calculating the normal ranges for various CBC parameters. They were all adult patients with an age range of 22 – 54 years. The data were classified into three groups of 22 – 32, 33 – 43, and 44 – 54 years. The mean, standard deviation(SD) and baseline values and number of subjects for the various hematological parameters of 3 age groups are calculated.

<table>
<thead>
<tr>
<th>Age</th>
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<tr>
<td>22 – 32 Years</td>
<td>33 – 43 Years</td>
<td>44 – 54 Years</td>
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<tr>
<td>M</td>
<td>F</td>
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<td>30</td>
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Table 1: Age Group Distribution

DISCUSSION

Reference ranges are sets of values by the health professionals to interpret patient test values and are considered as the most authoritative tools in laboratory science to assist in the decision-making phase, and hence, useful for patient care. The study was performed in 180 patients including 90 males and 90 females of ages between 22 – 54 and is divided into three groups, 22 – 32, 33 – 43 and 44 – 54. A total of fifteen hematological parameters were tested in this study and showed significant differences among males and females. The reference values for RBC, HGB and HCT were found to vary significantly in age group (22-32), (33-43) and (44 – 54) subjects (p<0.001).

The RBC, HGB and HCT concentration were higher in males than females within three age groups. These findings are in concordance with the study of Khalid Usman et.al that also concludes that the HGB and HCT were significantly higher in males than females value (p<0.05) respectively. The MCV, MCH, MCHC and RDW showed no statistical significance within three age groups. The WBC and MPV concentration for males and females show no significant differences within the three age groups. Whereas PLT count in the females of the age group of 33-43 and 44-54 were significantly higher than the corresponding values of the males (p<0.05).NEU, EOS and MONO showed statistical difference in the age group of 33-43, 22-32 and 44-54.

CONCLUSION

This study has established reference values for hematological parameters in the tertiary care centre. The age groups and sex differences of some of the hematological parameters have attained statistical significance. RBC, HGB and HCT showed statistical significance in males than females within the age groups of 22-32, 33-43 and 44-54. PLT count in the females of the age group of 33-43 and 44-54 was significantly higher than the corresponding values of the males. MONO concentration in males was significantly higher than the values in females within the age group of 44-54.

Limitations
The sample size of our study is small. Only adult age groups are included.

Acknowledgements
- Department of Pathology, Hematology, Biostatistics and comprehensive, Amrita Institute of Medical Sciences, Kochi.
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ABSTRACT
Background: OSA is a very common but underdiagnosed entity in our country. With urbanisation of the society and the obesity pandemic, the number of cases of OSA are expected to increase proportionately. Obesity, neck circumference, craniofacial abnormalities and hypothyroidism are important risk factors in OSA. Identification of these factors responsible for OSA would assist in diagnosing, treating and preventing the complications of OSA. This study was conducted to evaluate the correlation and prevalence of these factors in a group of randomly selected patients diagnosed as having OSA by PSG at a tertiary care hospital.

Material and Methods: 60 Patients known cases of OSA were randomly selected to undergo anthropometric and clinical evaluation with focus on BMI (for obesity), neck circumference, craniofacial anomalies and hypothyroidism. Subsequently correlation between the various factors and OSA was confirmed by PSG.

Results: Patients of OSA, had a higher propensity to be obese, increased neck circumference, craniofacial abnormalities and hypothyroidism, with a direct correlation in severity of OSA with increasing BMI and increase in neck circumference.

Conclusion: Obesity, hypothyroidism, neck circumference and craniofacial abnormalities have a strong correlation with the incidence and severity of OSA.

Keywords: OSA (Obstructive Sleep Apnea), PSG (Polysomnography), AHI (Apnea Hypopnea Index).

INTRODUCTION
Obstructive sleep apnea (OSA) is a very common but underdiagnosed entity in our country. With urbanisation of the society and the obesity pandemic, the number of cases of OSA are expected to increase proportionately. Obesity, neck circumference, craniofacial abnormalities and hypothyroidism are important risk factors in OSA. Identification of these factors responsible for OSA would assist in diagnosing, treating and preventing the complications of OSA. This study was conducted to evaluate the correlation and prevalence of these factors in a group of randomly selected patients diagnosed as having OSA by PSG at a tertiary care hospital.

MATERIALS AND METHODS
This study was done at Department of Pulmonary Medicine of tertiary hospital, Pune. This is a Cross sectional, observational study conducted from Jan 2016 to Dec 2016, where all patients with diagnosed OSA on the basis of AASM Criteria and PSG were included. The patients were selected on the basis of history and Berlin questionnaire and all were included. The inclusion criteria were all diagnosed cases of OSA based on American Academy of Sleep Medicine (AASM) diagnostic criteria for OSA and confirmed by polysomnography (PSG). Exclusion criteria were only those Patients unwilling to participate.

The selected patients, included in the study, were re-evaluated at Department of Pulmonary Medicine. These patients were already diagnosed as cases of OSA on the basis of American Academy of Sleep Medicine (AASM) diagnostic criteria for OSA, which requires at least 1 of the following criteria for OSA to be diagnosed:

- The patient reports daytime sleepiness, unrefreshing sleep, fatigue, insomnia, and/or unintentional sleep episodes during wakefulness. The patient awakens with breath holding, gasping, or choking. The patient’s bed partner reports loud snoring, breathing interruptions, or both during the patient’s sleep.

- Polysomnography (PSG) shows more than 5 scoreable respiratory events (eg, apneas, hypopneas, Respiratory effort related arousals (RERAs) per hour of sleep and/or evidence of respiratory effort during all or a portion of each respiratory event.

- PSG shows more than 15 scoreable respiratory events (eg, apneas, hypopneas, RERAs) per hour of sleep and/or evidence of respiratory effort during all or a portion of each respiratory event.

These enrolled patients were re-examined clinically, subjected to Cephalometry, and evaluated for hypothyroidism. They were then subjected to repeat overnight PSG to assess severity. The PSG reports were compared with clinical parameters and thyroid profile and their sensitivity was compared. The Equipment’s used in this study were Enzyme linked immunosorbent assay (ELISA) based Lab tests for Thyroid profile and Polysomnography laboratory.

The data thus obtained were analysed by using Statistical Package For Social Sciences (SPSS) version 17.0

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RESULT

Demographic profile revealed that of the 60 patients selected for study, 48 were male and 12 were female. Out of these patients, the youngest was 22 years old and the oldest was 73 years with the mean age of 47.9 (±13.26) years. Majority of the patients were in the age group of 31 to 40 years (30%).

In the study group, 26 (43.33%) had BMI >30 kg/m² classified as obese per WHO definition and 34 (56.66%) had BMI <30 kg/m². The minimum value of BMI was 21 kg/m² and maximum was 44.9 kg/m². Mean BMI was 30.36 (±6.85) kg/m².

The minimum value of neck length was 10cm and maximum was 21cm. Mean neck length of the patients noted was 15.3 (±2.25) cm.

Minimum value of neck circumference was 35 cm and maximum was 48 cm. Mean neck circumference of the patients was 40.75 (±3.16) cm.

On examination, 10 (16.7%) had Mallampati score of II, 30 (50%) had score of III and 20 (33.3%) had score of grade IV. Oral cavity examination revealed, 42 (70%) had no obvious abnormality, 2 (3.3%) was edentulous, 8 (13.3%) were high arched, 2 (3.3%) had small mandible, 4 (6.7%) had macroglossia, 2 (3.3%) had retrognathia, increased hyoid distance 2 (3.3%), overbiting of teeth 2 (3.3%), submandibular fat deposition and decreased posterior airway space 2 (3.3%). Out of 60 patients, 40 (66.6%) had normal thyroid profile and 20 (33.3%) were hypothyroid.

Assessing relationship between Apnea hypopnea index (AHI) score by PSG and BMI, out of 26 subjects with BMI >30 kg/m², 20 (76.9%) were having severe OSA and 6 (23%) had AHI <30 events/hr. However in 34 subjects with BMI <30 kg/m², 18 (52.9%) were having severe OSA and 16 (47%) were having AHI <30 events/hr.

On correlating neck circumference with AHI, as the neck circumference increased from 38 cm onwards till 48 cm, the number of ODIS and, hence, the severity of OSA also gradually raised (i.e. 46 patients with ODI >15 events/hr were confirmed to have severe.

DISCUSSION

In this study we used parameters like BMI, neck length, neck circumference, cranio facial abnormalities, Mallampati score and thyroid status and their association with OSA which have been studied by a very few authors from Indian subcontinent.

Excess weight is the strongest risk factor of OSA. Body mass index (BMI: weight in kg/height in m²) is used to define and quantify obesity with the cut-off value of 30 kg/m². There is a graded increment in prevalence of OSA with increasing BMI as shown by several studies. Higher BMI is also associated with increased severity of OSA. An increase in BMI of just 1 standard deviation is associated with a four-fold increase in risk for OSA. Increased body weight affects breathing in many ways like: (1) change in upper airway structure (i.e. altered anatomy), (2) change in upper airway function (i.e. increased collapsibility), (3) unstable relationship between respiratory drive and workload and (4) exacerbation of OSA events via obesity related reductions in functional residual capacity and increased whole body oxygen demand. Fatty tissue accumulation varies between person to person with accumulation occurring in the upper part of the body in some and lower part in the other. OSA is associated with centripetal pattern of obesity, i.e. fat depositing in abdominal viscera, upper part of the trunk and neck (android obesity), rather than gynecoid obesity where fat distribution is predominantly in buttocks and thighs.

Neck circumference is the most important predictor of OSA among all other anthropometric variables. Neck circumference is measured at the level of superior border of cricothyroid membrane with the subject in upright position. A neck circumference of more than 40 cm should alert the physician about the presence of OSA in the subject. Fat deposition around the upper airway or fat deposited in the parapharyngeal fat pads is important in the development of OSA. Studies indicate that parapharyngeal fat volume is greater in obese with OSA. Katz et al reported that the mean neck circumference in subjects with OSA was 43.7 cm (±4.5 cm) and those without OSA was 39.6 cm (±4.5 cm). Also there was a better correlation between neck circumference and the severity of OSA than BMI or other indices of obesity.

Craniofacial factors play important role in development of OSA, especially in non-obese subjects. However, in obese subjects, it may act as added risk factor. Patients with sleep apnea have small and/or retro positioned mandible and maxillae, narrow posterior airway space and inferiorly positioned hyoid bone. Several studies have demonstrated that anterior displacement of the hyoid bone in all patients with OSA and the inferior displacement of the hyoid bone in non-obese OSA patients were significant predictors of the severity of OSA. The more inferior placement of the hyoid, the greater the AHI. However, reduction in the mandibular length appears to be the most common and, probably, the most important skeletal abnormality predisposing to OSA. Soft tissues of the pharynx viz. tonsils, soft palate, uvula, tongue and the lateral pharyngeal walls are important factors in reducing airway size. Thickening and enlargement of lateral pharyngeal walls has been shown to be the predominant factor resulting in airway narrowing in subjects with apnea. Schellenberg et al conducted a study trying to identify the upper airway bony and soft tissue structural abnormalities determined by physical examination that were associated with an increased risk of OSA and found narrowing of the airway by the lateral pharyngeal walls had the highest association with OSA (odds ratio 2.5) followed by tonsillar enlargement, enlargement of uvula and tongue enlargement (odds ratio of 2.0, 1.9 and 1.8 respectively). Apart from tongue enlargement, tongue length is also a significant risk factor as it might obstruct the hypopharynx by projecting pos-
CONCLUSION

Obesity, hypothyroidism, neck circumference and craniofacial anomalies have a strong correlation with the incidence and severity of OSA. As both obesity and hypothyroidism are treatable, the physician must manage them aggressively and if possible all obese and hypothyroid patients should undergo PSG to rule out OSA, which may be responsible for most of their clinical symptoms of fatigability and day time somnolence.

REFERENCES

The study of incidence of post operative delirium in sensory impaired patients undergoing coronary artery bypass grafting procedure in a tertiary care hospital

Aswin Rajeev*, Sunil K S*, Priya Vijayakumar*, George Paul*

ABSTRACT
Background: Delirium, defined as an acute disorder of attention and global cognitive function is a common, serious and potentially preventable source of morbidity and mortality in hospitalized elderly patients. As a person ages, sensory impairment occurs in varying degrees which makes him vulnerable to stressors.

Objective: To assess the incidence of post operative delirium in elderly patients with sensory impairment undergoing coronary artery bypass grafting (a major cardiac surgery).

Materials and Methods: Prospective cohort study. Study Period: 1 ½ years. Using a prepared questionnaire after obtaining fully informed written consent. 3 visits for each patient: 1) before surgery, 2) in the ICU: 48 hours after surgery, 3) in the ward after shifting out from ICU. Details from patients, care givers and nursing staff regarding features of delirium are obtained.

Results: Patients with pre existing sensory impairment are more prone to develop post operative delirium. Out of 26 patients with pre existing sensory impairment, 16 patients (62.9%) developed post operative delirium compared to 27 patients (12.1%) out of 224 without sensory impairment. Hence, pre existing sensory impairment makes an elderly patient delirium prone, and it should be identified at the earliest.

Corresponding Author: George Paul

BACKGROUND
Delirium is an important geriatric syndrome with devastating consequences. It is a fluctuating disorder of consciousness of acute onset characterized by profound alteration in the mental state of the affected person and manifests as impairments in arousal, attention, orientation, thinking, perception and memory. It commonly occurs in the setting of multiple physical illnesses and affects the person’s normal function so that there is increased risk for susceptibility to adverse events, increased functional dependence, impairment of mobility, occurrence of falls, fractures and development of pressure sores. Certain risk factors that predispose to delirium have been identified. These include older age, male gender, visual and hearing impairment, pre-existing cognitive impairment, depression, functional dependence, dehydration, drugs, alcoholism, existence of multiple co-morbid conditions and previous stroke1.

Based on the state of arousal, three types of delirium have been described which include hyperactive, hypoactive and a mixed form2. Morbidity and mortality associated with delirium can be minimized by prevention or early detection and management of the condition.

Coronary artery bypass grafting surgery (CABG) is being increasingly performed in elderly patients for management of coronary artery disease in recent years with successful revascularization. Improved surgical techniques and peri-operative care have resulted in better outcomes from the procedure and has resulted in increased longevity in such patients. But postoperative delirium continues to be one of the grey areas in surgical field due to under recognition of its occurrence especially in elderly patients. It was found to be mainly due to lack of preoperative mental status assessment and delay in detection of development of delirium. Delirium has been found to be associated with increased hospital stay, morbidity, poor functional outcomes and increased mortality. It is also one of the preventable complications, if detected and managed early, and which can improve the outcome from procedure and the patient's quality of life3.

We decided to study the incidence of post operative delirium in patients with sensory impairment since most of the elderly adults have either vision or hearing impairment or both. Coronary artery bypass graft surgery patients were chosen since it is mostly a planned procedure which is increasingly being done in elderly population. We also wanted to highlight the importance of recording preoperative baseline cognitive status of a patient as a routine assessment along with other assessments for surgical fitness since this enables early detection of post operative cognitive decline which is suggestive of delirium.

MATERIALS AND METHODS
The study was a prospective cohort study, which was done over a period of 1 ½ years. All patients >/= 65 years getting admitted for coronary artery bypass graft surgery in the hospital were included in the study.

But patients taken up for surgery on emergency basis, those who were too sick to undergo assessment or in whom the assessment could not be completed in full due to death or any adverse events in perioperative period were excluded from the study.

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The study was conducted in 5-3 ward and 6-1 (CVTS-SURGICAL ICU) in Amrita institute of Medical Sciences, Kochi, Kerala, India. A total of 250 patients who underwent coronary artery bypass graft surgery fulfilling the above mentioned criteria were included in the study.

**Method of study**

Prior approval from the hospital ethics committee was obtained.

Three visits were conducted for each patient during the hospital stay for assessment. During the first visit which was conducted after admission at bedside of the patient, a pre-operative mental status assessment using mini mental state assessment (MMSE)\(^4\), delirium screening using confusion assessment method (CAM)\(^5\) and depression assessment using geriatric depression scale (GDS)\(^6\) were done.

Patients were screened for sensory impairment. Vision was tested using Snellen’s chart and hearing was assessed by finger rub test with the patient using assistive device, if any.

The second visit was conducted 48-72 hours after the surgery in the intensive care unit. Assessment was done to detect presence of delirium by using the modified version of confusion assessment method (CAM-ICU), which can be used to detect delirium even in intubated patients.

The third visit was conducted in the ward after the patient was shifted out from the ICU. CAM and MMSE were done. Details of mental state of patient, its fluctuations during different periods of the day, episodes of agitation, abnormal behaviour, sleep disturbance which could point to development of delirium were obtained from reliable reporters such as nursing staff and patient care givers.

**Statistical methods**

Sample size was calculated based on incidence rate of delirium in geriatric patients from an earlier Indian publication from CMC, Vellore by Anugrah Chirspal et al\(^7\). Taking average incidence rate (REF) and with 20% allowable error and 95% confidence, minimum sample size came to 225.

A total of 250 cases were studied during the time period of 1 ½ years.

**Statistical Analysis**

Percentage incidence rate of delirium was computed. Chi square test was applied to test the statistical significance of various factors (variables) associated with development of post operative delirium.

**Results**

43 (17.2%) patients out of total 250 developed post operative delirium.

26 patients had pre existing sensory impairment.

16 (62.9%) patients out of 26 developed post operative delirium compared to 27 (12.1%) out of 224 patients with no sensory impairment (p< 0.001).

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<td>Hearing</td>
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<table>
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<th>Study of population</th>
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<td>No</td>
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</table>
DISCUSSION

The incidence of delirium in our study was found to be 17.2%. This is lower than comparable studies. The reasons could be multiple. Our patients were admitted to the hospital for coronary artery bypass grafting procedure (CABG). They came on a planned basis after stabilization of risk factors and other co-morbid conditions. Also, we did not include sick patients or those who underwent CABG on an emergency basis, due to the possibility of confounding factors. The protocol, pre anaesthetic work up and better postoperative care all could have minimized incidence of infections and metabolic abnormalities, and thereby, incidence of post operative delirium.

Those with sensory impairments defined as significant hearing or visual impairment seem to be more susceptible to delirium. From our study, it was found that out of 26 patients who had got sensory impairment, 16 (62.9%) patients developed post operative delirium compared to 27 out of 224 patients (12.1%) with no sensory impairment (p< 0.001). This was along expected lines.

The study on post operative delirium in hip fracture surgery patients by Anugrah Chrispal et al7 shows high incidence of delirium in patients with pre-existing visual impairment. It was found that 16 patients with visual impairment (41.2%) developed delirium (p: 0.013). The same study reports the incidence of post operative delirium to be 21%. Out of the 81 patients included in their study, 17 (21%) developed post operative delirium. Incidence of delirium amounts to 33.6% in post coronary artery bypass graft surgery (Santos)8, 41% after bilateral total knee replacement surgery (William Russo)9 and 43-61% following hip fracture repair surgeries (Holmes)10.

The exact mechanism behind sensory impairment leading to delirium is multifactorial. The most likely mechanism could be frequent change of environment, ICU environment with dim light and beeps of monitors, unaddressed pain, failure to communicate problem/needs, lack of familiar people around and excess use of sedatives.

Recognizing delirium is a challenge, but by systematic application of validated tools in at-risk patients, it can be better picked up. Geriatricians, Psychiatrists and multidisciplinary teams can help bring about favourable outcomes. However, growing burden of the condition demands delirium recognition skills from health related professionals from other domains also.

Key Points
1. Post operative delirium is one of the common preventable causes of poor outcome after surgery in elderly.
2. Recognizing delirium is a challenge but it can be detected early by subtle changes in at risk patients.
3. Sensory impairment is one of the important risk factors for post operative delirium. Hence, assessment of cognitive and sensory function during pre-operative check up is important.

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Common Errors of Insulin Injection in Patients with Diabetes

Amrithesh A*, Harish Kumar*, Ashfan Azeez*, Akhila M*

ABSTRACT

Every day millions of people with Diabetes Mellitus have to inject themselves with insulin and it is essential that they do it correctly. Inspection of injection sites and adoption of correct injection techniques will help the patients to improve their glycemic control. The objective of the study was to find out the errors in the insulin injection related errors in patients with Diabetes on regular insulin therapy. Each patient was individually interviewed about various aspects of insulin injection technique by one of the members of the study group and data was entered into a database. This is a prospective analysis of 101 patients with Diabetes both inpatients and outpatients at the Amrita Institute of Medical Sciences during the period February to June 2015. The results showed that 67 were males and majority of them had Type 2 Diabetes, and more than 50% were using premixed insulin. Many of them were only using insulin syringes (62 patients) as the insulin delivery device. The number of usage of insulin syringes was variable. Almost 68.3% patients were never hold the syringe/needle in position for few seconds after injection. 98% didn’t know how to dispose the sharps properly. 64 of the patients knew how to match syringe with the vial. More than 50% of patients were injecting in the proper way i.e. perpendicular to the body. This study has found the errors in insulin injection techniques were very common in Diabetic patients were using insulin regularly. These errors can be minimised by proper education.

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INTRODUCTION

Insulin is the most effective drug for the treatment of Diabetes and it is a life saving drug for patients with Type 1 Diabetes. Many patients with Type 2 Diabetes may eventually require insulin therapy for adequate control of Diabetes. As the incidence of the Diabetes increases the number of patients using the insulin can reasonably expected to increase and unless patients are carefully educated the mistakes will no doubt definitely increase as well. There may be errors both on the part of the physicians and the patients. There may be clinician errors such as incorrect dosing of insulin, self administration errors like inadequate patient training and education, or improper equipment and self monitoring errors like incorrect recording of blood glucose in self monitoring blood glucose charts (SMBG). Careless prescription of insulin may lead to many errors which include everything from the ill written orders, poorly labelled insulin vials and incorrect rates programmed into an insulin pump. These errors in prescription of insulin may lead to hyperglycaemia or hypoglycaemia and may even necessitate hospital admission.

It is not only prescription errors but also errors in insulin administration technique which may put the patient in danger. Errors occur due to many causes and contributing factors such as incomplete information provided to the patient and poor knowledge of patient about insulin administration. The Diabetes specialists are often the people who teach the patient how to inject insulin. Busy clinicians often do not have the time to teach patients all the points about insulin injection techniques. Many patients repeatedly inject at the same site and this can result in Lipohypertrophy which can alter and delay the uptake of insulin from injection site, thereby causing unstable blood glucose levels and leading to poor metabolic control. Over a period of time a number of errors in the method and timing of injection may be the cause of worsening glycemic control. So it is important for health care providers to properly educate their patients so that such errors can be reduced. Improper disposal of sharp needles with other waste can result in injuries and injection to people who collect garbage.

There are many recently published guidelines both international and national which have clearly defined the steps to be taken for proper insulin injection technique. We conducted this study to find out the problems and errors in insulin injection technique in our patient population.

MATERIALS AND METHODS

This is a prospective analysis of Diabetes in both inpatients and outpatients at the Amrita Institute of Medical Sciences and Research centre during the period February to June 2015. Consecutive Type 1 and Type 2 Diabetes patients who attended the outpatient clinic as well as inpatients were selected for this study. Inclusion criteria for patients included age more than 5 years and having either Type 1 or Type 2 Diabetes Mellitus and being on insulin therapy for managing Diabetes. A detailed questionnaire was used and data was collected regarding all aspects regarding insulin injection technique. The questionnaire was prepared on the basis of various articles regarding insulin technique and management. Each patient was individually checked for insulin injection sites, insulin delivery devices and asked questions about the number of times of usage, storage of insulin and also about disposal of sharps etc. Each patient’s data was collected by members of the group by talking and discussing with the patient and data was entered into a database. Statistical analysis were done using SPSS software version 11, continuous and categorical variables

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Common Errors of Insulin Injection in Patients with Diabetes

RESULT

There were 101 patients included in this study. The mean duration of Diabetes was 15 years. 67 were males and rest were females. The majority were Type 2 Diabetes patients (97%) and only 3 of the patients had Type1 Diabetes. The mean duration of insulin therapy was 4.68 years. Analysis of the data showed that 61.4% of patients were taking premixed insulin, which was Human Mixtard (30/70) in most of the cases (fig 1). Regular Human insulin was being used by 21 patients. Patients on Glargin and premixed insulin analogues Novomix 30/70, Humalog Mix 25/75 were fewer (fig 1). The mean daily dose of insulin taken by the patients was 42.59 units. The most common insulin regimen was twice daily premixed regimen (54.5%) followed by basal and multiple bolus regimen (28.7%). Premixed thrice daily was the preferred regimen in 5.9% of patients (fig 2).

We found that most of the patients were using insulin syringe as the delivery device, and there were no patients who were using insulin pump in this study. 62 of patients were only using insulin syringes. The second most used insulin delivery device was the insulin permanent pen, which was being used by 19 of the patients (fig 3). Patients on insulin temporary pen were very low (8 patients). Some patients (12 patients) who were on multiple insulin injections were using both syringes and pens simultaneously (fig 3). 69 patients were on 40 IU syringe and only 5 were on 100 IU syringe. It was found that 4 patients had a mismatch of their insulin syringes as they were using 100 IU syringe for injecting 40 IU insulin. When we enquired about the number of times a syringe was reused, we found that of the 74 patients who were using insulin syringes, 15 of them changing the syringe after every prick, 31 of them used each syringe for 2-4 pricks and 17 of them for 4-6 pricks, 3 of them for 6-10 pricks and 8 of them for more than 10 pricks.
pricks. Similarly the 39 patients who were on insulin pen (both temporary and permanent) when checked for frequency of needle changes we found that 2 patients changed the needle after every prick, 18 of them after 2-4 pricks, 9 of them after 4-6 pricks, 4 of them after 6-10 pricks and 6 of them for more than 10 pricks.

The time that the patients held the needle in place after the injection was also analysed and we found that 68.3% of patients never hold the needle for ten seconds after the insulin injection. We also enquired about whether the patients knew that they had to pinch the injection site prior to injecting and 69.3% of the patients were aware of this, while the remaining 30.7% were not aware that pinching the injection site was necessary. On being asked about whether they were injecting with the needle perpendicular to the body, 55 of patients said they were doing this correctly, whereas 38 were injecting at an angle to the body and the remaining 8 were injecting randomly. We also checked the storage of insulin, and found that 68.3% patients stored insulin correctly in the refrigerator, while 17.8% kept it randomly in the room, 11.9% stored in the cupboard and 2% kept it above the TV or electronic items (fig 4). And within the refrigerator 28 patients kept the insulin at the lower compartment of refrigerator, 26 patients kept just opposite to the freezer, 4 kept inside the freezer and 11 patients kept in the middle area. When asked whether they injected the insulin while it was still cold, 41.6% of patients said that they injected cold insulin. We found that the majority of patients (55.4%) never roll the insulin vial/pen in palm of hand.

Insulin injection sites were also checked during the study, majority of patients (34.6%) were taking insulin on both abdomen and thighs, 23.8% were injecting on the abdomen alone, 17.8% on thighs, 4% on the Arms, 6.9% in both abdomen and arms, 4% in both thighs and arms, 1% in buttocks and 7.9% of patients injects in all the above sites and Fig 5). 79.2% of patients were never cleaning the site of injection with alcohol. And 99% of them never did a hand washing procedure before the insulin injection. Most of the patients (96%) were rotating the sites of injection. 76 patients rotate after each injection, 19 after 2 injections, 5 after 3-5 injections and 1 patient after more than 5 pricks. We found that 25 patients had developed lumps at the area of injection, and 28 of patients were unaware that it was not recommended to massage the area after injection.

Finally we enquired about the safe disposal of sharps and syringes, and we found that most of the patients did not know how to dispose the needles and insulin syringes safely without causing any harm. We found that 65.3% of patients disposed the needles and syringes in domestic waste bins without proper management, 9.9% just threw it on the roadside, 10.9% burrowed it in the soil and 11.9% threw away or burn the needles and sharps without knowing what to do. Only 2% of the patients were disposing the sharps and syringes in the biomedical waste segregation labs (fig 6).
DISCUSSION

This study was done to estimate the incidence of common errors of insulin injection in people with varying duration of Diabetes. Such a study was planned based on by assessing how much they knew about insulin self administration technique. The therapeutic success of insulin does not depend only on its type and dose prescribed but also on the basis of how it is administered. The DCCT\textsuperscript{9} has suggested the need of exogenous insulin to maintain a good metabolic control has been increasingly acknowledged as a therapeutic option for treatment of Type 2 Diabetes mellitus. As per UKPDS\textsuperscript{7} multiple daily doses of insulin need to be injected into the subcutaneous tissue to achieve a better glycemic control to prevent acute as well as chronic complications of the disease. The description of the steps for preparing and injecting insulin according to ADA and recommendations by Diabetes Care is the accepted standard\textsuperscript{6}. These recommendations have 3 steps- first is hand washing, second is insulin preparation and third is administration. According to ADA\textsuperscript{6} the 2nd and 3rd steps of insulin self administration technique involves procedures with consecutive steps. This means that expected results will be achieved only if all steps are directly and properly followed. Our study attempted to find out how diligently our patients were adhering to these standards. A study done by Stacciarini\textsuperscript{9} while assessing the errors of insulin injection technique found that all patients committed errors in some step of insulin administration. In this study too we have found a number of areas where there were deficiencies in the technique of insulin therapy. The same study done by Stacciarini et al\textsuperscript{9}, for the for insulin self administration technique looked at the for the procedure of hand washing before injection, and they have found that 88.8% of their participants used water and soap or liquid detergent before preparing and administering insulin. However, we found that most of the patients (99%) never did a hand washing procedure. Some recent studies\textsuperscript{10,11} have reported multicenter data collection on insulin injection techniques and they too had reported many deficiencies in insulin injection technique similar to our study The medical errors in insulin therapy occur commonly in outpatient settings than in patient settings and the most frequent mistakes were variety of factors like holding time for syringe/needle, times of usage and proper storage of insulin\textsuperscript{10}. If the health care providers especially diabetes specialist educators have a proper communication with the patients then we can reduce the risk the errors due to lack understanding.

Another study was done by Richard to assess the good insulin practices in Diabetes management\textsuperscript{12}, also showed some similarities to our study. In that study the procedure of injection technique, injection sites, needle reusage, incidence of lumps and the risk of infection by contamination were looked at in detail. They reported that patients who have a regular injection site rotation have a lesser risk of lumps and other skin manifestations followed by insulin injection. On the subject of needle contamination, the study were done by Le Floch and his colleagues\textsuperscript{13}, showed that sterility is guaranteed with single use of the syringe and pen needles, and the potential contamination increases with repeated use. They also showed that biological material was trapped within the pen needles or cartridges of 62% of patients after injection\textsuperscript{13}. This indicates that rate of infection increases with the rate of reuse of needles. But this study only evaluated the percentage of patients with site rotation and did not report any patients who developed infections followed by insulin injection.

There are several studies which were done to assess which was the better site for absorption. One study done by Bantle and Weber\textsuperscript{14}, showed that insulin is absorbed differently from different sites and it is absorbed most quickly from the abdomen, followed by arms and then legs. The slowest absorption is from buttocks. This study showed that most of the patients are using abdomen and thighs as their sites (34.6%) and only few patients selected hands and buttocks as their sites of injection. Their study also proves that better control can be achieved by consistently rotating the insulin injection within set area. The ADA\textsuperscript{6}, recommends that after injecting insulin the injection site should not be massaged. But rather light pressure should be applied to minimize the bruising. Our study has shown that most of patients (73%) after injection were not massaging the area. As per US Food and Drug Administration (FDA) guidelines insulin injection needles are sterile products and must be labelled for single use only. In spite of most of insurance plans covering them on this basis, some patients will reuse their needles anyway. Unfortunately some of health care providers also encourage patients to repeat-

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\includegraphics[width=\textwidth]{disposal_of_insulin_sharps}
\caption{Disposal of insulin sharps.}
\end{figure}
edly reuse needles due to cost considerations. The rate of reuse of needles varies depend upon the patients and majority of them use it for 3-4 times for injection. One of our main findings was regarding the safe disposal of sharps and syringes. Most of the patients did have any clear idea about how or where to dispose the sharps. In our study we have reported that about 65.3% of people disposed used and damaged needles and syringes in domestic waste bins without proper waste management. Of these 9.9% disposed sharps on the roadside, 10.9% buried it in the soil and 11.9% just threw the sharps away or burned it without knowing what was to be done. Ideally it should be disposed in a puncture proof container by sending them biomedical waste segregation labs, in order to ensure public safety and prevent infection. Health care workers are not only the ones who are at the risk of sharp injuries, people at high risk of being injured by used sharps include children, janitors, housekeepers, sanitation and sewage treatment workers and workers in the recycling facilities and landfills. According to Europe-wide study nearly half of the insulin injecting patients disposes their needles directly into the house hold after clipping or recapping. Similar problems with sharp disposals were reported in an Indian study. This is clearly a public hazard. Therefore patients should be taught to safely dispose sharps.

Studies have clearly shown that an individualized approach to teaching insulin injection technique results in better control of Diabetes, greater satisfaction with insulin therapy and even a lower dose of required insulin. So the role of the Diabetes Educator in sorting out this problem cannot be overemphasized.

CONCLUSION

Patients on treatment with Insulin therapy were found to have a lot of gaps and wrong practices in their insulin injection techniques. These errors may lead to poor control of their Diabetes. It is the responsibility of health care workers, mainly Diabetes Educators to minimise such errors by providing a thorough education of all the steps of insulin injection technique including disposal of sharps.

REFERENCES

Organic or Steroid-induced Mania with Psychotic Symptoms

Rahul Savalgi*, Kesavan Kutty Nayar*, Chitra Venkateshwaran*

ABSTRACT

Among the studies of patients being treated for Systemic lupus erythmatosus (SLE) with corticosteroids about 5% developed mania/psychosis. Also SLE by itself develops neuropsychiatric changes which include psychosis. This is a case report of 42 year old female, who after being diagnosed with SLE and treated with steroids, started to have symptoms of mania with psychotic symptoms, and it was challenging to assess whether the above symptoms were due to SLE or steroids.

Corresponding Author: Chitra Venkateshwaran

INTRODUCTION

Systemic lupus erythmatosus (SLE) is a chronic inflammatory condition caused by an autoimmune disease. SLE has been described as inducing neuropsychiatric symptoms in approximately 13-80 percent of SLE patients1,2. This case report aims to highlight the potential complications of SLE and steroid use in relation to psychiatric presentations.

CASE REPORT

42 year old woman became physically unwell in 2014 presenting initially with anorexia, weight loss, fever and anemia. In January 2015 she was admitted to the local hospital with fever and a characteristic butterfly rash suggestive of Lupus. At that time she had been noted to be quite withdrawn, low in mood and confused. The diagnosis of SLE was made and she underwent a lumbar puncture which revealed elevated lymphocytes but was negative for bacterial culture including tuberculosis. Following this she underwent a MRI scan which revealed changes consistent with cerebral lupus. She was treated by the Rheumatology team with pulse Prednisolone and Cyclophosphamide. She made a good response and blood tests tended towards normal range. She was maintained on 40mg of Prednisolone.

In terms of background history she had no past psychiatric history. She was one of four siblings and reported some form of mental illness in two family members but was unable to give any further detail. Her father had passed away following a stroke some years ago and her mother did not have any medical problems. She had two children. She had regularly chewed tobacco in the past but denied any recent use over the last 24 months. She was maintained on 40mg of Prednisolone.

In the week prior to admission patient became suddenly verbally hostile towards family members, decreased sleep, decreased appetite, grandiose delusions, increased activities and increased talk. As she continued to present aggressively, and caused disturbance at home she was admitted as she became increasingly difficult to manage at home. In the hospital she had incidents where she presented aggressively towards staff. In terms of her mental state she presented with an attitude towards examiner which was hostile, increased psychomotor activity, impaired social judgment, increased volume and increased volubility, acceleration of speech, flight of ideas, grandiose delusions of being extremely rich and knowing influential people with elated mood and insight of grade1. Differential diagnosis included steroid induced mania and organic psychosis due to SLE affecting the brain.

Due to her deterioration in mental state she was transferred to psychiatric wards. She was commenced on Olanzapine 10mg twice daily and Clonazepam 2mg three times a day. Initially she remained poorly compliant with medication and remained disinhibited, impulsive and overactive. She continued to present manic, with lack of insight and required intra muscular medications due to non-compliance. Close contact was maintained with the Rheumatology team and Prednisolone was slowly tapered down to 20mg once daily. Overtime she became more compliant with the oral medications and was transferred back to Rheumatology in 15 days. Following the transfer she remained compliant with Olanzapine 10mg twice daily and Clonazepam was slowly reduced and tapered off. Her Prednisolone was reduced further by Rheumatology team and was commenced on Hydroxychloroquine 200mg twice daily and she was maintained on 10mg of Prednisolone. Her last review with the Rheumatologist showed her SLE to be in remission which coincided with her presentation becoming more settled. She made good progress in the ward and remained euthymic in terms of mental state. She began to take leave appropriately with family support and was discharged.

DISCUSSION

The differential diagnosis included steroid induced mania. Some studies have reported corticosteroids increasing dopamine levels3. A study of patients with SLE who were treated with corticosteroids five percent developed steroid induced psychosis4. Patients usually present with mood symptoms and 13 percent have been reported to present with psychotic symptoms5. Usually the symptoms develop 2 weeks after starting corticosteroids and usually associated with doses over 40mg6,7. The Boston collaborative drug surveillance pro-

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gram revealed increasing percentage of patients developing steroid induced psychiatric symptoms ranging from 1.3% at a dose of 40mg to 18.4% in those receiving a dose greater than 80mg. However differentiating steroid induced mania from organic psychosis secondary to lupus spreading to the cerebellum is challenging due to the lack of diagnostic criteria available. Patients are more likely to develop neuropsychiatric changes secondary to SLE rather than steroids. Symptoms usually begin within one year which was the case for our patient and onset was not related to any change in steroids dose. In view of the resolution of symptoms it took over 3 months with is consistent with SLE related mania/psychosis. However despite this due to patient’s improvement occurring with a combination of antipsychotics, reduction in steroid dose and immunosuppressant medication it is difficult to state for definite the exact aetiology of this presentation.

In conclusion we feel this case report highlights the importance of organic cause presenting with psychiatric symptoms. It shows the importance multi disciplinary work and close liaison with physicians when needed to help improve patients mental state.

REFERENCES
Unrecognised Transfixion of Colon During Percutaneous Endoscopic Gastrostomy

Zubair Mohamed*, Syed Sameer Ahmed**

BACKGROUND
A 31-year old female with learning difficulties underwent an uneventful, elective percutaneous endoscopic gastrostomy insertion under general anaesthesia. Four hours after the procedure, she developed surgical emphysema over her anterior abdominal wall and became agitated and tachycardic. She was sedated and ventilated to facilitate emergency computerised tomography of her abdomen following which she was taken for an emergency diagnostic laparoscopy. The CT scan and laparoscopic images are shown in the figure.

What is the diagnosis?

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ANSWER
The CT scan shows the gastrostomy tube (arrow) passing into the stomach through the transverse colon (Fig 1a). Pneumoperitoneum and extensive abdominal wall subcutaneous emphysema is noted. Laparoscopy confirmed the gastrostomy tube traversing the transverse colon before entering the stomach (Fig 1b). The surgery was converted to laparotomy. Primary repair of colon and insertion of a new gastrostomy was performed. The patient made a good recovery. This case highlights an uncommon, but potentially serious complication of an otherwise relatively minor procedure. Risk factors for this complication in this case were abnormal anatomy, kyphoscoliosis and chronic distension of the colon.

CONFLICTS OF INTEREST
On behalf of all authors, the corresponding author states that there is no conflict of interest.

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