A CLINICAL AND ARTERIAL BLOOD GAS ANALYSIS OF 100 CHRONIC OBSTRUCTIVE PULMONARY DISEASE CASES IN A GENERAL HOSPITAL OF AHMEDABAD

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INTRODUCTION

Now-a-days chronic obstructive pulmonary diseases (COPD), the few examples of the diseases which are of increasing incidence are mainly due to increased tobacco smoking and growing industrial hazard. Joule correctly observed “the air we breathe is as important as the water we drink”.1 It must be uninfected unpolluted. In the United States COPD is the fourth main cause of death at present.2 COPD is also a disease of increasing public health importance around the world. So it is quite evident that if the disease is so common in developed country like USA, the problem is much worse in developing country like India where smoking is increasing day by day.

Most dangerous part of the disease is that patient does not stop smoking and usually the disease progress to cor-pulmonale.3 Laennec mentioned that COPD causes cor-pulmonale through several interrelated mechanisms including hypoventilation, hypoxemia from ventilation perfusion mismatch and destruction of perfused surface area.1

The measurement of blood gases can provide important information related to clinical state and these data can play a major role in decision concerning patients care and management.4 In present study it has been tried to evaluate few cases of chronic obstructive pulmonary disease.

MATERIALS AND METHODS

I) Design Of Study

The study was designed to initially describe all presentations to emergency ward for people experiencing an acute exacerbation of their COPD.5 A descriptive study using retrospective data is the methodology to use. This decision was made because the aim was to widen the clinical inquiry into the COPD population by examining variables within the acute presentation and gain underlying interpretation of the groups and subgroups. All the patients with acute exacerbation of chronic obstructive pulmonary disease were admitted in
emergency ward in our institution from July 2008 to October 2010. Thus, total cases were 100.

II) Collection of Blood
Arterial blood for blood gas analysis was extracted by a phlebotomist, nurse, or respiratory therapist. The blood was commonly drawn from the radial artery, because it had less risk for occlusion and compressed to control bleeding. The femoral artery (or less often, the brachial artery) was also used, especially during emergency situations or with children. Blood was also collected from an arterial catheter already placed in one of these arteries.

III) Blood Sample Handling and Transfer
The syringes were pre-packaged and contains a small amount of heparin, to prevent coagulation or needs to be heparinised, by drawing up a small amount of heparin and squirting it out again. Once the sample was obtained, care was taken to eliminate visible gas bubbles, as these bubbles can dissolve into the sample and cause inaccurate results. The sealed syringe is taken to a blood gas analyzer. If the sample couldn’t immediately analyzed, it was chilled in an ice bath in a glass syringe to slow metabolic processes which could cause inaccuracy. Samples drawn in plastic syringes were not iced and were analyzed within 30 minutes.

IV) Blood Gas Analysis
The blood gas analysis were done in the AVL COMPACT 3 which was a fully automatic, microprocessor controlled pH /blood gas analyzer with an integrated thermo printer for quantitative “in vitro” measurement of pH, PCO₂, PO₂. A complete pH/ blood gas analysis was performed on only 55 µl of whole blood. Quick and precise analysis was completed within 20 seconds from sample introduction to result.

Data collected and analysed with Microsoft excel software.

RESULTS
Total 100 cases were studied, in which majority (84%) had chronic bronchitis, whereas the remaining 16% cases had emphysema. The mean age of the patients in the study was 48.51 and standard deviation was 8.76. More than three fourth patients (78%) were from 41 to 60 years of age and two third of them were within the age group of 41-50 years (Table 1). Out of 100 patients, majority of patients were male (72%) and rest 28% were females. Majority of the patients were Hindu (82%) whereas the remaining 18% cases were from the Muslim community. Only 26% patients came from the rural area, whereas almost three fourth cases (74%) came from urban area. According socio-economic status, 96% cases were from lower class society.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31-40</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>41-50</td>
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<td>50</td>
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<td>51-60</td>
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<td>61-70</td>
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<td>2</td>
</tr>
<tr>
<td>71-80</td>
<td>4</td>
<td>4</td>
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</table>

Table 2: Distribution of COPD cases according to occupation (N=100)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number (N)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>32</td>
<td>32.0</td>
</tr>
<tr>
<td>Labour</td>
<td>32</td>
<td>32.0</td>
</tr>
<tr>
<td>House wife</td>
<td>26</td>
<td>26.0</td>
</tr>
<tr>
<td>Retired</td>
<td>10</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Graph 1: Distribution of patients based on occupation

Out of total 100 patients, approximately one third (32%) were industrial workers and other one third (32%) were laborers while 10% cases were retired and 26% women patients were housewives (Table 2). Regarding diet pattern, 82% patients were vegetarian whereas rest 18% had mixed diet. 64% patients had the habit of smoking, whereas the remaining 36% cases were non-smokers. Mean years of smoking were 17.22 with standard deviation of 5.6 years and range was 8-30 years.

Graph 2: Distribution of patients based on smoking

Data collected and analysed with Microsoft excel software.
Out of 100 cases enrolled for the study, only 6% cases had tuberculosis. Majority of the cases (82%) had no history of orthopnoea, only 18% patients had the history of orthopnoea. Only 14% cases had the cor pulmonale while remaining 86% cases had no history of cardiac disease. 42% cases were edematous, whereas the remaining 58% cases were non-edematous. 56% patients were enrolled with the cyanosis, whereas 46% cases had no cyanosis.

The duration of disease was 3.28 ± 1.12 years. The mean duration of smoking was 17.22 ± 5.59 years. Pulse rate in these patients was 79.02 ± 6.66 and pH was in the range of 7.25 to 7.47. The mean partial pressure of CO2 & O2 was 46.77 mm of Hg and 64.72 ± 4.85 respectively. Oxygen saturation was maintained at 88.91% (Table 3).

**DISCUSSION**

In present study 100 patients are included. The mean age in present study is 48.5 years while in other studies9,12 it was ranging from 59-72 years. The difference in mean age in present study and other studies is because other studies are done in developed countries (UK & Finland) where age of occurrence of COPD is more as compared to developed countries like India. In present study there is male preponderance comparable with other studies10-13. In present study, the most important risk factor was tobacco smoking and urbanization was the second risk factor. According to R.Isoaho et al14, the disease is more common among men who work in manufacturing industries. Dyspnoea and cough with expectoration were present in all the cases which were comparable with other studies.11,12 18% patients having orthopnoea was found in our study while in Padmavati et al study14 64.8% of patients were having orthopnoea. This is because in present study both patients of COPD and COPD with Cor - Pulmonale are included while in Padmavati et al study criteria for selection was dyspnoea grade 2,3. Common physical findings in present study were wheeze, cyanosis and oedema feet. Similar findings were found by Benjamin et al10 and Padmavati et al.14 Arterial blood gas findings were hypoxemia (PaO2 level <80mmhg), hypercapnia (PaCO2 >44mmhg), decreased oxygen saturation (SaO2< 90%) and compensatory rise in bicarbonate level (> 26 mmol/l). Same findings were observed in other studies.9,12,15,19

In summary, male smokers, industrial workers and people living in urban polluted atmosphere were at risk of developing COPD. Common symptoms were dyspnoea, cough, expectoration, fever and orthopnoea while common physical findings were cyanosis, oedema and wheezing. On Arterial blood gas analysis common findings was hypoxemia, hypercapnoea, SaO2 less than 95% and compensatory rise in bicarbonate levels. Thus, smoking in combination with air pollution was the commonest risk factors for COPD.

**Table 3: Distribution of COPD cases according to clinical and laboratory findings (N=100)**

<table>
<thead>
<tr>
<th>Findings</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Duration of disease(year)</td>
<td>3.28</td>
</tr>
<tr>
<td>Duration of smoking(year)</td>
<td>17.22</td>
</tr>
<tr>
<td>Pulse rate(min)</td>
<td>79.02</td>
</tr>
<tr>
<td>pH</td>
<td>7.3650</td>
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<tr>
<td>PCO2</td>
<td>46.772</td>
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<tr>
<td>PO2</td>
<td>64.720</td>
</tr>
<tr>
<td>HCO3</td>
<td>26.318</td>
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<tr>
<td>SaO2</td>
<td>88.918</td>
</tr>
</tbody>
</table>

**CONCLUSION**

On ABG analysis common findings were hypoxemia (86%), hypercapnoea (66%), SaO2 less than 95% (92%) and compensatory rise in bicarbonate levels (56%).

**REFERENCES**

13. Bhatia Bb and Jain Sc: Cor- Pulmonale: The Indian Heart Journal 1931; 5:117-128.