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# Electrolytes imbalance in acute exacerbation of COPD

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**Abstract**
Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airways disease (e.g., obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contributions of which vary from person to person. To study the electrolytes imbalance in Acute Exacerbation of COPD in patients and correlate the clinical features with laboratory readings is the main objective. The present study revealed that majority pt are female how has exposed to biomass fuel exposure 24 cases (64.9%) and in males who are exposed to biomass fuel exposure are cook by occupation and farmer by occupation 5 cases (7.9%). Cough, breathlessness and expectoration were the major symptoms of COPD at initial presentation. But cough was observed more in this study (98%) followed by breathlessness (80%), expectoration (72%) and chest pain (32%). So, these data will monitore routinely in those patients an attempt should be made to correct them at the earliest to avoid poor outcomes, faster recovery.

**Keywords:** Chronic, COPD, electrolyte

## Introduction
The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airways disease (e.g., obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contributions of which vary from person to person. These changes do not always occur together, but evolve at different rates over time. Chronic inflammation causes structural changes, narrowing of the small airways and destruction of the lung parenchyma that leads to the loss of alveolar attachments to the small airways and decreases lung elastic recoil. In turn, these changes diminish the ability of the airways to remain open during expiration. A loss of small airways may also contribute to airflow limitation and mucociliary dysfunction is a characteristic feature of the disease. Airflow limitation is usually measured by spirometry as this is the most widely available and reproducible test of lung function [1, 2]. An exacerbation is of COPD is defined as 'event in the natural course of the disease characterised by a change in the baseline dyspnea, cough and/ or sputum and beyond normal day to day variations, that is acute in onset and may warrant a change in regular medication in a patient with underlying COPD [3, 4]. Exacerbations are categorized in terms of either clinical presentations (number of symptoms) or healthcare utilization [3, 4]. In addition to the financial burden required to care for these patients, other 'costs' such as days missed from work and severe limitation in quality of life (QOL) are important features of this condition [5, 6]. Although respiratory infections are assumed to be the main risk factors for exacerbation of COPD, other conditions, including industrial pollutants, allergens, sedatives, congestive heart failure, and pulmonary embolism, have been identified [3, 4, 7, 8]. Thus, simple overlooking of the coexistent metabolic abnormalities may contribute to a great morbidity and mortality. Thus, early recognition and prompt correction of these metabolic abnormalities are crucial. Aim of study was to study of serum electrolytes in acute exacerbation of COPD Patient.

## Material and Methods
### Source of data
Patients who presented to the OPD and IPD of PG Department of pulmonary medicine and emergency department at IMS& SUM Hospital & were subsequently diagnosed with AE COPD according to GOLD Guideline. It is a cross sectional study of sample size taken as AE COPD 100 Cases, Stable COPD 40 Cases. All cases of diagnosed COPD patients presenting to OPD and IPD of PG Department of pulmonary medicine and emergency department with acute exacerbation according GOLD Guideline. The exclusion criteria was Patients who are sputum smear positive for TB. Pregnant women and HIV AND HBC. Other causes of Dyselectrolytemia were excluded from the study like chronic renal failure, diabetic ketoacidosis, adrenocortical insufficiency, cerebral salt wasting.

### Sample collection
Under all aseptic condition blood samples from all the subjects were collected for the estimation of serum electrolytes like sodium and potassium and chloride in auto analyzer (Easylyte plus-sodium, potassium, chloride analyzer, Medica Corporation, USA. Kit used was supplied by the same company.) and magnesium and phosphorus in modulator analyzer cobos <501 (6000), Hitachi at the clinical laboratory of IMS ANS SUM Hospital, Bhubaneswar, Odisha.

Statistical analysis will be done using MS Office Ex-Cel AND SPSS for windows v17.0 & data will be presented as mean ± SD, Statistical significance analyzed by Student's t-test ($P < 0.005$ was considered as statistically significant).

### Results
Majority of the study population (65 cases) were between 60 years – 80 years of the age few populations is (13 cases) are >80 years.

**Table 1:** Age distribution in AE COPD

| Age In Yrs | Frequency | Percentage |
|---|---|---|
| 40-60 | 22 | 22 |
| 60-80 | 65 | 61 |
| >80 | 13 | 17 |
| Total | 100 | 100 |

Majority of the study population are male (63 cases) and female population is (37 cases)
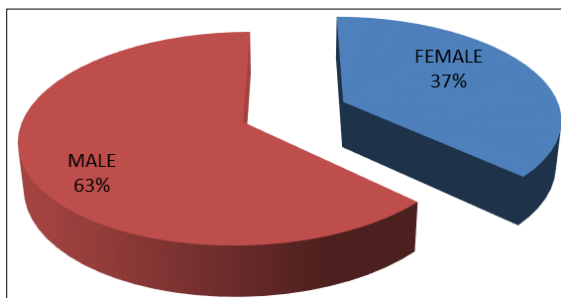


**Fig 1:** Gender distribution in AE COPD

**Table 2:** Mean and standard deviation of age in AE COPD

| Male | 61.30±15.94 |
|---|---|
| Female | 56.35±14.60 |
| Total | 59.47±15.57 |

**Table 3:** Age and Gender Distribution AE COPD

| Age In Yrs | Female | | Male | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| 40-60 | 11 | 29.7 | 11 | 17.5 |
| 60-80 | 20 | 54.1 | 45 | 71.4 |
| >80 | 6 | 16.2 | 7 | 11.1 |
| Total | 37 | 100 | 63 | 100 |

Majority of the study population were (60 -80 year) of age groups. male population is 45 cases (71.4%) and female population is 20 cases (54.1%). 40-60 year of age group, male 11 cases (17.5%) and female population is 11 cases (29.7%)

**Table 4:** Smoking Status in both Male and Female in AE COPD

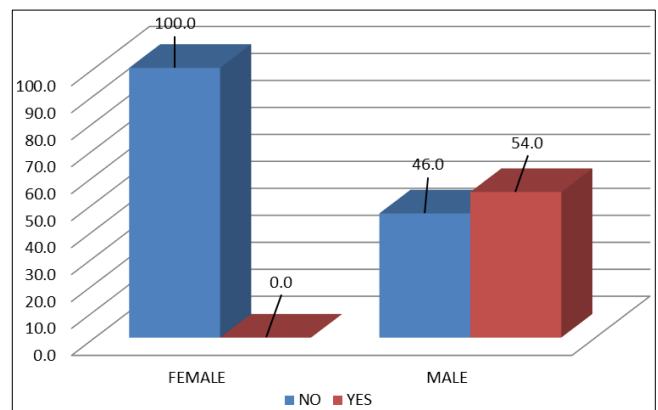| Smoking | Female | | Male | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| No | 37 | 100.0 | 29 | 46.0 |
| Yes | 0 | 0.0 | 34 | 54.0 |
| Total | 37 | 100 | 63 | 100 |



**Fig 2:** Smoking status in male and female in AE COPD

The study revealed that majority COPD patients are smoker, smoker male COPD are 34 cases (54%), nonsmokers male COPD are 29 cases (46%). female are nonsmokers 0 cases (100%)

**Table 5:** Symptomatology in AE COPD

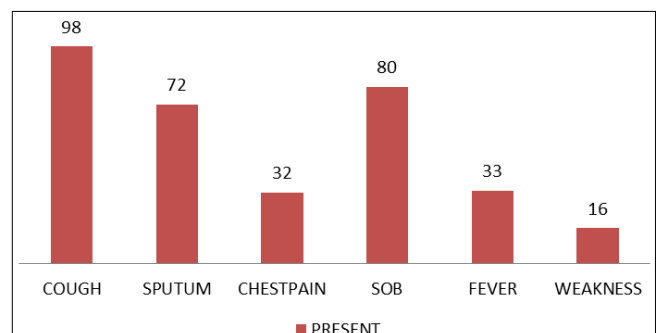| Symptoms | Present | | Absent | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| Cough | 98 | 98 | 2 | 2 |
| Sputum | 72 | 72 | 28 | 28 |
| Chestpain | 32 | 32 | 68 | 68 |
| Sob | 80 | 80 | 20 | 20 |
| Fever | 33 | 33 | 67 | 67 |
| Weakness | 16 | 16 | 84 | 84 |



**Fig 3:** Symptomatology of AE COPD

Cough, breathlessness and expectoration were the major symptoms of COPD at initial presentation. But cough was observed more in this study (98%) followed by breathlessness (80%), expectoration (72%) and chest pain (32%).

## Discussion

As per the existing data available till now imbalance in serum electrolytes has been proved in COPD patients, both in acute exacerbation and stable disease as well (Das *et al.* 2010). In the present cross sectional study revealed that more number of male cases are in both groups which is comparable to results of Das P *et al.* (151) of the total AE COPD 100 and stable COPD 40 (63%) are male and (37%) are female and in stable (65%) are male and (35%) are female respectively. According to Gold Classification the division of AE COPD of 100 cases in which Gold – D has major number of cases 30 cases (male 18, female 12) followed by the Gold – C 27 cases (male 19, female 8) in comparing with stable COPD cases where more in Gold – A 20 cases (male 10 and female 10) followed by Gold – C 9 cases (male 7 and female 2).

Very few data available regarding serum phosphate level, in AE COPD the present study revealed that 32 cases (32%) has hypophosphatemia and 20 cases (20%) are hyperphosphatemia. GOLD - A has 6 cases (30%) are hypophosphatemia and 5 cases (25%) are hyperphosphatemia with $3.51 \pm 1.20$ mean $\pm$ SD and Gold – B has 6 cases (26.08%) are hypophosphatemia and 4 cases (17.39%) are hyperphosphatemia with $3.37 \pm 1.35$ mean $\pm$ SD and Gold – C has 9 cases (33.33%) are hypophosphatemia and 4 Cases (14.48%) are hyperphosphatemia with $3.32 \pm 0.92$ mean $\pm$ SD and Gold –D has 11 cases (36.66%) are hypophosphatemia and 7 cases(23.33%) are hyperphosphatemia with $3.54 \pm 1.73$ mean $\pm$ SD and has more cases of hypophosphatemia and total mean $\pm$ SD of serum magnesium in AE COPD is $2.03 \pm 0.45$. (9)

## Conclusion and future prospective

Patients with COPD are susceptible to hyponatremia for a number of reasons. Chronic hypoxia and hypercapnia secondary to the underlying pulmonary illness, heart failure use of bronchodilators or steroids, malnutrition, and poor intake during acute exacerbations are common contributing factors for hyponatremia in such patients. Activation of the renin-angiotensin-aldosterone system and inappropriately elevated plasma arginine vasopressin (AVP) in COPD may cause hyponatremia. Patients with acute severe exacerbation of COPD, are at a higher risk of decreased serum levels of Na, K, Mg, CL. than normal subjects. So, these levels should be monitored routinely in those patients an attempt should be made to correct them at the earliest to avoid poor outcomes, faster recovery.

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