



THE RELATIONSHIP BETWEEN DYSELECTROLYTEMIA AND ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Internal Medicine

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ABSTRACT

Background: Electrolyte imbalances are common in the emergency room. Hyponatremia may be associated with acute exacerbations of community-acquired pneumonia (CAP) and chronic obstructive pulmonary disease (AECOPD). The incidence and prevalence of hyponatremia or potassium levels in individuals with AECOPD are still uncertain. **Method:** In this cross sectional observational study was conducted among 200 participants, 150 were cases and 50 were controls. **Results:** Hyponatremia was found to be more prevalent among the cases (35.3%) compared to the controls (10.0%). This suggests an association between hyponatremia and COPD. Hypokalemia is more frequent in the cases (14.0%) than in the controls (6.0%), while the majority of both groups have normal potassium levels. This indicates a potential relationship between hypokalemia and COPD.

KEYWORDS

Hyponatremia, acute exacerbation, chronic obstructive pulmonary disease, hypokalemia

INTRODUCTION

Chronic obstructive pulmonary disease is the third leading cause of death and a significant health issue globally ^[1]. The complexity of COPD is further complicated by acute exacerbations, which result in significant healthcare costs and high levels of morbidity. Patients with severe COPD exacerbation have factors that influence serum electrolyte imbalance, such as hypoxia, respiratory acidosis, metabolic abnormalities such as serum electrolyte imbalance, uremia, and liver function abnormalities ^[2].

Some patients may experience weakness or immobility, which can restrict their ability to access water even if they still feel thirsty. Both conditions might increase the risk for hyponatremia in these patients. Electrolyte disorders are common in the emergency department. Hyponatremia is known to be associated with adverse outcome in community-acquired pneumonia and acute exacerbation of chronic obstructive pulmonary disease.

Xiao M et al ^[3] (2023) found that hyponatremia is an independent predictor of poor prognosis, including increased mortality and readmission, in COPD patients. Identifying modifiable etiologies of hyponatremia may help reduce adverse events in patients with AECOPD.

Lindner et al.^[4] found a high prevalence of hyponatremia as well as hypokalemia in patients with AECOPD with about 1 in 5 patients presenting with one of the electrolyte disorders. Prevalence rates of dysnatremias and dyskalemiass were similar to patients with CAP.

Aim: To study the relationship between Acute exacerbation of COPD with Electrolyte imbalance

Material And Methodology

This hospital based cross sectional observational study conducted in outpatient department of general medicine of tertiary care center in Jaipur underwent a detailed medical history and a thorough physical examination of patients diagnosed with COPD

Inclusion criteria:

- All cases of COPD patients presenting to outpatient department or emergency with acute exacerbation.
- Age of patient between 18 -65 yrs. of age

Exclusion criteria:

- COPD patients admitted for causes other than COPD exacerbation
- COPD patients requiring mechanical ventilation
- Patients with pre-existing renal, hepatic, endocrinal or cardiac

illness.

- All patients not willing to give consent.

RESULTS

Demography

The largest proportion of cases (49.3%) falls within the 51-60 years' age group, followed by 37.3% in the 61-70 years' age group. In contrast, the control group shows a slightly different distribution, with the majority (44.0%) also in the 51-60 years' age group and 42.0% in the 61-70 years' age group.

Gender Distribution

The majority of the cases are male (76.7%), while females constitute 23.3% of the cases. Similarly, the control group has a higher proportion of males (72.0%) compared to females (28.0%). This suggests that COPD may be more prevalent among males in the studied population.

Distribution According to FEV1

The minimum FEV1 observed is 36.0%, the maximum is 75.0%, and the mean FEV1 is 57.74% with an SD of 10.68%.

Serum Na ⁺ Levels	Cases Freq	Cases %	Controls Freq.	Controls %
Hyponatremia	53	35.3%	5	10.0%
Normal	97	64.7%	45	90.0%
Total	150	100.0%	50	100.0%

Distribution of Serum Sodium Levels

Hyponatremia is more prevalent among the cases (35.3%) compared to the controls (10.0%). Conversely, the majority of the controls (90.0%) have normal serum sodium levels, compared to 64.7% of the cases. This suggests an association between hyponatremia and COPD.

Distribution of Serum Potassium Levels

Hypokalemia is more frequent in the cases (14.0%) than in the controls (6.0%), while the majority of both groups have normal potassium levels. This indicates a potential relationship between hypokalemia and COPD.

Serum K ⁺ Levels	Cases Freq	Cases %	Controls Freq	Controls %
Hypokalemia	21	14.0%	3	6.0%
Normal	129	86.0%	47	94.0%
Total	150	100.0%	50	100.0%

Correlation Between COPD Severity and Serum Sodium Levels (Cases Only)

Hyponatremia is significantly more prevalent in severe COPD cases

(31 cases) compared to moderate COPD cases (22 cases). The chi-square test indicates a significant association (Chi-Square = 27.350, $p < 0.001$).

Correlation Between COPD Severity and Serum Potassium Levels (Cases Only)

Hypokalemia is more frequent in severe COPD cases (16 cases) than in moderate COPD cases (5 cases). The chi-square test shows a significant association (Chi-Square = 20.651, $p < 0.001$).

DISCUSSION

Demography

The study population's age distribution clearly shows that COPD affects older age groups more severely. The age ranges of 51–60 and 61–70 years represent the majority of cases, indicating the higher incidence of COPD in older persons. This is in line with research that shows an increase in COPD incidence with advancing age.^[5] The notion that COPD is largely an illness of the elderly is supported by the control group, which has a higher frequency in these older age groups while having a slightly different distribution.

Gender Distribution

According to the gender distribution data, men are more likely than women to have COPD (76.7% of cases vs 23.3%). Although to a much lower level, the control group also exhibits this gender disparity. These results are consistent with epidemiological research that indicates men are more likely to acquire COPD, presumably as a result of men's greater rates of occupational exposure and smoking in many different geographic areas.^[6]

Pulmonary Function (FEV1)

The large range of FEV1 values (36.0% to 75.0%) in the cases illustrates the different levels of pulmonary impairment that COPD patients experience. According to the severity distribution seen, many of the study's patients have moderate airflow limitation, as indicated by the mean FEV1 of 57.74%. This variation in lung function emphasizes how different COPD is from person to person.

Serum Sodium Levels

Analysis of serum sodium levels indicates a strong correlation between COPD and hyponatremia. In contrast to just 10.0% of the controls, hyponatremia was seen in 35.3% of the patients. Given that hyponatremia can aggravate COPD symptoms and consequences, this finding has clinical significance. Elevations of blood sodium in the cases ranged from 123–145 mEq/L, while values in the controls ranged from 130–143 mEq/L. This shows that electrolyte imbalance is more severe in COPD patients.

Serum Potassium Levels

The prevalence of hypokalemia was higher in the patients (14.0%) than in the controls (6.0%), suggesting a possible association between hypokalemia and COPD. Compared to the controls (4.10 mEq/L), the mean serum potassium level in the cases (4.01 mEq/L) was marginally lower. Despite its smallness, this difference could have clinical ramifications because hypokalemia can impair respiratory muscles and exacerbate COPD symptoms.

The prevalence of hypokalemia was higher in the patients (14.0%) than in the controls (6.0%), suggesting a possible association between hypokalemia and COPD. Our investigation indicates a clinically meaningful difference in mean serum potassium levels between the patients (4.01 mEq/L) and controls (4.10 mEq/L).

Correlation Between COPD Severity and Electrolyte Imbalances

Significant relationships between the severity of COPD and specific electrolyte abnormalities were discovered by the investigation. Hyponatremia and hypokalemia were much more prevalent in severe COPD cases compared to mild instances, as demonstrated by the chi-square tests ($p < 0.001$). This implies that the probability of electrolyte abnormalities increases with the severity of COPD.

The results emphasize how crucial it is to keep an eye on electrolyte levels in COPD patients, particularly those with advanced illness, in order to successfully manage any potential consequences.

The information highlights the intricate interactions between systemic variables and COPD, highlighting the necessity of all-encompassing treatment plans that take into account the pulmonary and systemic

components of the illness.

Significant relationships between electrolyte abnormalities and the severity of COPD were discovered in our investigation.

CONCLUSION

The prevalence of electrolyte abnormalities in individuals with chronic obstructive pulmonary disease (COPD), were measured in this study. Significant electrolyte abnormalities were found in COPD patients, with hyponatremia and hypokalemia being particularly common in severe cases. These anomalies emphasize the significance of routine electrolyte monitoring as well as the systemic effects of COPD. In order to enhance patient outcomes and the overall care of the condition, it can be helpful to understand the prevalence and nature of these electrolyte abnormalities and to design focused therapy methods. Healthcare professionals can more effectively reduce problems and improve the quality of life for COPD patients by treating both the pulmonary and systemic elements of the disease.

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