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Dr. Vinoth N

Assistant Professor, Department of Anesthesiology, RVS Institute of Medical Sciences, Chitoor, Tirupati Road, Andhra Pradesh, India

Dr. Nischal Reddy M

Ramchandra R Associate Professor, Department of General Medicine, Shree Lakshmi Narayan Institute of Medical Sciences, Pondicherry, India

Corresponding Author: Dr. Nischal Reddy M Ramchandra R Associate Professor, Department of General Medicine, Shree Lakshmi Narayan Institute of Medical Sciences, Pondicherry, India

To investigation of serum electrolytes in COPD episodes

Dr. Vinoth N and Dr. Nischal Reddy M Ramchandra R

Abstract

Background and Objective: The occurrence of hyponatremia and hypokalemia was frequently observed in individuals who presented with acute aggravation of chronic obstructive pulmonary disease (COPD). Therefore, it can be observed that among those who do not smoke and maintain good health, the pace at which lung function decreases is estimated to be between 15 and 30 milliliters per year, commencing at the age of 35.

Material and Methods: 100 COPD patients hospitalized after experiencing an acute exacerbation are analyzed in this study. This was a prospective study that relied on primary data obtained by the lead researcher from patients with COPD who had just been hospitalized to the medical wards of Department of Anesthesiology, Sree Lakshmi Narayan Institute of Medical Sciences, Pondicherry, India due to an acute aggravation of their condition. Acute aggravation of chronic obstructive pulmonary disease patients admitted to medical wards. The research period for this study spanned from February 2018 to February of 2019.

Results: A strong and statistically significant association was observed between serum electrolyte levels and many indications of acute exacerbation severity in individuals with chronic obstructive pulmonary disease. These indicators include the 6-minute walk test, oxygen saturation levels, the Modified Medical Research Council dyspnea scale, pulmonary function test results, the Global Initiative for Chronic Obstructive Lung Disease score, and the length of illness.

Conclusion: Given the observed association between exacerbation of chronic obstructive pulmonary disease (COPD) and blood electrolyte levels, it is imperative to promptly address any imbalances in order to expedite remission and minimize the duration of hospitalization.

Keywords: Prevalence, pericardial effusion, hypothyroid patients

Introduction

The occurrence of acute exacerbation of chronic obstructive pulmonary disease (COPD) is closely linked to notable rates of both mortality and morbidity. The abrupt exacerbation of chronic obstructive pulmonary disease (COPD) gives rise to both economic and social burdens. Chronic Obstructive Pulmonary Disease (COPD) is recognized as the fourth most prevalent cause of mortality globally, contributing to 5.6% of total deaths worldwide. The identification of characteristics linked with unfavorable outcomes in individuals experiencing acute exacerbation of chronic obstructive pulmonary disease (COPD) holds significant importance ^[1-3].

Patients experiencing acute exacerbation of chronic obstructive pulmonary disease (COPD) exhibit symptoms characteristic of acute respiratory infections, as well as various metabolic disorders such as hyponatremia, hypokalemia, hypomagnesemia, hyperbilirubinemia, and elevated renal parameters. These metabolic disturbances can arise either due to the underlying disease process or as a result of therapeutic interventions such as beta 2 agonists, steroids, and diuretics. Frequently, there is a tendency to overlook the presence of concomitant metabolic disorders, which can significantly contribute to increased morbidity and mortality rates ^[4, 5]. The maintenance of serum electrolyte levels is crucial for facilitating efficient nerve transmission and muscle contraction. Hyponatremia, hypokalemia, and other electrolyte problems have been found to be associated with the development of cardiac arrhythmias, convulsions, coma, renal insufficiency, impaired nerve-muscle transmission, respiratory muscle paralysis, and potentially fatal outcomes. Therefore, the objective of this study is to assess the serum electrolyte levels in individuals experiencing acute exacerbation of chronic obstructive pulmonary disease ^[6, 7].

The objective of this study is to examine the serum electrolyte levels in individuals experiencing acute exacerbation of chronic obstructive pulmonary disease.

The evaluation of acute exacerbation of chronic obstructive pulmonary disease is conducted by assessing the degree of dyspnea by the utilization of the Modified Medical Research Council Dyspnea Scale, clinical examination, and pulmonary function tests^[8].

According to the Global Initiative for Chronic Obstructive Lung Disease, COPD is a pathological condition defined by enduring respiratory symptoms and a restriction in airflow that cannot be completely reversed. The observed airway and alveolar abnormalities can typically be attributed to substantial exposure to harmful particles or gases. The clinical manifestations of chronic obstructive pulmonary disease encompass a persistent cough, the generation of sputum, and dyspnea ^[9, 10].

In typical circumstances, men typically achieve maximum lung function at approximately 20 years of age, slightly later than women. The stability of lung function persists until the age of 35, suggesting the occurrence of a phase characterized by a plateau. Subsequently, at the age of 40, a gradual decline in lung function becomes evident, with women exhibiting this decline earlier than males ^[11, 12].

Materials and Methods

100 COPD patients hospitalized after experiencing an acute exacerbation are analyzed in this study. This was a prospective study that relied on primary data obtained by the lead researcher from patients with COPD who had just been hospitalized to the medical wards of Department of Anesthesiology, Sree Lakshmi Narayan Institute of Medical Sciences, Pondicherry, India due to an acute aggravation of their condition. Acute aggravation of chronic obstructive pulmonary disease patients admitted to medical wards. The research period for this study spanned from February 2018 to February of 2019.

Inclusion Criteria

COPD patients experiencing an acute exacerbation.

Exclusion Criteria

- Failure of the kidneys
- Cardiac congestive failure Liver dysfunction
- Ketoacidosis in diabetics
- Expectant mothers
- People with COPD who were admitted for reasons other than an acute flare-up

Statistical Methods

The acquired dates were inputted into Microsoft Excel, and statistical analysis was conducted utilizing the SPSS software. In the context of reporting categorical values, numerical representations such as numbers and percentages are commonly employed. Numerical values are typically reported using measures of central tendency, such as the mean, and measures of dispersion, such as the standard deviation. The statistical methodology employed in this study involved the use of analysis of variance (ANOVA) and unpaired t-tests. The criterion for determining statistical significance was the attainment of a p-value below 0.005.

Results

A study was conducted on a sample of 100 patients diagnosed with acute exacerbation of chronic obstructive

pulmonary disease (COPD) who were admitted to Coimbatore Medical College and Hospital. The process of diagnosing the condition involves considering the patient's medical history, doing a thorough physical examination, administering pulmonary function tests, and utilizing the modified Medical Research Council grading system to assess the severity of dyspnea. Healthy controls matched for age and sex were recruited from the general population. Two sets of serum electrolyte levels were tested, one at the time of admission and the other at the time of release, for each patient.

Table 1: Among Participants

Sr. No.	Group	Total patients	%
1.	Cases	70	77%
2.	Controls	30	23%

Table 1 displays the distribution of participants, with 77% belonging to the cases group and 23% to the control group.

Table 2: Age distribution

Sr. No.	Age in years	Case	Controls	Total
1.	< 40	18	2	20
2.	41-50	16	4	20
3.	51-60	19	1	20
4.	61-70	15	5	20
5.	> 70	19	1	20
	Total			100

Table 2 displays the distribution of patients used in this investigation according to age. A higher number of patients were observed within the age range of 51-60 and those above the age of 70.

Table 3: Sex Distribution

Sr. No.	Sex	Group		
		Cases	Controls	
1.	Male	50	10	
2.	Female	30	10	

Table 3 displays the distribution of patients used in this investigation, categorized by gender.

Table 4: Smoking

Sr. No.	Smoking	Group		
		Cases	Controls	
1.	Yes	45	05	
2.	No	35	15	

Table 4 presents the distribution of smokers (50%) and non-smokers (500%) as utilized in this investigation.

Table 5: BMI

Sr. No	Group	BMI		
5r. No.		Mean	SD	
2.	Cases	20.00	1.12	
3.	Controls	21.22	3.14	

Table 5 displays the body mass index (BMI) values of the patients that were included in the present investigation.

 Table 6: Type of therapy

Sr. No.	Type of Therapy	Total Patients	%
1.	No oxygen support	10	10.00
2.	nasal oxygen	50	50.00
3.	noninvasive ventilation	30	30.00
4.	mechanical ventilation	10	10.00

Table 6 displays the various therapeutic interventions employed in the current medical conditions of the patients.

Discussion

The research encompassed a sample size of 100 individuals diagnosed with chronic obstructive pulmonary disease, alongside 30 healthy community controls who were matched in terms of age and sex. This study reveals that the average age of the patients is 58.35 years, while the control participants had an average age of 58.33 years ^[13, 14]. The study sample consisted of 60% males and 40% females, with both cases and controls being represented in these proportions. Fifty-five percent of the cases and eighty percent of the control participants exhibited a history of smoking. The mean oxygen saturation levels (SpO2) of the cases were found to be 83.77 percent, which was determined to be statistically significant based on the results of an unpaired t-test ^[15]. The mean forced expiratory volume in one second for the patients was found to be 52.23 percent. whereas for the controls it was 95.36 percent. This difference was determined to be statistically significant. The mean forced expiratory volume in one second to forced vital capacity ratio for patients was 52.1, whereas for controls it was 77.56. Upon admission, the cases exhibited a blood sodium level of 131.86 meq/l, while the controls displayed a level of 141.6 meq/l. In terms of serum potassium, the cases had a level of 3.39 meq/l, whereas the controls exhibited a level of 4.25 meg/l. The graphical representation of serum sodium levels in relation to age revealed a significant decline in sodium concentration, accompanied by a decrease in potassium levels, as individuals advanced in age [16-18].

The mean serum sodium levels for males were recorded as 131.7 meq/l, while females had a mean serum sodium level of 132.1 meq/l. In terms of serum potassium levels, males had a mean of 3.3 meq/l, whilst females had a mean of 3.41 meq/l. The statistical analysis revealed a substantial association between the duration of chronic obstructive pulmonary disease and the severity of hyponatremia and hypokalemia [19-22]. In the observed cases, wheezing was present in 85% of instances, whereas crepitations were detected in 43% of cases. A total of 18% of the patients exhibited a peripheral capillary oxygen saturation level below 70% ^[23, 24]. The statistical analysis revealed a significant association between decreasing oxygen saturation and the severity of hyponatremia and hypokalemia. The cohort of patients exhibiting radiographic indications of both emphysema and chronic bronchitis demonstrated a mean serum sodium level of 129.68 meg/l and a mean serum potassium level of 3.15 meq/l. Patients with shortened 6 minute walk test demonstrated low levels of serum salt and potassium. Patients with advanced Modified Medical Research Council and Global Initiative for Chronic Obstructive Lung Disease staging exhibited decreased levels of serum salt and potassium ^[25-30].

There was a strong correlation observed between the severity of hyponatremia and hypokalemia and both the duration of hospital stay and the frequency of exacerbation. Patients who required mechanical breathing exhibited a serum sodium level of 129 meq/l and a serum potassium level of 3.03 meq/l ^[31-33].

Conclusion

Patients who experience acute aggravation of chronic obstructive pulmonary disease may have disturbances in serum electrolyte levels. Given the presence of a notable association between aggravation of chronic obstructive pulmonary disease and serum electrolyte levels, it is imperative to promptly address and rectify any imbalances in order to expedite remission and minimize the duration of hospitalization.

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