

Evaluation of Anemia in Patients of COPD: An Observational Retrospective Study

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Abstract

Background and Objectives: Chronic obstructive pulmonary disease (COPD) is characterized by chronic airway obstruction resulting from persistent inflammatory processes. As a prominent contributor to premature mortality and morbidity in adults, COPD often coexists with various comorbidities, including anemia. This study aimed to retrospectively investigate the prevalence of anemia in a hospital-based population.

Materials and Methods: This retrospective hospital-based study encompassed 456 clinically diagnosed COPD patients who received medical care at a tertiary care teaching hospital in India. A meticulous analysis was conducted on 234 patients who fulfilled the specified inclusion criteria. The diagnosis of anemia was determined based on the World Health Organization (WHO) criteria. The statistical analysis was performed employing IBM SPSS version 21.0.

Results: The mean age of the COPD patients was 67.34 years for males and 66.82 years for females. Among the 234 patients investigated, 25.05% males exhibited Hb levels below 13 g%, while 33.15% females manifested Hb levels below 12 g%. Regarding hematocrit levels, 24.31% males displayed values below 39%, and 33.11% females presented values below 36%.

Conclusion: The findings revealed that the prevalence of anemia in males was 26.1%, and in females, it was 34.3%, as indicated by the Hb measurements. Similarly, when assessed based on Hct values, the prevalence of anemia was 25.6% in males and 34.2% in females. Additionally, we observed a higher occurrence of anemia in advanced age groups for both males and females.

Keywords: Hematocrit, Anemia, Chronic Obstructive Pulmonary Disease, India.

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Introduction

Chronic obstructive pulmonary disease (COPD) is characterized by persistent airway obstruction resulting from chronic inflammation and lung parenchymal destruction, leading to emphysema. This condition is a significant contributor to premature mortality and morbidity in adults and ranks highest among respiratory diseases in terms of mortality rates [1,2].

It is projected to become the third leading cause of mortality worldwide [3]. Apart from severe airway obstruction and reduced functional capacity, COPD is associated with systemic inflammation and multiple comorbidities [4]. This disease is considered a chronic systemic inflammatory process, with elevated levels of inflammatory

markers such as interleukin-1, interleukin-6, and tumor necrosis factor- α [5,6]. The comorbidities linked to COPD primarily result from its impact on extrapulmonary organs, encompassing weight loss, anxiety, depression, skeletal muscle dysfunction, atherosclerosis, coronary artery disease, osteoporosis, and an elevated incidence of lung cancer [4,7].

Anemia is recognized as a comorbidity in COPD, despite the common occurrence of hypoxic hypoxia and polycythemia. Reported anemia prevalence in COPD ranges from 13% to 33% [8-11]. The presence of anemia in COPD patients leads to frequent hospitalizations, increases healthcare resource utilization, and adversely affects the quality

of life, particularly in older age groups. This study aimed to retrospectively investigate the prevalence of anemia in a hospital-based population.

Material & Methods

We conducted a retrospective analysis of clinically diagnosed COPD patients who received outpatient care in the Department of Pulmonary Medicine at a Teaching Hospital in India. The data retrieval process encompassed hospital records.

Anemia was defined according to the WHO criteria, which included hemoglobin (Hb) levels below 13 g% in males and 12 g% in females, as well as hematocrit (Hct) levels below 39% in males and below 36% in females. COPD diagnosis was based on clinical assessments made by the treating physicians.

Patients with concurrent bleeding disorders, malignancies, thyroid disease, chronic liver or kidney disease, heart failure, gastrointestinal bleeding, abnormal uterine bleeding, tuberculosis, collagen disease, diabetes mellitus, or major surgeries within the past 3 months were excluded from the study. Out of 456 retrieved records, 234

records met the inclusion criteria and were thus included and analyzed in the study, while the remaining records were excluded either due to coexisting disease conditions per the exclusion criteria or incomplete documentation in the patient records.

Data including hospital numbers, names, ages, sexes, addresses, Hb levels, red blood cell (RBC) counts, and red cell indices (Hct, mean corpuscular volume [MCV], mean corpuscular hemoglobin [MCH], and MCH concentration [MCHC]) were collected and recorded in a proforma. Statistical analysis was performed using SPSS Version 21.0 and Microsoft Excel 2010. Mean values were compared using ANOVA, and frequency comparison was conducted using the Chi-square test.

Results

We conducted a comprehensive study involving 234 clinically stable patients diagnosed with COPD. Among these participants, there were 144 (61.54%) female patients and 90 (38.46%) male patients, with ages spanning from 21 to 95 years, as presented in Table 1.

Table 1: Age wise distribution of study population

Age group	Females	%	Males	%	Total	%
21-30	3	1.28	7	2.99	10	4.27
31-40	5	2.14	4	1.71	9	3.85
41-50	16	6.84	5	2.14	21	8.97
51-60	15	6.41	14	5.98	29	12.39
61-70	42	17.95	15	6.41	57	24.36
71-80	38	16.24	25	10.68	63	26.92
81-90	17	7.26	16	6.84	33	14.10
≥91	8	3.42	4	1.71	12	5.13
Total	144	61.54	90	38.46	234	100.00

The mean age of the COPD patients was 67.34 years for males and 66.82 years for females. In males, the estimated prevalence of anemia was 25.05% based on Hb levels and 24.31% based on Hct values, while in females, the corresponding prevalence rates were 33.15% and 33.11%, respectively, as per the criteria

established by the WHO. Table 2 presents a comparison of different indices between patients with anemia and those without anemia. On the other hand, Table 3 provides a comparison of various indices based on gender.

Table 2: Comparison of various indices between anemic and non-anemic patients

Patient type	Mean Hb	Mean RBC count ($\times 10^5$)	Mean Hct	Mean MCV	Mean MCH	Mean MCHC
Anemic (141)	10.33	3.55	31.83	85.11	28.48	33.01
Non-anemic (93)	13.22	4.221	39.66	88.51	29.13	33.32
Total (234)	11.71	3.942	35.56	86.97	29.01	33.16
P value	<0.05	<0.05	<0.05	<0.05	<0.05	0.399

Table 3: Comparison of various indices between Genders

Patient Gender	Mean Hb	Mean RBC count ($\times 10^5$)	Mean Hct	Mean MCV	Mean MCH	Mean MCHC
Females (144)	12.31	3.93	35.88	87.51	29.36	33.00
Males (90)	11.78	4.12	34.75	89.90	28.93	33.71
Total (234)	11.96	4.01	35.62	87.12	29.73	32.82
P value	0.48	0.63	0.42	0.32	0.22	0.94

Discussion

The prevalence of anemia among COPD patients has been the subject of varied observations in previous research, with reported rates ranging from 10% to 15% [12-16]. However, a study conducted by John et al. revealed a notably higher estimated prevalence of anemia, reaching 23.1% [17].

Regarding Hb levels, our investigation found that males exhibited a mean Hb level of 11.78 g% and females had a mean Hb level of 12.31 g%. These levels indicated mild anemia, which aligns with findings from previous studies [18,19]. In our present study, anemia was defined by Hct levels below 39% in males and below 36% in females. We identified anemia in 24.31% of male participants and 33.11% of female participants, surpassing the results reported by Chambellan et al., who observed anemia in 13% of males and 8% of females [15]. This difference in prevalence could be attributed to their focus on patients with severe O₂-dependent COPD.

It is worth noting that age seems to play a significant role in the prevalence of anemia, not only in COPD patients but also in the general population [20]. Nonetheless, some other studies have indicated that aging may contribute to a higher prevalence of anemia specifically in COPD patients [18,19,21,22]. These findings underscore the importance of considering age-related factors when analyzing anemia in the context of COPD or other chronic conditions.

The study encountered some limitations that should be taken into consideration when interpreting the results. Firstly, not all patients underwent spirometry, which restricted the ability to definitively diagnose COPD solely based on clinical findings. Consequently, the association between COPD severity and its correlation with anemia could not be fully established. Secondly, the levels of iron and Vitamin B12 were not assessed in this investigation, and their inclusion could have provided valuable insights into the underlying mechanisms of anemia in COPD patients. Lastly, the study duration spanned three years and involved a limited sample size, suggesting that conducting a more extensive investigation over a longer period, with a larger and more diverse sample, and incorporating stringent inclusion criteria to eliminate confounding factors could have shed further light on the intricacies of the problem at hand.

Conclusion

We observed a higher prevalence of anemia in both male and female COPD patients belonging to older age groups. Considering that anemia has been identified as a significant predictor of mortality in COPD patients, it becomes imperative to address this condition as part of routine clinical practice. By

doing so, the detrimental consequences of oxygen deficiency resulting from anemia in patients with pulmonary dysfunction can be effectively managed, ultimately leading to an improved quality of life for these individuals.

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