

# Frequency of Anemia in Chronic Obstructive Pulmonary Disease (COPD)

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## ABSTRACT

**Background:** Multiple western studies have focused on anemia in COPD and observed that anemia is more prevalent in COPD patients than Polycythemia. Anemia significantly increases the morbidity and deteriorates the functional status of COPD patients.

**Objectives:** The objective of current study was to determine the frequency of anemia in Chronic Obstructive Pulmonary Disease (COPD) patients present in a tertiary care hospital.

**Study Design:** Retrospective

**Material and Methods:** Two hundred COPD patients fulfilling the inclusion criteria were selected for the study. Hemoglobin (Hb) level test was done on all patients. Hb level was calculated by Automated Blood Cell Analyzer and anemia was labeled at Hb<13g/dL

**Results:** The mean of patients' age was 56.65+ 7.95 years. 181 (90.5%) patients were male and 19 (9.5%) patients were female. The mean Hemoglobin level (Hb) of the patients was 13.46 + 1.45 g/dL. 48 patients (24%) were anemic and 152 patients (76%) were non anemic.

**Conclusion:** The conclusion of the study is there is frequent occurrence of anemia in patients with chronic obstructive pulmonary disease (COPD), as in current study the frequency of anemia was found in 24.0% patients.

**Keywords:** Chronic Obstructive Pulmonary Disease (COPD), Anemia, Frequency

## INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a common pulmonary ailment leading to continuing obstruction in airflow and a magnified chronic inflammatory feedback to toxic stimuli<sup>1</sup>. Major cause of COPD is smoking other factors causing COPD are biomass smoke either occupational or environmental and genetic (alpha1-antitrypsin deficiency)<sup>2</sup>. Even after the new drugs for the treatment of COPD, the death toll is on the rise now becoming the third major reason of world's mortality<sup>3</sup>.

Classification of COPD can be done according to FEV1, mild (FEV1 more than 80%), moderate (FEV1 50% to 80%), severe (FEV1 30 to 50%), extremely severe (FEV1 less than 30%)<sup>4</sup>. COPD has systemic aspects, chiefly in patients having severe disease, which has a significant response on mortality and morbidity<sup>5</sup>. Osteoporosis polycythemia, depression, chronic anemia, and cardiovascular diseases are some consequences of COPD<sup>6</sup>. Others drawbacks are pneumonia, pneumothorax, exacerbations (infective or non-infective) of COPD, end-stage lung disease and cor-pulmonale<sup>7</sup>.

WHO designates anemia as a hemoglobin of 12 g/dL or below for females without pregnancy and 13 g/dL or below for males<sup>8</sup>. There is a systemic inflammation in COPD interrupting erythropoiesis which can lead to anemia. Anemia occurs as Anemia of chronic disease (ACD), having low levels of Hb circulating, which is an immune driven anomaly and it happens in many inflammatory diseases. It also underlies the basis of anemia in COPD. Anemia increases the morbidity and decreases the quality of life of the patient of COPD. Park et al have studied the relationship of decreased hemoglobin and increased mortality<sup>9</sup>.

Hence, the current study was planned to determine the frequency of anemia in patients with COPD as it will not only help in early detection but also may pave the way for preventive management reducing morbidity and improving functional status.

## MATERIAL AND METHODS

Medical records of two hundred patients were collected were collected who had COPD between 1<sup>st</sup> July 2017 until 30<sup>th</sup> January 2018. Information recorded included demographics, medical comorbidities, age and gender. Spirometric reversibility test was used for diagnosis and classification of severity of COPD was used for staging COPD. Hemoglobin value was measured on Automated

Blood Cell Analyzer after drawing 1-2 cc of blood via aseptic measures and anemia was labeled as per operational definition. This was a retrospective cross-sectional study that was conducted at Gulab Devi Teaching Hospital, Lahore, Pakistan. Non probability purposive sampling technique was used. Patients who had associated bronchial asthma (spirometric reversibility of more than 12%), malignancy, left ventricular failure, chronic liver disease (CLD), chronic renal failure (CRF) and patients of gastrointestinal bleeding or blood loss of any other cause defined by history of upper / lower gastrointestinal bleeding and Positive drug history for ferrous sulfate, folic acid, and vitamin B12 were excluded from this study. Statistical Package for Social Sciences (SPSS) software version 23 was used to process and analyze the collected data.

## RESULTS

Table 1: Distribution of Patients by Age (N=200)

Variables	n	(%)
Age (Years)		
36 – 42	8	4.0
43 – 49	24	12.0
50 – 55	53	26.5
56 – 62	68	34.0
63 – 69	37	18.5
70+	10	5.0
Mean + SD	56.65+ 7.95	
Gender		
Male	181	90.5
Female	19	9.5
Hemoglobin (g/dL)		
9.6 - 10.2	1	.5
10.3 - 10.9	8	4.0
11.0 - 11.5	22	11.0
11.6 - 12.2	8	4.0
12.3 - 12.9	11	5.5
13.0 - 13.6	56	28.0
13.7 - 14.3	39	19.5
14.4 - 14.9	34	17.0
15.0 - 15.6	11	5.5
15.7 - 16.3	4	2.0
16.4+	6	3.0
Mean + SD	13.46 + 1.45	
Anemia Status		
Anemic	48	24.0
Non anemic	152	76.0

The mean age of the patients was 56.65+ 7.95 years. In the distribution of patients by gender, there were 181 (90.5%) patients

were male and 19 (9.5%) patients were female (Table 1). The mean Hemoglobin level (Hb) of the patients was 13.46 + 1.45 g/dL. There was 1 (0.5%) patient in Hb range of 9.6 - 10.2. There were 8 (4%) patients in Hb range of 10.3 -10.9. There were 22 (11 %) patients in Hb range of 11.0 - 11.5. There were 08 (04 %) patients in Hb range of 11.6 - 12.2. There were 11 (5.5 %) patients in Hb range of 12.3 - 12.9. There were 56 (28 %) patients in Hb range of 13.0 - 13.6. There were 39 (19.5 %) patients in Hb range of 13.7 – 14.3. There were 34 (17 %) patients in Hb range of 14.4 - 14.9. There were 11 (5.5 %) patients in Hb range of 15.0 - 15.6. There were 04 (2 %) patients in Hb range of 15.7 - 16.3. There were 06 (03%) patients with Hb > 16.4 (Table 1). In the distribution of the patients regarding anemic/ non anemic status, 48 patients (24%) were anemic and 152 patients (76%) were non anemic table 1.

## DISCUSSION

COPD is the third major cause of death all over the world and regardless of developments and improvements in management, the rate of mortality is estimated to increase in coming decades<sup>3</sup>. COPD has numerous systemic features, mostly in patients having severe disease, and it has a prime influence on co-morbid diseases and survival<sup>6</sup>. Multiple western studies have focused anemia in COPD patients. Cote C. et al studied potential cohort of stable COPD outpatients (n683) in a US Veterans Administration pulmonary clinic. Anemia was present in 116 (17%) patients<sup>10</sup>. According to Park et al, the COPD patients getting long-term oxygen therapy have 12.6% (men) and 8.2% (women) prevalence of anemia<sup>9</sup>. Toft-Petersen et al conducted a study stating that 39% of males had hemoglobin below 130 g/L and 24% females had below 120 g/L. The mortality rates of in-hospital patients with Hb above or below these limits were 5.4% and 11.6% respectively<sup>11</sup>.

The mean age of the patients in current study was 56.65+7.95 years. In the study of Tahir et al, mean age was 63 years ± 11.38, which is relatable to our study<sup>15</sup>. A study by Cote C et al showed that the patients' mean age was 67±9 years<sup>10</sup>. According to a study by Oh et al, the mean age of the patients was 67.0±7.5 years which is higher than our study<sup>14</sup>. Pandey et al had mean age of 57.2 ± 9.5 in anemic group of COPD while 56.7 ± 9.33 in non-anemic group of COPD which is comparable to our study<sup>12</sup>. In our study males were predominant constituting 90.5 % while females made up 9.5%. Tahir et al had 46.5% males and 53.5% females in their research that doesn't relate to our study<sup>15</sup>. Pandey et al had 80 % males and 20 % females in their study which is comparable to our study<sup>12</sup>. Oh et al had 97.3 % males and 2.7 females in their research work that is relatable to our study.<sup>14</sup>In our study, the mean Hb level of the patients was 13.46 + 1.45 g/dL. In the study by Cote C et al, the mean Hb of the patients was 14.4±1.7 g/dL which is comparable to our study<sup>10</sup>. In the study conducted by Pandey et al, the mean levels of HB in anemic group were 11.04 ± 1.1 g/dl, however, it was 13.9 ± 0.8 g/dl in non-anemic group.<sup>12</sup>In our study the frequency of anemia was 24%. There were 48 (24%) anemic and 152 patients (76%) non anemic patients. Pandey et al found 31.6% anemia in COPD patients<sup>12</sup>. In a study by Budnevsky et al, anemia associated to COPD was expected to be 26.5%<sup>13</sup>. This is comparable to our study.

This study has a few constraints. Primarily, being a single center study it might not epitomize the entire country populace

even though Gulab Devi Teaching hospital is the largest pulmonary tertiary health care center in Punjab. Secondly, relatively small sample size, as it is a single institutional study.

## CONCLUSION

The conclusion of current study is that there is high anemia frequency in patients with COPD, as the frequency of anemia was 24.0% among the patients in our study.

## REFERENCES

1. Lareau SC, Fahy B, Meek P, Wang A. Chronic obstructive pulmonary disease (COPD). *American journal of respiratory and critical care medicine*. 2019 Jan 1;199(1):P1-2.
2. Celli BR, Agustí A. COPD: time to improve its taxonomy?. *ERJ open research*. 2018 Jan 1;4(1).
3. Raheerison C, Girodet PO. Epidemiology of COPD. *European Respiratory Review*. 2009 Dec 1;18(114):213-21.
4. Soriano JB, Lamprecht B, Ramirez AS, Martinez-Cambor P, Kaiser B, Alfageme I, Almagro P, Casanova C, Esteban C, Soler-Cataluña JJ, de-Torres JP. Mortality prediction in chronic obstructive pulmonary disease comparing the GOLD 2007 and 2011 staging systems: a pooled analysis of individual patient data. *The Lancet Respiratory medicine*. 2015 Jun 1;3(6):443-50.
5. Frogale K, Schnell KM, Boyd CM. COPD, Comorbidity, and Disease-Specific Clinical Practice Guidelines. *Chronic Obstructive Pulmonary Disease*. 2012;193-210.
6. Ugurlu E, Pekel G, Altinisik G, Bozkurt K, Can I, Evyapan F. New aspect for systemic effects of COPD: eye findings. *The clinical respiratory journal*. 2018 Jan;12(1):247-52.
7. Burns MD. Nicotine Addiction. In: *Harrison's Principles of Internal Medicine*, 16th ed. New York: McGraw Hill; 2005.p 2573-6.
8. Bikbov MM, Kazakbaeva GM, Zainullin RM, Salavatova VF, Gilmanshin TR, Yakupova DF, Uzmanbaeva YV, Arslangareeva II, Panda-Jonas S, Mukhamadiyeva SR, Khikmatullin RI. Prevalence and associated factors of anemia in a Russian population: the Ural eye and medical study. *BMC Public Health*. 2019 Dec;19(1):1-5.
9. Park SC, Kim YS, Kang YA, Park EC, Shin CS, Kim DW, Rhee CK. Hemoglobin and mortality in patients with COPD: a nationwide population-based cohort study. *International journal of chronic obstructive pulmonary disease*. 2018;13:1599.
10. Cote C, Zilberberg MD, Mody SH, Dordelly LJ, Celli B. Haemoglobin level and its clinical impact in a cohort of patients with COPD. *Eur Respir J*. 2007;29:923–929.
11. Toft-Petersen AP, Torp-Pedersen C, Weinreich UM, Rasmussen BS. Association between hemoglobin and prognosis in patients admitted to hospital for COPD. *International journal of chronic obstructive pulmonary disease*. 2016;11:2813.
12. Pandey S, Garg R, Kant S, Gaur P. Chronic Obstructive Pulmonary Disease with Anemia as Comorbidity in North Indian Population. *Advanced biomedical research*. 2018;7.
13. Budnevsky AV, Provotorov VM, Ulyanova MI. Chronic obstructive pulmonary disease and anemia: clinical manifestations and therapeutic strategy. *Klinicheskaia meditsina*. 2016 Jan 1;94(9):677-83.
14. Oh YM, Park JH, Kim EK, Hwang SC, Kim HJ, Kang DR, Yoo KH, Lee JH, Kim TH, Lim SY, Rhee CK. Anemia as a clinical marker of stable chronic obstructive pulmonary disease in the Korean obstructive lung disease cohort. *Journal of thoracic disease*. 2017 Dec;9(12):5008.
15. Tahir M, Nasib HA, Hanan A, Nasib B, Muhammad S, Raza SS. ANEMIA AND CHRONIC OBSTRUCTIVEPULMONARY DISEASES. *Journal Of Medical Sciences*. 2016 Aug 1;24(3):159-62..