



OCCURRENCE OF ANEMIA AMONG COPD PATIENTS AS COMPARED TO HEALTHY INDIVIDUALS IN POPULATION OF NORTHEASTERN UTTAR PRADESH

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ABSTRACT

Aim: To study the frequency of occurrence of anemia among COPD patients. **Methods:** This was a single centre case control cross-sectional observational study design including 50 cases and 50 controls. COPD patients more than 40 years of age, having acute exacerbation were included in the study after proper screening. CBC, hb, LFT, RFT, ABG, hsCRP, Spirometry, ECG, ECHO was performed and data was collected and recorded for analysis. **Results:** Among COPD patients 92 % (n=46 out of 50) had anemia compared to 30 % (n=15) among healthy volunteers at a hemoglobin cutoff of: <13.5 gm/dl for male and <12.5 gm/dl for female. Most of the anemic cases both in control as well as cases were females. **Conclusion:** Anemia rather than polycythemia is commonly seen among COPD patients in this population group. 92% of cases were anemic as compared to control in which 30% of the population was found to be anemic.

KEYWORDS: CBC, hb, LFT, RFT, ABG, hsCRP, Spirometry, ECG, ECHO.

INTRODUCTION

COPD represents an important public health challenge that is both preventable and treatable. COPD is a major cause of chronic morbidity and mortality throughout the world; many people suffer from this disease for years, and die prematurely from it or its complications.^[1] Globally, the COPD burden is projected to increase in coming decades because of continued exposure to risk factors and aging of the population.

COPD is not just an airway disease. Now days more persons are in favor of multisystem approach rather than tubular approach. COPD often co exists with other diseases that may have a significant impact on prognosis. Some of these arise independently of COPD whereas others may be casually related, either with shared risk factors or by one disease increasing the risk or compounding the severity of the other. It is possible that features of COPD, are shared with other diseases and as such this mechanism represents a link between COPD and some of its co-morbidities. This risk of co-morbid disease can be increased by the sequel of COPD e.g., reduced physical activity or continued smoking.^[2] Some common comorbidities occurring in patients with COPD include cardiovascular disease (CVD), heart failure, ischemic heart disease (IHD), arrhythmias, peripheral vascular disease, dyslipidemia, anemia, hypertension,

osteoporosis, anxiety and depression, lung cancer, metabolic syndrome and diabetes, gastroesophageal reflux (GERD), bronchiectasis, obstructive sleep apnea.

AIM: To study the frequency of occurrence of anemia among COPD patients.

Methods: Approval of the ethical committee was obtained in May 2017. This study was done from June 2017 to April 2019. COPD patients more than 40 years of age, having acute exacerbation and presenting to SS Hospital were screened and those meeting the inclusion and exclusion criteria were selected for the study.

Table 1: Inclusion criteria:

COPD patients with:	
	Post Bronchodilator FEV ₁ /FVC <70%
	Post-bronchodilator reversibility <200ml and < 12%
	Indian population
	Aged >40years.

Table 2: Exclusion Criteria.

Domiciliary oxygen therapy
Hypertension
Diabetes mellitus
Inflammatory diseases
Hemodynamically unstable patients
Coagulopathies
Renal diseases
Liver diseases
Malignancies
Long term steroids use
Anticoagulant and antiplatelet medication use
Drug abuse
Alcoholics
Active smokers
Pregnancy

Control group

Adult aged >40 years among indian population and hemodynamically stable.

Study Design

A single center case control cross-sectional observational study design including 50 cases and 50 controls (healthy volunteers) was done.

Anemia

An individual is said to have anemia in this study if serum level of hemoglobin <13.5 gm/dl for male and <12.5 gm/dl for female.

Data Analysis

Data was analyzed using Trial version of SPSS 20 utilizing ANOVA, Student t-test, chi-square, Mann-Whitney test.

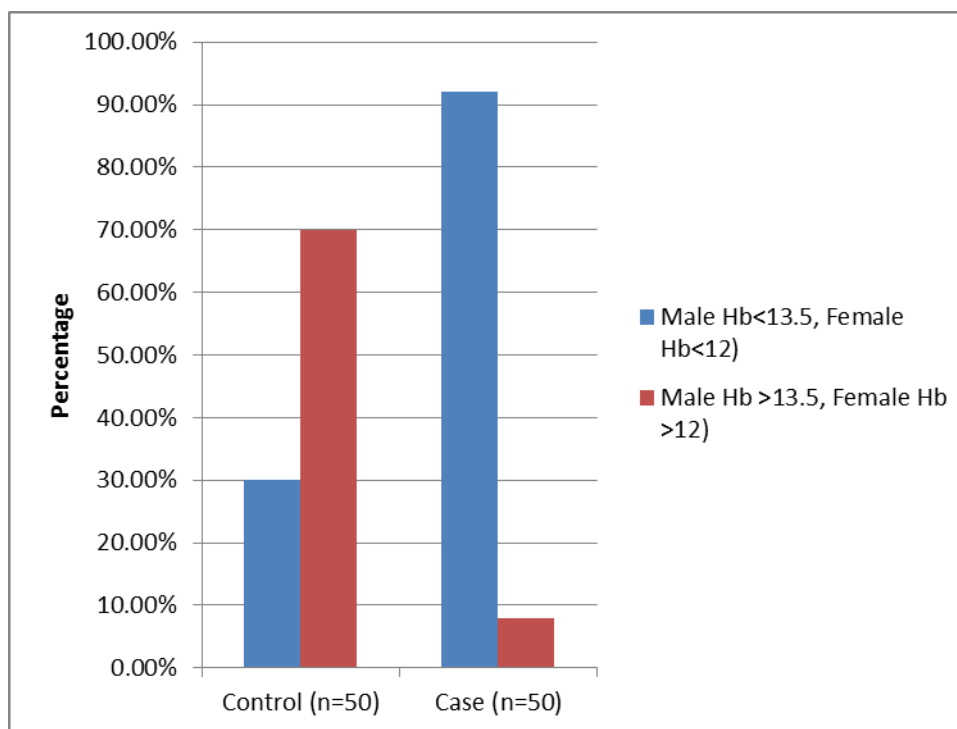
Table 3: Base line characteristic of controls (healthy volunteers) and cases (COPD patients).

Variables	Group I (control)	Group II (cases)	P-value
Age in years	60.68±7.78	60.82±8.68	0.933
Sex			
Male	46.0% (n=23)	36.0% (n=18)	0.309
Female	54.0% (n=27)	64.0% (n=32)	0.309
BMI in kg/m ²			
<18.5	14.0% (n=7)	2.0% (n=1)	0.051
18.5-24.9	80.0% (n=40)	80.0% (n=40)	
25-29.9	6.0% (n=3)	16.0% (n=8)	
>30	0.0% (n=0)	2.0% (n=1)	
FEV1/FVC			
<70%	0.0% (n=0)	100.0% (n=50)	
>70%	100.0% (n=50)	0.0% (n=0)	
FEV1			
>80%(GOLD 1)	100.0% (n=100)	0.0% (n=0)	0.000
>50-80%(GOLD 2)	0.0% (n=0)	32.0% (n=16)	
>30-50%(GOLD 3)	0.0% (n=0)	46.0% (n=23)	
<30% (GOLD 4)	0.0% (n=0)	22.0% (n=11)	
mMRC grading			
0	84.0% (n=42)	0.0% (n=0)	0.000
1	12.0% (n=6)	0.0% (n=0)	
2	4.0% (n=2)	14.0% (n=7)	
3	0.0% (n=0)	30.0% (n=15)	
4	0.0% (n=0)	56.0% (n=28)	
CAT Score			
0-40	1.52±1.86	25.84±6.58	0.000

OBSERVATION**Table 4: Hb.**

Hb (gm/dl)	Control (n=50)		Case (n=50)		Total	
	N	%	N	%	N	%
Male Hb<13.5, Female Hb<12)	14	30.0%	46	92.0%	61	61.0%
Male Hb >13.5, Female Hb >12)	36	70.0%	4	8.0%	39	39.0%
Total	50	100.0%	50	100.0%	100	100.0%

$\chi^2=42.667$, $p=0.000$



Control group

Hb (gm/dl)	Female (n=27)		Male (n=23)		Total	
	N	%	N	%	N	%
Male Hb < 13.5, Female Hb < 12)	12	44.4%	2	8.7%	14	28.0%
Male Hb > 13.5, Female Hb > 12)	15	55.6%	21	91.3%	36	72.0%
Total	50	100.0%	50	100.0%	100	100.0%

Cases

Hb (gm/dl)	Female (n=32)		Male (n=18)		Total	
	N	%	N	%	N	%
Male Hb < 13.5, Female Hb < 12)	31	96.9%	15	83.3%	46	92.0%
Male Hb > 13.5, Female Hb > 12)	1	3.1%	3	16.7%	4	8.0%
Total	50	100.0%	50	100.0%	100	100.0%

Above table clearly showed that among COPD patients 92 % (n=46 out of 50) had anemia compared to 30 % (n=15) among healthy volunteers at a hemoglobin cutoff of: <13.5 gm/dl for male and <12.5 gm/dl for female. Most of the anemic cases both in control as well as cases were females. Upon applying statistical analysis, statistically significant difference in anemia was found between COPD cohort and healthy volunteers.

DISCUSSION

It has long been known that COPD causes polycythemia secondary to erythrocytosis caused by hypoxia present in advanced cases of COPD.^[3] Although, theoretically polycythemia is likely to be the consequence in COPD patients, the occurrence of anemia is thought to be

multifactorial (nutritional- most common, worm infestation) in our population. It was shown in several studies that some COPD patients had anemia rather than erythrocytosis.^[4] Several hypotheses were proposed for this finding: for example it was thought that the inflammatory burden of COPD caused anemia of chronic disorders due to the effects of IL-1 and TNF- α (anemia in COPD), also CRP and IL-6.^[5] This might occur through shortened RBC survival, iron homeostasis dysregulation and impaired bone marrow erythropoietic response.^[6] Nutritional derangements in COPD patients were proposed as a cause for anemia. Also, tobacco smoking and its role in oxidative stress has a role in RBCs production. Lastly, the role of comorbidities frequently encountered in COPD patients as upper GI bleeding and

folate deficiency was proposed however they were largely related to smoking also. EPO is an endogenous glycoprotein hormone that serves as the primary stimulus for erythropoiesis. The kidney is the primary site of EPO production, but the liver also produces the hormone. EPO acts in the bone marrow, where it promotes terminal differentiation of progenitor cells into erythrocytes. Diminished arterial oxygen content associated with anemia or hypoxia is the major stimulus for EPO production and usually produces an exponential increase.^[7] Ninety percent of EPO is produced in the peritubular cells of the adult kidney in response to a decrease in tissue oxygenation. There is evidence indicating that the protein on these cells which detects oxygen saturation of the blood is a heme containing moiety. As the pO₂ of the plasma, a function of the hematocrit decreases, EPO concentration will increase.

Limitations

This study had some shortcomings/lacunae like; the study design was a case-control, single-centered, all comorbidities were not taken into consideration, and limited sample size. The evidence just addressed the association between COPD and levels of haemoglobin. However, the level of haemoglobin is affected as a consequence of smoking, nutrition, worm infestations and other comorbidities as well. Hence, further prospective, longitudinal, and well-designed cohort studies are needed. Potential confounders, such as smoking, diet intake can affect serum haemoglobin status. However, insufficient information regarding these factors limited the adjustment of the results in this study.

CONCLUSION

Anemia rather than polycythemia is commonly seen among COPD patients. 92% of cases were anemic as compared to control in which 30% of the population was found to be anemic. COPD patients are prone to develop polycythemia theoretically due to hypoxemia driven erythropoiesis, but in developing countries like India, anemia outnumbers polycythemia; perhaps due to multifactorial etiology like nutritional intake, worm infestation, comorbidities etc.

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