PREVALENCE AND EFFECT OF IRON DEFICIENCY ANEMIA IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

Background

Anemia is progressively recognized as significant comorbidity in the context of chronic obstructive pulmonary disease (COPD).

Objectives

To determine the extent of iron deficiency anemia in both exacerbation of COPD and stable COPD.

Patients and Methods

A prospective, multicenter, cross-sectional study was conducted between April 2017 and January 2018. Two groups of patients were enrolled, group A included those patients admitted in the emergency rooms for the management of acute exacerbation of COPD and group B comprised of those patients with stable COPD visited the consultatory medical department. Inclusion criteria included those patients known cases of COPD and categorized according to the GOLD criteria.

Results

The study included 150 patients. Group A contained 100 patients. Seventy-nine (79%) were male with a mean age and standard deviation of 66.77 years ± 12.07 years. While the other groups (group B) comprised of 50 patients, 39 (78%) were male with a mean age of 59.86 years ± 9.87 years. The inflammatory marker was significantly more positive in group A (89, 89%) compared to group B (6, 12%), P-value 0.0001. Overall, the low iron profile was found in 15 (15%) patients in group A, and in 2 (4%) patients in group B (P-value 0.0559). Both iron and non-iron deficiency anemia were more prevalent among the exacerbation group (group A).

Conclusion

Anemia is a relatively common finding among COPD patients (both IDA and non-IDA). It is more prevalent among those patients developing frequent exacerbations.

Keywords: *Iron deficiency anemia; COPD; Exacerbation COPD; Chronic obstructive pulmonary disease.*

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INTRODUCTION

COPD is defined as a spectrum of progressive clinical and pathologic entities, primarily including emphysema and chronic bronchitis [1]. Its pathophysiology has been recognized as an aberrant inflammatory response of the lung to the diverse noxious gases and particles [2]. Global Initiative for Chronic Obstructive Lung Disease (GOLD) defined COPD as the progressive airflow limitation due to pernicious exposure [2].

There are several risk factors for developing COPD which are intrinsic (gender, genetics, and airway hypersensitivity) and environmental (smoking, diet, pollution, and infection) factors [3]. The consensus definition of acute exacerbation of COPD is "a sustained worsening of the patient's condition from the stable state and beyond normal day-to-day variations that is acute in onset and necessitates a change in regular medication in a patient with underlying COPD" [4]. It comprises up to 10% of medical emergency admission with an 11% mortality rate [5]. Anemia is progressively recognized as significant comorbidity in the context of COPD, affecting a relevant number of patients and with an established negative impact on overall prognosis [6].

Several disease mechanisms could potentially explain the increased occurrence of anemia in COPD patients, including iron deficiency and inflammatory processes. Nonetheless, evidence about the role of anemia and iron deficiency anemia in the COPD patient remains limited and, consequently, these conditions continue to be undervalued in most COPD clinical settings [6].

This study aimed to reveal the prevalence and difference of anemia and iron deficiency anemia among patients with acute exacerbation and stable COPD with the comparison.

PATIENTS AND METHOD

Design and Setting

a prospective, multicenter, cross-sectional study has been conducted between April 2017 and January 2018. Socio-demographic and clinical characteristics (age, sex, smoking history, exacerbation, complete blood count (CBC), C-reactive protein (CRP), red cell distribution width (RDW), serum iron, serum ferritin, total iron-binding capacities (TIBC) and transferrin saturation). Two groups of patients were enrolled, group A included those patients admitted in the emergency rooms for the management of acute exacerbation of COPD and group B comprised of those patients with stable COPD visited the consultatory medical department.

Inclusion criteria

Patients have known cases of COPD and categorized according to the GOLD criteria [2].

Exclusion criteria

The following have been excluded from the study: patients with asthma, malignancy, hematological disorders, autoimmune disease, heart failure, and those with a history of blood transfusion in the preceding four months.

Ethical approval

Approval was granted from the Scientific and Ethical Committee of the Iraqi Board for Medical Specialities.

Statistical analysis

All data were admitted to and analyzed using the SPSS-22 (Statistical Package for Social Sciences-version 22). Descriptive statistics were calculated as mean ± standard deviation and percentages. Chi-square was used for the comparison of the categorical variables and an independent t-test was used to compare the numerical characters. The level of significance (p-value) was set as ≤ 0.05.

RESULTS

The study included 150 patients. Group A contained 100 patients. Seventy-nine (79%) were male, 21 (21%) were female with a mean age and standard deviation of 66.77 years ± 12.07 years and history of smoking of 50.65 pack-years ± 32.17 pack-years. While the other groups (group B) comprised of 50 patients, 39 (78%) were male and 11 (22%) were female, with a mean age of 59.86 years ± 9.87 years and smoking history of 51.14 pack-years ± 29.74 pack-years.

P-value 0.99 for the gender, 0.0006 for the age and 0.93 for the smoking history. The inflammatory marker (CRP) was significantly more positive in group A (89, 89%) compared to group B (6, 12%), P-value 0.0001. Overall, a low iron profile was found in 15 (15%) patients in group A, while it was found in 2 (4%) patients in group B (P-value 0.0559) (Table 1). Both iron and non-iron deficiency anemia (anemia of chronic disease) were more prevalent among the exacerbation group (group A) (Table 2).

Table 1. Anemia and iron deficiency anemia among both groups.

Variables	Exacerbation Group (Group A), Mean ±SD	Stable Group (Group B) Mean ±SD	P.value
S.Ferritin	133.42±127.31	66.28±29.47	0.0003
S.Iron	76.50±41.59	71.10±13.75	0.373
T.I.B.C	296.79±98.94	271.48±48.57	0.089
Transferrin Saturation %	29.97±22.28	27.10±6.81	0.375
Hb	13.32±1.45	14.43±1.11	0.0001
MCV	85.35±7.02	87.30±5.71	0.123

S.: serum, T.I.B.C: Total Iron Binding Capacity, Hb: hemoglobin MCV: mean corpuscular volume

Table 2. overall anemia and iron deficiency anemia among the study groups.

	COPD-Status		
Anemia Types	**Exacerbation (Group A) N (%)**	**Stable (Group B) N (%)**	**P.Value**
IDA	15 (15)	2 (4)	
Non-IDA (anemia of chronic disease)	29 (29)	2 (4)	0.0005
Non-Anemic	56 (56)	46 (92)	

IDA: iron deficiency anemia

DISCUSSION

Chronic obstructive pulmonary disease COPD is a chief cause of long-lasting morbidity and mortality all through the world. Countless people hurt from this problem for ages and die prematurely from its complications [7]. Overall, 6% of the adult population has been diagnosed as cases of COPD [8]. It is proposed that COPD would be the third leading source of decease and the fifth reason for incapacity by the year 2020 [9].

The percentages of female patients with COPD in both groups (21% in group A and 22% in group B) were lower than the international standards (42%). This may be explained by the corresponding lower smoking habits among female genders in our communities [10]. In the current study, the mean age of patients in the two groups was different significantly being more in the acute exacerbating group (group A, 66.77 years comparing with group B 59.86 years). This may herald the fact that acute exacerbation occurs more commonly among older age COPD patients.

Overall, the mean age of the participants is comparable with the international standard [11]. Different levels of CRP among COPD patients have been reported in different studies [12, 13]. In the study of AL-Kadhmi et al, among 50 patients with acute exacerbation of COPO, 27 (54%) patients had positive CRP [12]. In the study of Funda Aksu, et al conducted in Turkey, the CRP level was significantly higher in COPD patients than the healthy control; also the CRP level was directly associated with the increasing age and inversely related to the hemoglobin levels in COPD patients [13]. In this study, the level of CRP was significantly higher in the exacerbating group in comparison to the stable group. This may be due to either or both of these two factors; increasing age and prolonged hypoxia in group A.

Anemia is a common finding among COPD patients being slightly higher in those patients with frequent exacerbation. Nunes et al reported a 35% prevalence of anemia among exacerbating COPD patients and 30% among stable COPD [6]. In the current study, the anemia is significantly higher (five folds) in group A comparing to group B (44% 15 % vs 8%) 4 %.

There is no definitive explanation for this deviation and further studies are recommended to confirm and interpret this outcome.

There are different data regarding iron deficiency anemia (IDA) in patients with COPD [14, 15]. Nickol et al found 18% of IDA among 113 COPD patients (65% male) while Plesner et al published a series of 75 patients with COPD (44% male) in which 31 patients (41%) had IDA [40]. In the current study, 18% of the cases had IDA.

In conclusion, anemia is a relatively common finding among COPD patients (both IDA and non-IDA). It is more prevalent among those patients developing frequent exacerbations. The finding varies across different studies.

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