FREQUENCY OF SECONDARY POLYCYTHEMIA IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

Objective: The purpose of this study was to determine the frequency of secondary polycythemia in patients suffering from COPD as no local studies have been conducted in our setup up till now.

Materials and Methods: This Cross-sectional study was conducted in Medical "A" unit Hayat Abad Medical complex Peshawar from 1st January 2010 to 30th July 2011. All male and female patients of all ages having COPD according to the criteria of Pakistan Chest Society were included in this study.

Results: A total of 126 patients COPD patients were enrolled in this study. Male patients outnumbered female. Male patients were 86.5% and 13.5% were female. Mean age was 58years (ranged 37 to 72 years). Mean Hb was 12 gm/dl. Shortness of breath was the predominant symptom found in 71% patients followed by cough and fever found in 61.9% and 46% patients respectively. Headache was experienced by 25% and dizziness by 18% patients. Seven patients had duration of COPD <5years, 19 patients had COPD for 6 to 10 years, 23 patients had COPD for 11 to 15 years, 46 patients for 16 to 20 years and 31 patients for >20 years. In our study 40% patients were current smokers, ex-smokers 33% and 27% never had smoking habit.

Secondary polycythemia was confirmed in 9% patients. Among these confirmed case 11.7% were female and rest 88.3% were male.

Conclusion: Secondary polycythemia is important complication of COPD and quite common.

Key words: Secondary polycythemia, COPD.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease state characterized by airflow limitation[1] that is a slowly progressive disorder characterized by fixed or partially reversible airflow obstruction (FEV1 <70% predicted and FEV1/FVC ratio <70%).[2]

Chronic obstructive pulmonary disease is a leading cause of morbidity and mortality worldwide, and results in an economic and social burden that is both substantial and increasing. COPD is the 4th most common cause of death worldwide[3] and is estimated to be the third leading cause of death by 2020.[4] It has the prevalence of about 9-10% in adults over the age of 40 years.[5]

One of the complications of COPD is polycythemia which occurs secondary to hypoxemia and carboxyhemoglobin as smoking is one of the important causes of COPD.[6] Secondary polycythemia can be defined as an absolute increase in RBC mass that is caused by enhanced stimulation of RBC production[7] in response to appropriate or inappropriate increase in erythropoietin.[8]

Secondary polycythemia is suspected when the Haematocrit (HCT) is >48% or 52% in females & males respectively or when the Hemoglobin (Hb) is >16.5gm/dl or >18.5gm/dl in females and males respectively.[9] It is 6% in prevalence[10] and can result in thrombosis, hemorrhage and cardiac failure.[8] It also increases the incidence of stroke & myocardial infarction which may lead to cardiac arrest.[11]

The purpose of this study was to determine the frequency of secondary polycythemia in patients suffering from COPD as no local studies have been conducted in our setup up till now. The results of the study will provide an objective evidence of secondary polycythemia frequency which may be helpful in making plans for prevention of secondary polycythemia and its complication.

MATERIALS AND METHODS

Study design: Cross-sectional study (Descriptive study).

Setting & duration: We conducted this study in medical A unit Hayat Abad Medical Complex Peshawar from 1st January 2010 to 30th July 2011.

Sampling technique: Consecutive, on-probability.

SAMPLE SELECTION

Inclusion criteria: All patients having COPD according to the criteria of Pakistan Chest Society[3], both males and females admitted in Medical A unit Hayat Abad Medical Complex Peshawar from 1st January 2010 to 30th July 2011.

Exclusion criteria:

1. Patients having Asthma (those having peak expiratory flow variability of >20% or an increase in FEV1 of >15% (and >200ml) 15 mint after inhalation of standard dose of beta-2 agonist. This condition will be excluded to control bias in the study.
2. Patients having secondary polycythemia due to
   a. Renal diseases.
   b. Hepatocellular carcinoma.
   c. Adrenal tumors.
   d. Massive uterine fibroma.
   e. Living at high altitude (>2000 feet above sea level)

The above conditions will be excluded to control bias in the study.

OPERATIONAL DEFINATIONS:

1. **Chronic Obstructive Pulmonary Disease (COPD):** COPD is a slowly progressive disorder characterized by fixed or partially reversible airflow obstruction (FEV1 <70% predicted & FEV1/FVC ratio <70%).[2]

2. **Secondary Polycythemia:** Secondary polycythemia can be defined as an absolute increase in RBC mass that is caused by enhanced stimulation of RBC production[7] in response to appropriate or inappropriate increase in erythropoietin.[8]

3. **Haematocrit (HCT):** The HCT is expressed as the percent of a blood sample occupied by intact RBCs[9] Haematocrit (HCT) >48% or 52% in females and males respectively will be taken as secondary polycythemia.

4. **Hemoglobin (Hb) concentration:** The Hb concentration is its content in gm/dl of whole blood.[9] Haemoglobin (Hb) >16.5gm/dl or >18.5gm/dl in females & males respectively will be taken as secondary polycythemia.

DATA COLLECTION PROCEDURE:

After approval from ethical committee, patients who fulfilled the diagnostic criteria for COPD as per Pakistan Chest Society Guidelines (FEV1 <70% predicted & FEV1/FVC ratio <70%), admitted through emergency or OPD in the medical A unit Hayat Abad Medical Complex Peshawar. The purpose of the study was explained and informed consent was taken. Demographic characteristic were recorded and information regarding duration of COPD, symptoms of COPD and secondary polycythemia (like vertigo, tinnitus, burring of vision, tiredness) were obtained and signs (cyanosis, plethora) were checked. The diagnosis of polycythemia was confirmed by doing HCT on oxalate blood inside the Hayat Abad Medical Complex Peshawar. All data was entered in an objectively structured Performa annexed.

DATA ANALYSIS:

Data collected was entered into SPSS version 16.0 for statistical analysis. Mean and standard deviation of age, body mass index, FEV1, duration of COPD, frequencies and percentages of sex, and secondary polycythemia were calculated.

RESULTS

A total of 126 patients COPD patients were enrolled in this study. Male patients outnumbered female. Male patients were 109 (86.5%) and 17(13.5%) were female. Mean age was 58years (ranged 37 to 72 years). Mean Hb was 12 gm/dl. Shortness of breath was the predominant symptom found in 90(71%) patients followed by cough and fever found in 78 (61.9%) and 58(46%) patients respectively. Headache was experienced by 32(25%) and dizziness by 23(18%) patients. Seven patients had duration of COPD <5years, 19 patients had COPD for 6 to 10 years, 23 patients had COPD for 11 to 15 years, 46 patients for 16 to 20 years and 31 patients for >20 years. In our study 50(40%)

TABLE 1: SYMPTOMS OF COPD PATIENTS

Symptoms	Number (%)
Shortness of breath	90(71%)
Cough	78 (61.9%)
Fever	58(46%)
Headache	32(25%)
Dizziness	23(18%)

TABLE 2: DEMOGRAPHIC AND FUNCTIONAL CHARACTERISTICS OF COPD PATIENTS (126)

Character	Number (%)
Mean Age	58years
Male	109 (86.5%)
Female	17(13.5%)
Current Smokers	50(40%)
Ex-Smokers	42(33%)
Non Smokers	34(27%)
Total Polycythemic	11 (9%)
Male Polycythemic	15 (88.3%)
Female Polycythemic	2(11.7%)
Mean Hemoglobin	12 gm/Dl

patients were current smokers, ex-smokers 42(33%) and 34(27%) never had smoking habit.

Secondary Polycythemia was confirmed in 11 (9%) patients. Among these confirmed case 2(11.7%) were female and rest 15 (88.3%) were male.

DISCUSSION

COPD is expected to increase globally in the coming decades. The main reasons are the changing age distribution in all countries, with increased life expectancy and an ever increasing proportion of the population living to >60 years.[12] COPD death rates are very low under the age of 45 yrs and increase steeply with age.[13] The mean age in our study was 58 years. While in study from France by Chambellan et al[14] the mean age was 68 years.

Worldwide, COPD is more prevalent in males than in females.[15] in our study the male gender was predominant as were the case in other studies from Cote et al[10] and Tripathy et al. [11]

Shortness of breath was the main complaint in our study same finding was reported by Cote et al[10] and Tripathy et al [11]

Tobacco smoke is by far the most important risk factor for COPD worldwide[16] COPD is increasing because of increased uptake of smoking especially in developing countries.[17] in our study 45% were current smokers 32% ex-smokers and 23% never had smoking habit. While in study by Chambellan et al[14] current Smoker were 11% Ex-smoker 72% and Nonsmoker were 17%.

There is limited information in the current literature describing the distribution of Hb and its impact on outcomes in the COPD population. Secondary polycythemia, traditionally thought to be highly prevalent in COPD, occurs less frequently nowadays with more rigorous correction of hypoxaemia.[18]The relative risk of death decreases by 14% with every 5% increase in haematocrit and haematocrit is the strongest predictor of mortality next to age.[18] secondary polycythemia causes tissue hypoxia, metabolic acidosis, increased thrombogenicity and higher incidence of coronary disease and stroke in these patients.[19]

In our study Secondary Polycythemia was confirmed in 9% patients. Among these confirmed case 11.7% were female and rest 88.3% were male compared to 8.9% of men and 5.9% of women in study from France by Chambellan et al[14] while Zielinski et al[18] reported secondary polycythemia in 6% of the COPD patients.

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