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Original Research Article.

Pulmonary Hypertension in Patients with COPD Due to Biomass Smoke and Tobacco

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ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) is a major cause of chronic morbidity and mortality throughout world. Pulmonary hypertension (PH) is a common and well established complication of COPD. Therefore, the present study was designed to investigate the pulmonary hypertension frequency of hospitalized COPD patients with the PFT parameters, demographic aspects, smoking status, and history of use of biomass.

Methodology: Subjects were chosen from the patients presented to OPD and IPD patients in the Department of TB and Chest (Respiratory Medicine), Geetanjali Medical College, Udaipur, Rajasthan, India. The duration of study was over a period of six months.

Results: In our study 160 total numbers of cases were included. Among all cases 63.75% had exposure of tobacco smoke and 36.25% had biomass exposure. The prevalence of severe pulmonary hypertension from all categorization were 17.6% in cigarette cases followed by other.

Conclusion: We conclude that strategies like modification of stove design, switching over to other high-efficiency & low-emission fuels for cooking to reduce exposure risk.

Keywords: Pulmonary Hypertension, COPD, Tobacco Smoke.

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INTRODUCTION

The most significant cause of chronic morbidity and mortality throughout world is chronic obstructive pulmonary disease (COPD). COPD is the fourth leading cause of death in the world. As its prevalence increases day by day so mortality can be predicted in the coming decades.[1,2]

Pulmonary hypertension is a common complication of COPD.[3] Its presence is related with decreased survival.[4,5] More than 80% of the incidence of tobacco smoking (TS) is responsible for COPD in industrialized countries,.[6] It has been also observed in rural areas of developing countries that COPD is affecting largely non-smoking women due to the exposure to biomass smoke during cooking. Biological fuels that generate heat are called biomass. It is estimated that more than 90 % of the rural population in developing countries uses biological fuels.[7] All over the world, around 3 billion people are exposed to smoke from biomass fuel in comparison to 1.01 billion people who smoke tobacco. It is suggesting that exposure to BS might be the most important risk factor for COPD globally. Though, there is very few studies which examined the prevalence of PH.

Chronic obstructive pulmonary disease (COPD) is a major cause of chronic morbidity and mortality throughout world. Pulmonary hypertension (PH) is a common and well established complication of COPD.[8] Its presence is associated with decreased survival.[9,10] It is predicted that half of the world population and more than 90 % of the rural population in developing countries uses biological fuels.[11]

Therefore, the present study was designed to investigate the pulmonary hypertension frequency of hospitalized COPD patients with the PFT parameters, demographic aspects, smoking status, and history of use of biomass.

MATERIALS & METHODS

Study Population: 160 total numbers of cases were included in this study.

Study Area: Subjects were chosen from the patients presented to OPD and IPD patients
in the Department of TB and Chest (Respiratory Medicine), Geetanjali Medical College, Udaipur, Rajasthan, India.

Study Duration: The duration of study was over a period of six months.

Data Collection: Retrospective review of 160 patients was conducted on COPD patients who had history of smoking or biomass fuel exposure and who had undergone echo-cardiography for evaluation of pulmonary hypertension. Diagnosis of COPD was performed by assessment of functional criteria of chronic and irreversible airflow obstruction (forced expiratory volume in one second (FEV1) (forced vital capacity) < 70 %, FEV1 < 80 % predicted) and without asthma as assessed by clinical history and response to bronchodilators (change <12% in FEV1 following 400 µg of inhaled salbutamol). Echocardiography was performed by our cardiologist by the using a Vivid 3 instrument (General Electric, US) and by utilizing a 2 MHz probe. Right ventricular systolic pressure (RVSP) can be estimated by measuring the TR jet maximum velocity by continuous wave (CW) spectral Doppler. If there is no significant stenosis at the right ventricular outflow tract, or the pulmonic valve, the RVSP is equivalent to the systolic pulmonary artery pressure (SPAP). Elevated right ventricular systolic pressure (RVSP > 25mmhg) calculated through echocardiography was taken as having pulmonary hypertension. Patients are graded according to the RVSP Values into mild (25-40), moderate (40-55) and severe (>55) PH.5 Patients were further categorized into total tobacco smokers ,beedi smokers, cigarette smokers, total biomass exposures, biomass exposure<10 years duration, biomass exposure > 10 years duration and the RVSP values are plotted accordingly against each individual category

Data Analysis: Data were analyzed by using Microsoft excel.

RESULTS

In our study 160 total numbers of cases were included. Among all cases 63.75% had exposure of tobacco smoke and 36.25% had biomass exposure. Out of total tobacco smoke exposure cases 62.3% cases had pulmonary hypertension and among the biomass exposure cases 37.7% had pulmonary hypertension. We found that in the present study 34 cases were coming in beedi & 68 in cigarette categories from tobacco smoke exposure cases. The prevalence of severe pulmonary hypertension from all categorization were 17.6% in cigarette cases followed by other.

Table 1: Distribution of Cases According to Exposure

Exposure	No. of Cases	Percentage
Tobacco Smoke	102	63.75%
Biomass Exposure	58	36.25%
Total	160	100

Table 2: Distribution of Cases According To Pulmonary Hypertension

	Pulmonary Hypertension	Percentage
Out of Tobacco Smoke Cases	56	62.3%
Out of Biomass Exposure Cases	34	37.7%
Total	90	100

Table 3: Distribution of Cases According To Categorization

Categorizing		No. of Cases	Percentage
Tobacco Smoke	**Beedi**	34	21.2
	Cigarette	68	42.5
Biomass		58	36.3
Total		160	100

Table 4: Prevalence of Severe Pulmonary Cases

Exposure	Cases	Severe Pulmonary Hypertension	Prevalence
Beedi	34	2	5.8%
Cigarette	68	12	17.6
Biomass <10	16	0	0
Biomass >10	42	6	14.2
Total	160	20	12.5

DISCUSSION

Biomass smoke (BS) is composed of a comparatively equal mixture of gases and particles. It can penetrate deeply into the lung and producing several morphologic and biochemical changes.[12,13] it has been already established that there is a relationship among biomass smoke exposure, pulmonary hypertension and core-pulmonale (CP).[14]

In all COPD patients, the routine examination of pulmonary hypertension is very difficult due to request of right heart catheterization. The prevalence of PH in COPD patients varies widely. Previous studies on the commonness of pulmonary hypertension in COPD are confounded by numerous limiting factors. Hypoxia has been considered to be the most significant

pathogenic mechanism of pulmonary hypertension in COPD.[15] it has been suggested by early histopathologic findings that the morphologic changes in the pulmonary arteries are originated by the toxic effects of tobacco and biomass smoke and progress in parallel with the parenchymal changes of COPD.[16]

The findings of the present study were very much similar to the studies conducted by Department of Pulmonary and Critical Care, Yuzuncu Yil University Medical Faculty, Turkey in 2015.

CONCLUSION

Pulmonary hypertension frequency is almost equal with tobacco smoke and biomass fuel exposure. Frequency of pulmonary hypertension is more significant in biomass smoke exposure for more than 10years duration. Therefore biomass exposure should always be considered as an important etiological agent for COPD.

We conclude that strategies like modification of stove design, switching over to other high-efficiency & low-emission fuels for cooking to reduce exposure risk.

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