

JIOM Nepal, Volume 41, Number 1, April 2019, page 15-19

Prevalence of Chronic Cor Pulmonale in Chronic Obstructive Pulmonary Disease Patients in a Teaching Hospital in Nepal

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ABSTRACT

Introduction

Chronic obstructive pulmonary disease (COPD) is the most common cause of cor pulmonale. Cor pulmonale in COPD is associated with decreased survival, increased hospitalization and mortality. In this study we aim to find out the prevalence of chronic cor pulmonale in COPD patients which would help in prevention of right sided heart failure and improve patients' quality of life.

Methods

This was a cross sectional observational study done in Kathmandu Medical College Teaching Hospital, Nepal. 50 COPD patients above the age of 30 years attending the outpatient department or admitted in wards were included. All COPD patients diagnosed by pulmonary function test (PFT) were assessed for cor pulmonale by echocardiography (ECHO). The demographic data, chest X-ray, PFT, electrocardiography (ECG) and ECHO findings were recorded, entered and analyzed using SPSS software, version 17.

Results

Most of the patients enrolled in the study were between age group of 51-60 with female preponderance. 68% of the COPD patients had chronic cor pulmonale. Out of 21 male, 76.2% and out of 29 female COPD patients, 62.06% had cor pulmonale. Cor pulmonale was present in 53.12% and 94.4% of patients who had COPD for < 10 years and ≥ 10 years duration respectively. Cor pulmonale was present in 76% patients with severe COPD, 75% of patients with moderate COPD, 64.2% patients with very severe COPD and none of the patients with mild COPD. Pulmonary hypertension (PH) was present in 67.64% of cor pulmonale patients.

Conclusion

The prevalence of chronic cor pulmonale in COPD patients was 68%. It was more in male patients, highest in patients with severe COPD, and the prevalence increased with duration of COPD. PH was present in 67.64% of cor pulmonale patients.

Keywords: *Chronic obstructive pulmonary disease, chronic cor pulmonale*

INTRODUCTION

COPD is one of the leading causes of morbidity and mortality in the industrialized and the developing countries. The burden of COPD in Asia is currently greater than that in developed Western countries, both in terms of the total number of deaths and the burden of disease.¹ Cigarette smoking, occupational exposure to organic and inorganic dusts and indoor air pollution resulting from burned wood, animal dung, crop residues and coal used for cooking and heating in poorly ventilated dwellings are important risk factors

for COPD. Most of the people are ignorant of the fact that smoke inside the house can produce a chronic debilitating disease like COPD, which ultimately results in chronic cor pulmonale needing lifelong treatment. COPD can be prevented by making the Nepalese people aware of the facts mentioned above.

In a symptom-based study in Nepal, the crude prevalence of COPD in a rural community was 18%.² Another study done in Nepal Medical College Teaching Hospital (NMCTH), Nepal showed that the prevalence of COPD was 17.3%.³ COPD is the most common cause

of chronic cor pulmonale in North America⁴ accounting for more than 50% of cases of cor pulmonale. It is estimated that between 10 and 30% of all hospital admissions for heart failure in the United States yearly are due to cor pulmonale.⁵

A study done in NMCTH, Nepal in COPD patients showed that the prevalence of chronic cor pulmonale was 56.3% and mild PH was detected in approximately half of patients (49.1%), followed by moderate PH in 17.6% patients.⁶

METHODS

This was a cross sectional observational study done in Kathmandu Medical College Teaching Hospital, Nepal between April 2010 to March 2011. 50 COPD patients above 30 years of age attending the outpatient department or admitted in wards were included. Patients with lung cancer, bronchiectasis, pulmonary fibrosis, left ventricular systolic dysfunction with an ejection fraction of <55 %, history of old myocardial infarction, congenital heart disease with left to right shunt and who could not perform pulmonary function test were excluded. Informed consent was taken and prepared proforma was filled.

Diagnosis of COPD was considered on the basis of history, clinical, and radiological findings while confirmation was done and severity was assessed by PFT as per GOLD 2007 update spirometric classification. Diagnosis of cor pulmonale was considered on the basis of history, clinical, radiological and ECG findings and confirmed by ECHO.

The echocardiographic criteria of diagnosing

chronic cor pulmonale were as follows:

- Thickened right ventricular free wall of > 0.6 cm.^{7,8}
- RV diameter in diastole of >26 mm

Right ventricular free wall thickness in diastole was measured by subcostal view and right ventricular diameter in diastole was measured by parasternal long axis view by ECHO. Systolic pulmonary artery pressure (sPAP) was derived by modified Bernoulli formula: $sPAP = 4V^2 + RAP$. RAP was arbitrarily taken as 10 mm Hg. PH was defined as systolic pulmonary pressure more than 30mm of Hg and PH was arbitrarily classified as mild PH (31-50 mm Hg), moderate PH (51-70 mm Hg) and severe PH (>70 mm Hg). The data was entered and analyzed in SPSS software version 17.

RESULTS

Demographic profile of COPD patients:

The mean age of the COPD patient was 66.82 ± 11.06 years. 58% were female and 42% were male with female to male ratio 1.38:1. 52% were housewives, 28% were farmers and 20% had other occupation. 90% were illiterate. The mean body mass index (BMI) was 20.96 with ± 3.011 kg/m². 20 % of patients were underweight, 70% had normal weight, 8% were overweight and 2% were obese. 66% of COPD patients were ex-smokers, 24% were smokers and 10% were non smokers. 58% of patients used wood, 20% used LPG gas, 20% used combination of various fuels and 2% used kerosene for cooking purpose in their homes.

Productive cough was present in 74%,

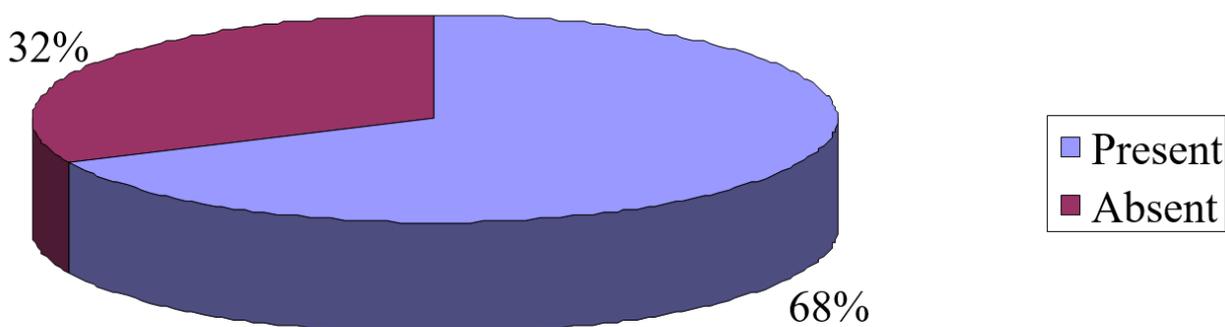


Figure 2. Pie chart showing prevalence of Cor pulmonale in the COPD patients

Table 1. Prevalence of Cor pulmonale according to sex distribution

Sex of COPD patients	Cor pulmonale		Total no of COPD patients	Cor pulmonale (%) in COPD patients according to sex of COPD patients	p value
	Present	Absent			
Male	16	5	21	76.2	0.29
Female	18	11	29	62.06	

Table 2. Prevalence of Cor pulmonale according to duration of COPD

Sex of COPD patients	Cor pulmonale		Total no of COPD patients	Cor pulmonale (%) in COPD patients according to sex of COPD patients	p value
	Present	Absent			
< 10 yrs	17	15	32	53.12	0.0026
≥ 10 yrs	17	1	18	94.4	

Table 3. Prevalence of Cor pulmonale according to severity of COPD

Severity of COPD	COPD numbers (N)	Cor pulmonale (%) in COPD patients according to severity of COPD
Mild	3	0
Moderate	8	75
Severe	25	76
Very severe	14	64.2
Total	50	

shortness of breath in 94%, fever in 24%, chest tightness in 24 % and leg swelling in 40% of patients. On examination, pedal edema was present in 42%, jugular venous pressure was raised in 26 %, prolonged expiration was present in 88%, wheeze in 92% and crepitations in 84 % of COPD patients.

ECG findings in cor pulmonale patients:

Out of 34 cor pulmonale patients, right atrial enlargement was present in 32%, right axis deviation in 12% and right ventricular hypertrophy in 8 % of patients.

Cor pulmonale in COPD patients:

Out of 50 patients with COPD, cor pulmonale was present in 68% of patients.

Prevalence of Cor pulmonale according to sex distribution:

Among 34 patients who had cor pulmonale, 47.06% were males and 52.94% were females. Out of 21 male and 29 female

COPD patients, 76.2% and 62.06% had cor pulmonale respectively (p=0.29).

Prevalence of Cor pulmonale according to duration of COPD:

Out of 50 COPD patients, 32 had COPD for less than 10 years duration while 18 had COPD for 10 years or more. In patients who had COPD for < 10 years 53.12% and who had COPD for ≥10 years 94.4% had cor pulmonale (p =0.0026).

Prevalence of COPD according to severity of COPD:

6% had mild COPD, 16% had moderate COPD, 50% had severe COPD and 28% had very severe COPD.

Prevalence of Cor pulmonale according to severity of COPD:

Cor pulmonale was present in none of the patients with mild COPD, 75% of patients with moderate COPD, 76% of patients with

severe COPD, and 64.2% of patients with very severe COPD.

46% of COPD patients had PAH, which was mild in 52.17%, moderate in 34.78% and severe in 13.04%. Prevalence of PAH in cor pulmonale patients was 67.64% .

DISCUSSION

This study has shown that mean age of the patients was 66.82 ± 11.067 years reflecting COPD is a disease of older age. The female:male ratio was 1.38:1 meaning more female were affected with COPD. This finding is similar to the previous report from NMCTH and other hospitals in Nepal.⁶ Greater number of females in our study may be due to increasing number of female smokers and high exposure to domestic smoke in females in our country. Most patients had smoked tobacco (22% were smokers and 66% were ex smokers) which seem to correlate with various studies where cigarette smoking as the most common cause of COPD was well established.^{9,10} 90% were illiterate. In a study done in China, subjects with low educational level had a significantly increased risk of COPD.¹¹ 52% were housewives and 20% were farmers in our study . The mean BMI was 20.96 with standard deviation of ± 3.011 . BMI of less than 21 is associated with increased mortality.¹²

50% of the patients had severe COPD, followed by very severe COPD in 28%, moderate COPD in 16% and mild COPD in 6%. In a study done by M Bednarek et al, mild COPD was present in 30.6%, moderate in 51.4%, severe in 15.3% and very severe in 2.7%.

68% of the COPD patients in the study had chronic cor pulmonale. A study done in NMCTH, Nepal showed that the chronic cor pulmonale was present in 56.3% of COPD patients.⁶ Out of 21 male COPD patients, 76.2% had cor pulmonale and out of 29 female COPD patients, 62.06% had cor pulmonale ($p=0.29$) which implies that more male COPD patients had cor pulmonale than female though it was not statistically significant.

Out of 32 COPD patients who had COPD for < 10 years, 53.12% had cor pulmonale and

out of 18 COPD patients who had COPD for duration of ≥ 10 years 94.4 % had cor pulmonale ($p=0.0026$) which implies that as the duration of COPD increases, the prevalence of cor pulmonale also increases.

Cor pulmonale was present in none of the patients with mild COPD, 75% of patients with moderate COPD, 76% of patients with severe COPD, and 64.2% of patients with very severe COPD. This implies that patients with severe COPD had high prevalence of cor pulmonale followed by moderate and very severe COPD. In a study done by MacNee W et al, right ventricular hypertrophy was present in 40 percent of patients with a FEV₁ of <1 litre and 70 percent of these with a FEV₁ of <0.6 litre.⁵ As right ventricular hypertrophy indicates cor pulmonale and as decrease in FEV₁ indicates increase in COPD severity, the study done by MacNee indirectly indicates that prevalence of cor pulmonale increases as the severity of COPD increases.

In our study PAH was present in 46% of COPD patients of which prevalence of mild, moderate and severe PAH was 52.17%, 34.78%, 13.04% respectively. In a study done by N.K Gupta et al, pulmonary hypertension was present in 63% COPD patients of which prevalence of mild, moderate and severe PAH were 58.82%, 23.53, 17.65% respectively.¹³

CONCLUSION

Most (68%) of the patients with COPD were found to have cor pulmonale. The prevalence of cor pulmonale was more in males, highest in patients with severe COPD and increased with duration of COPD. PAH was present in 67.64% of cor pulmonale patients.

CONFLICTS OF INTEREST

None declared.

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