



Original Articles

A Comparative Study on the Occurrence of Cor Pulmonale among the Cases of COPD and Bronchial Asthma

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Abstract

This hospital-based study was carried out on the patients of chronic obstructive pulmonary diseases (COPD) and bronchial asthma, who were admitted into the Department of Medicine, Rajshahi Medical College Hospital between the period of July 1999 to December 2000. The main objective of the study was to compare the occurrence of cor pulmonale among the patients of COPD and bronchial asthma. Sixty patients fulfilling the diagnostic criteria of bronchial asthma (n=30) and COPD (n=30) from the admitted cases of obstructive air way diseases were included in the study by random sampling method. It was found that occurrence of cor pulmonale was significantly higher among the patients of COPD than those of bronchial asthma.

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Introduction

The diseases causing cor-pulmonale comprises those in which the impediment to pulmonary blood flow is secondary to diseases of lung and those in which the pulmonary vasculature is primarily involved.¹ Chronic obstructive pulmonary diseases are by far the commonest causes of cor-pulmonale.² Although the incidence is not precisely known, it is seen more frequently in patients with hypoxemia, CO₂ retention and severely reduced FEV₁.³ Unlike chronic obstructive pulmonary diseases, asthma is not progressive. Although there are reports of patients with asthma developing irreversible changes in

lung function, these individuals frequently have comorbid stimuli such as cigarette smoking that could account for these findings. Even when untreated, asthmatics do not continuously move from mild to severe disease with time. Rather, their clinical course is characterized by exacerbation and remissions.¹ So there is a controversy regarding true occurrence of cor pulmonale in bronchial asthma.

Aims and Objectives

The main objective of the study was to compare the occurrence of cor pulmonale among the patients of COPD and bronchial asthma.

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Patients and Methods

This was a hospital based study carried out on the patients of chronic obstructive pulmonary diseases (COPD) and bronchial asthma, who were admitted into the Department of Medicine, Rajshahi Medical College Hospital between the period of July, 1999 to December, 2000. Each patient was diagnosed on the basis of clinical history, physical examination and relevant laboratory investigations. In absence of regular spirometry, serial peakflowmetry was used to observe reversibility of bronchospasm with bronchodilator therapy and to differentiate cases of COPD from bronchial asthma. Chest skiagram, electrocardiogram and echocardiogram were done in all the cases to detect right ventricular enlargement for establishment of the diagnosis of cor pulmonale. Sixty patients fulfilling the diagnostic criteria^{1,2,3,4,5} of bronchial asthma (n=30) or COPD (n=30) from the admitted cases of obstructive air way disease were included in the study by random sampling method. The numerical data obtained from the study were analyzed statistically. Standard deviation was taken as a measure of variation and the mean of data was expressed as mean \pm SD. Student's t-test was used to compare the significance of difference.

Results

Mean (\pm SD) age of the patients was 39.37 (\pm 16.55) years for bronchial asthma and 55.33 (\pm 12.64) years for COPD patients. Male patients

were predominant in case of COPD (96.66%); but females were predominant in bronchial asthma (46.66%). So there was a significant sex difference among the asthma and COPD patients. House wives (66.66%) and businessman (26.66%) were the common sufferers of bronchial asthma while farmers (40%) and day laborers (30%) were the common victims of COPD. Half of the asthmatics were from middle low socio-economic condition but most of the COPD patients were from low socio-economic condition though these differences were not significant. Interestingly asthmatics have their own house in town but patients of COPD came from villages as well as from town. The most important difference noted among the asthma and COPD patients was their smoking habit. Asthmatics were mainly non-smoker or smoker of less than 10 pack years. But most of the patients of COPD were smoker of more than 10 pack years and about two-third of them used to take bidi. However, there was no significant difference in total duration of illness among the two groups of patients. Out of 30 cases of bronchial asthma only 2 cases were identified as having cor pulmonale while 18 patients (60%) of COPD had clinical or ECG echocardiographic evidences of cor pulmonale. It was found that occurrence of cor pulmonale was significantly higher ($P < 0.001$) among the patients of COPD than those of bronchial asthma. The results are shown in tabulated form in Table-I and II.

Table I: Demographic profile

	Features	Br. asthma	COPD	P value	
Age	Mean (\pm SD)	39.37 \pm 16.55	55.33 \pm 12.64	<0.0001	HS
	Male	16(53.33%)	29 (96.66%)	<0.0001	HS
	Female	14 (46.55%)	01 (3.33%)	<0.0001	HS
	M:F	8:7	29:1		
Occupation	Farmer	01 (3.33%)	12 (40%)	<0.0001	HS
	Business	08 (26.66%)	06 (20%)	>0.6771	NS
	Service	04 (13.33%)	02 (6.66%)	>0.3681	NS
	Student	04 (13.33%)	0	<0.02	S

	Features	Br. asthma	COPD	P value	
	Teacher	01 (3.33%)	0	>0.317	NS
	Laborer	02 (6.66%)	09 (30%)	<0.016	S
	House wife	10 (66.66%)	01 (3.33%)	<0.0001	HS
Socio-economic condition					
	Upper	02 (6.66%)	01 (3.33%)	>0.4839	NS
	Middle	15 (50%)	11 (36.66%)	>0.1615	NS
	Lower	13 (43.33%)	18 (60%)	>0.1936	NS
Place of living					
	Slum	01 (3.33%)	03 (10%)	>0.3173	NS
	Village	07 (23.33%)	13 (43.33%)	>0.1	NS
	Town:				
	own house	16 (53.33%)	07 (23.33%)	<0.01	HS
	rented house	06 (20%)	07 (23.33%)	>0.7642	NS
Smoking					
	Non-smoker	19 (63.33%)	01 (3.33%)	<0.001	HS
	<10 py	09 (30%)	07 (23.33%)	>0.6771	NS
	10-20 py	02 (6.66%)	15 (50%)	<0.0001	HS
	>20 py	0	10 (33.33%)	<0.0001	HS
	Cigarette	06 (20%)	10 (33.33%)	>0.3173	NS
	Bidi	04 (13.33%)	19 (33.33%)	<0.0001	HS
Allergic to					
	Dust	27 (90%)	28 (93.33%)	>0.6892	NS
	Fumes	15 (50%)	12 (40%)	>0.4839	NS
	Pollen	05 (16.66%)	03 (8.33%)	>0.3681	NS
	Cold	28 (93.33%)	28 (93.33%)	1.0	NS
	Heat	01 (3.33%)	02 (6.66%)	>0.6771	NS
	Foods	16 (53.33%)	12 (40%)	>0.3173	NS
Total duration of illness					
	<5 years	10 (33.33%)	09 (30%)	>0.8415	NS
	5-10 years	07 (23.33%)	08 (26.66%)	>0.8415	NS
	>10 years	13 (43.33%)	13 (43.33%)	1.00	NS

Table II: Investigation findings

ECG findings	S. tachy	16 (53.33%)	17 (56.66%)	>0.8415	NS
	P-pulmon.	0	06 (20%)	<0.0069	HS
	RVH	01 (3.33%)	12 (40%)	<0.0001	HS
	RAD	01 (3.33%)	07 (23.33%)	<0.0278	S
	RBBB	01 (3.33%)	02 (6.66%)	>0.6771	NS
Echocardiogram	RVE	01 (3.33%)	18 (60%)	<0.0001	HS
Complications	Cor pulmonale	02 (6.66%)	18 (60%)	<0.0001	HS

Discussion

The term 'cor-pulmonale' was introduced about 60 years ago by Paul White^{7,8}. But generally little was known about this condition. In early '60s a WHO Expert Committee report focused new understanding in this sphere⁹. The committee preferred a definition based upon morbid anatomy as this provides the only characteristic common to all patients at all stages of the disease. They defined it as: 'Hypertrophy of the right ventricle resulting from diseases affecting the function and/or the structure of the lung, except when these pulmonary alterations are the result of the disease that primarily affect the left side of the heart or of congenital heart disease.' Recognition of cor pulmonale rests upon demonstration of right ventricular hypertrophy⁸ in the presence of the underlying causative disease. In some of these diverse clinical conditions, the abnormal signs indicative of right ventricular hypertrophy may be readily apparent in life. In other conditions, RVH may be unrecognizable. There are no symptoms specifically related to the presence of RVH. The cardiac signs are often concealed by distension of the overlying lung but may include a systolic thrust or left parasternal heave. There may be a loud pulmonary second sound. Other physical signs are either related to the severity of the pulmonary hypertension or to right heart failure.

Though no exact data is available in Bangladesh but a hospital based study suggests more than 10% of admitted patients with heart diseases were suffering from cor-pulmonale.¹⁰ Majumder et al reported that in a series of 500 cardiac patients referred for echocardiography 4.4% had cor-pulmonale.¹¹ Prospective study carried out among the admitted cases of cor-pulmonale in DMCH in 1994 revealed that out of 30 cases, chronic obstructive pulmonary disease (63.33%) was the principal cause of cor-pulmonale. Bronchiectasis (30%) and childhood bronchial asthma (6.67%) constituted the rest.¹² Numerous factors may contribute to the development of cor pulmonale in patients with COPD, but its primary cause is chronic alveolar hypoxia resulting in pulmonary vasoconstriction,

vascular remodelling and pulmonary hypertension.^{3,13-17} The same mechanism is likely to cause development of cor pulmonale in bronchial asthma particularly in chronic or persistent variety. Although there are reports of patients with asthma developing irreversible changes in lung function, these individuals frequently have comorbid stimuli such as cigarette smoking that could account for these findings. Even when untreated, asthmatics do not continuously move from mild to severe disease with time. Rather, their clinical course is characterized by exacerbation and remissions.¹ So there is a controversy regarding true occurrence of cor pulmonale in bronchial asthma. This study was performed to compare the occurrence of cor pulmonale among the patients of COPD and bronchial asthma. This study shows that COPD is more common among the elderly males; farmers and laborers are more affected who smokes particularly bidi more than 10 py. On the other hand bronchial asthma is common in younger patients; housewives and students are more commonly affected who usually dwell in their own house in town. They are usually non-smokers. But as a whole occurrence of cor pulmonale is significantly less common among them.

Conclusion

Many patients of bronchial asthma and COPD are unable to enjoy life to the fullest because of shortness of breath, physical limitations and inactivity imposed by the fear-provoking symptoms. Occurrence of complications like cor pulmonale makes the situation far worse. Though this study includes a very small population size and this may not be the representation of the actual picture but it can be concluded from this study that occurrence of cor pulmonale was significantly higher ($p < 0.0001$) among the patients of COPD than those of bronchial asthma. As because cor pulmonale is a chronically progressive and crippling complication of COPD, its early diagnosis and treatment is potentially beneficial for the patient, his family and the community as a whole. A further broad-based prospective study with large sample size should be done to clarify

the condition and to formulate an effective way to prevent the development of such a dreadful miserable complication in obstructive airway diseases.

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