ORIGINAL ARTICLE

Frequency and Associated Factors of Cor-Pulmonale among Asthma Patients: A Cross-Sectional Study at Tertiary Care Hospital

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Abstract

Background: Cor pulmonale, a severe complication of poorly controlled asthma, may involve both adults and children, significantly worsens patient outcomes but remains under-recognized. Its impact on quality of life a survival underscores the need for data on the frequency and risk factors; this study addresses a critical gap aiming to guide early detection and better management strategies.

Objective: The current study was conducted to explore the Frequency of Cor-Pulmonale among asthma patients at a tertiary care hospital

Material and Methods: The current cross-sectional study was conducted at the Department of Pulmonology, Khalifa Gul Nawaz Teaching Hospital (KGN), MTI Bannu, a tertiary care Hospital from August 2022 to January 2023. Patients presented with asthma for the last year aged 16-60 years were included in the study while those having existing cardiac diseases were excluded from the study. Cor-Pulmonale data was collected by operational definitions and annotated by the researcher on specifically created Proforma. Data was analyzed through SPSS version 20. After the stratification chi-square test was applied, p =0.05 was considered statistically significant.

Results: Among 134 patients enrolled in the study, 26.1% (29) were found to have cor pulmonale. The mean age of the participants was 37.22±13.29 years. The majority of the participants were male (71.6%) 55.9% were under 40 years of age and 59 (44.0%) patients were above 40 years of age. A family history of asthma was present in 20.1% of cases. Stratification analysis revealed no significant association between cor pulmonale and age, gender, family history, or asthma duration (p >0.05).

Conclusion: These findings highlight the notable frequency of cor pulmonale among asthma patients, especially in male and younger populations, irrespective of demographic and clinical characteristics

Keywords: Cor-Pulmonale, asthma, pulmonary hypertension, cardiopulmonary complications__

Introduction

Cor pulmonale is a Latin word that means pulmonary heart. It is defined as the structural or functional change in the right ventricle of the heart due to the disorder in the lung and is brought on by pulmonary hypertension (PAH)[1]. 5-10% of heart-related diseases and twenty to thirty percent of heart failure are caused by cor-pulmonale[2]. There are two reasons why it is challenging to determine the actual prevalence of Cor-Pulmonale. First, it does not always develop in people with chronic

lung disorders. Secondly, standard physical examination and laboratory investigations are relatively insensitive to specifically diagnose it[1]. In recent years, congestive heart failure (CCF) has come to be believed to be caused by chronic cor-pulmonary. The identification of chronic Cor-Pulmonale is therefore crucial for medical professionals, phonologists, and cardiologists[3]. Even though cor-pulmonale as a result of asthma is rarely documented, right ventricular strain may be shown on associated

electrocardiograms when hypoxia, hypercapnia, and fluid retention are involved[4]. Approximately 23.4 million people worldwide, including 7 million children, suffer from asthma, a figure that represents 5–10% of the world's population[5]. According to WHO 250,000 deaths and 15 million disabilities occur annually due to asthma[6]. The primary goal of medicine for asthma is to achieve complete control because of advancements in asthma treatment, such as steroids with LABA (long-acting beta agonist), leukotriene antagonist, and anti-IGE. As reported in the literature, asthmatic individuals continue to develop cor-pulmonale despite the availability of the aforementioned drugs[7]. The current study was conducted to find out the Frequency of cor-pulmonale among asthma patients at a tertiary Care hospital.

Material and Method:

Objective: The main aim of this study was to determine the frequency of cor pulmonale in patients suffering from asthma

Study Design: This study involved cross-sectional design.

Study Setting and Duration: This research was conducted at the Department of Pulmonology of Khalifa Gul Nawaz (KGN), MTI Bannu Hospital from August 2022 to January 2023

Sample size: The sample size of 134 was determined using the predicted frequency of cor-pulmonale in asthmatic patients as 20%, and 7% margin of error with 95% confidence level.

Inclusion Criteria:
1. Patients diagnosed with asthma
2. Age: 16 years to 60 years
3. Patients who gave informed written consent

Exclusion Criteria:
1. Asthma patients with any cardiac diseases like hypertension, ischemic heart disease, or Rheumatic heart diseases
2. Immunocompromised patients

Operational Definitions:

Asthma: It is a chronic inflammatory airway disorder, characterized by a reversible airflow obstruction bronchial hypersensitiveness, and variable symptoms triggered by genetic and environmental factors.

Cor pulmonale: It is a condition characterized by right-side heart dysfunction a hypertrophy resulting from pulmonary hypertension from chronic lung diseases such as Asthma, chronic obstructive pulmonary disease (COPD), or interstitial lung disease or disorders affecting pulmonary circulation.

Data Collection:

After obtaining approval from the institutional ethical committee and obtaining informed written consent from the patients, a total of 134 participants were enrolled in the study. Basic demographics were recorded, including age, gender, the length of time the asthma has been present, and weight on a standing scale, on a pre-designed proforma. Each individual had a chest CT scan followed by echocardiography. Cor pulmonale data was collected by operational definitions and annotated by the researcher on specifically created proforma.

Data analysis:

Data was analyzed through SPSS version 20. For quantitative characteristics including age, weight, height, BMI, and length of asthma, mean ±SDs were calculated. For Categorical variables like age groups, gender, and cor pulmonale Effect, frequency and percentage were calculated. After the stratification chi-square test was applied, p =0.05 was considered statistically significant.

Results:

A total of 134 patients with asthma were enrolled in the current study. Out of which male were 96 (71.6%) while female was 38 (28.7%). The mean age and standard deviation were 37.22±13.289 and 77.79±5.662 respectively. For height, the mean and SDs were 0.0816 ±5.498, and the mean and SDs for duration of asthma was 2.55±0.694. The basic demographic charters of the study population are described in Table 1.

Table 1: Descriptive Statistics (n=134)		
Variables	**Values**	**Mean±SD**
Age	16-62 years	37.22±13.289
Weight	62-95 Kg	77.79±5.662
Height	5.4-5.7 feet	5.498±.0816
Body mass index (BMI)	23-34.5	28.299±2.0568
Asthma duration	1-4 Months	2.55±.694

Seventy-five (55.9) % patients were below 40 years of age while 59 (44.0%) patients were above 40 years of age as shown in Table 2.

Table 2: Age-wise distribution of the study participants	
Age in years	N (%)
Under 40 years	75(55.9)
Above 40 years	59(44.0)
Total	134 (100)

Twenty (20.14%) patients had a family history of the disease. As per Cor-pulmonale in patients with asthma, 29 (21.6%) patients were recorded with Cor-pulmonale as displayed in Table 3.

Table 3: Baseline features of study participants	
Gender	**N (%)**
Male	96(71.6)
Female	38(28.35)
Total	134(100)
Family History	
Yes	27(20.14)

No	107(79.85)			
Total	134(100)			
Frequency of Cor- pulmonale				
Yes	29(21.6)			
No	105(78.35)			
Total	134(100)			

Cor pulmonale was also cross-tabulated with age groups gender groups, family history of the disease, and duration of asthma and no significant association was found with any one of these characteristics as displayed in Table 4.

Table 4: Cor pulmonale stratification with varying features of study cases (n=134).

Features		Cor- Pulmonale			
		Yes	**No**	**Total**	**P value**
Sex	Male	20(20.8%)	76(79.1%)	96	0.800
	Female	9(23.6%)	29(76.3%)	38	
Age in years	Below 40	15(20%)	60(80%)	75	0.613
	Above 40	14(23.7%)	45(76.2%)	59	
Family history	Yes	7(25.9%)	20(74.0%)	27	0.658
	No	22(20%)	85(79.4%)	107	
Asthma duration in months	Below 2	12(18.5%)	53(81.5%)	65	0.367
	Above 2	17(24.6%)	52(75.%)	69	

Discussion:

This study evaluated the frequency of cor pulmonale among asthma patients, finding a prevalence of 21.6%. These results align closely with previous studies, such as Idress et al., 2021, which reported a frequency of 20.88, and Tarlo SM et al., which documented 16.67%[9,10]. The predominance of male participants (71.6%) over females (28.7%) in this study is consistent with findings from similar research[11]. A plausible explanation for this gender disparity is the increased exposure of males in Pakistan to environmental triggers such as fumes, dust, and industrial pollutants, given their greater likelihood of working in outdoor or high-risk environments. Regarding age

distribution, 55.9% of the participants were under 40 years of age, and 44.0% were over 40, reflecting a pattern similar to a study conducted in Peshawar, Pakistan8. Family history of asthma was noted in 25.9% of cases, consistent with evidence suggesting the hereditary nature of asthma8. Despite these insights, this study did not find significant associations between cor pulmonale and factors such as age group, gender, family history, or asthma duration. This lack of significance may stem from several limitations. Firstly, the small sample size could have reduced the statistical power to detect meaningful associations. Additionally, as a single-center, cross-sectional study, the research might not fully capture the diversity of risk factors present in the broader population. Furthermore, the clinical heterogeneity of asthma patients, including variations in disease severity, comorbidities, and environmental exposures, may also have influenced these findings. Future studies with larger, multi-center cohorts and longitudinal designs are necessary to better explore potential risk factors for cor pulmonale in asthma patients. Nevertheless, this study underscores the importance of recognizing cor pulmonale as a potential complication of asthma and highlights the need for preventive strategies and early intervention to mitigate its impact.

Conclusion:

Our research highlights the notable frequency of cor pulmonale among asthma patients, especially in male and younger asthmatic populations, irrespective of demographic and clinical characteristics.

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