ORIGINAL ARTICLE

Exploring Comorbidity Prevalence and Influencing Factors in Respiratory Disease Patients: Evidence from Central India's Tertiary Hospital

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ABSTRACT
Background: Respiratory illnesses pose a substantial global health challenge, displaying diverse prevalence rates worldwide. Delving into comorbidity patterns and their influencers in these patients is crucial for customized interventions and enhanced healthcare. This research focused on probing comorbidity rates among respiratory disease patients in a Central Indian tertiary hospital. Moreover, it aimed to pinpoint and scrutinize the factors contributing to concurrent conditions in this patient group. **Methods:** In a cross-sectional analysis, 200 individuals seeking treatment for respiratory conditions in tertiary hospitals were studied. The research extensively reviewed demographic information, respiratory disease diagnoses, and accompanying comorbidities. Statistical evaluation was executed utilizing R 4.3.2 software. Findings were presented through frequency/percentage distributions and mean ± standard deviation calculations. **Results:** Participants' average age was 61.69 years, with the majority (72.6%) falling between 51 and 70 years old. Farmers represented the largest occupational group (25.3%) andSmoking emerged as the most prevalent factor, accounting for 44% (88 individuals) of the group, followed by occupational exposures (22% - 44 individuals) and allergens like pollen or dust mites affecting 15.5% (31 individuals). Chronic Obstructive Pulmonary Disease (COPD) was the most prevalent respiratory condition (35.14%), followed by pleural effusion (18.84%) and asthma (14.75%). Prevalence of comorbidity: Diabetes led as the primary comorbidity at 46.50%, succeeded by hypertension (35.50%). Ischemic heart disease (16.50%), chronic liver disease (8.00%), and chronic kidney disease (6.00%) were also observed, while septicaemia and malignancy showed lower prevalence at 4.50% and 2.00%, respectively. **Conclusion:** This study sheds light on the intricate prevalence patterns and factors influencing comorbidities in respiratory disease patients. The identified associations provide valuable insights for healthcare professionals to better understandand manage comorbidities among individuals afflicted with respiratory diseases in this region.
Keywords – Respiratory illness, Prevalence of comorbidity, Influencing factors.

Introduction

Respiratory illnesses impose a substantial global health challenge, impacting millions of individuals and creating considerable complexities in healthcare administration. Among the intricate realm of these conditions, the presence of concurrent health issues in patients with respiratory diseases has become a crucial element affecting how treatments work, healthcare needs, and patient welfare. Grasping the frequency and elements that contribute to these additional health concerns in respiratory disease patients is vital for improving medical approaches, allocating resources effectively, and ensuring better patient support.
Chronic conditions like asthma, allergic rhinitis (AR), chronic obstructive pulmonary disease (COPD), and rhinosinusitis affect the airways and lung structures over time. Research indicates that respiratory illnesses, including COPD, are expected to become a leading cause of mortality in the coming years [1]. The prevalence of asthma is anticipated to rise to 400 million by 2025 from the current estimate of 300 million [2]. This condition places a significant strain on society, being a leading cause of both illness and death globally. In the year 2000, nearly a fifth of all deaths and over a tenth of Disability-Adjusted Life Years (DALYs) were linked to the top five respiratory diseases [3].Over the past few years, the Asia-Pacific area has experienced significant growth, urban development, and economic shifts. Studies indicate

a noticeable rise in the occurrence of asthma, allergic conditions, and COPD, marking them as crucial health concerns in the region. [4-7].

This study delves into the complex relationship between respiratory diseases and associated conditions, aiming to untangle the web of contributing factors. It seeks to offer evidence-backed insights into the prevalence and types of comorbidities, as well as the underlying reasons for their simultaneous occurrence. Utilizing a robust dataset obtained from a leading healthcare facility, the research aims to significantly expand our understanding of comorbidities in patients with respiratory ailments. The outcomes of this study could serve as valuable guidance for healthcare policies, refine treatment approaches, and ultimately improve the overall care for individuals dealing with respiratory issues and related comorbidities in Central India.Through meticulous analysis and interpretation of the gathered data, this studyendeavours to provide a nuanced understanding of the prevalence and factors influencing comorbidities in respiratory disease patients, thereby paving the way for more targeted and effective healthcare interventions.

Methods

This was a cross-sectional study conducted over three years (Jan 2021 to Dec 2023) at a tertiary care hospital in central India. The study comprised 200 patients diagnosed with respiratory illnesses, all of whom sought treatment at the respiratory medicine department of the aforementioned tertiary care hospital. Before data collection, written informed consent was obtained and data were collected using a pre-designed and structured questionnaire. After selecting patients for the study, detailed sociodemographic information, clinical history, clinical features, and risk factor history were collected from each participant.

The study's targeted population was patients with respiratory illnesses attending a tertiary care hospital in Chhattisgarh. A sample cohort of 200 individuals was selected through systematic random sampling, employing specific selection criteria as mentioned further.

Inclusion Criteria: Patients above 18 years old with respiratory diseases who provided written consent.
Exclusion Criteria: Patients under 18 years old, those withholding consent, and pregnant/postpartum women within six weeks of delivery were excluded, along with individuals facing serious illnesses.

Sample size:
The sample size of this study was determined using the prevalence ofdiabetes mellitus among respiratory illness patients as it was the most common comorbidity. The sample size of 200 patients was estimated using a 23.05% prevalence ofdiabetes Mellitus[8]at a 95% confidence interval and 6 % allowable error.

Statistical analysis:
All collected data was entered into a Microsoft Excel worksheet andstatistical analysis was done using R 4.3.2 software. The results of the study were represented in an appropriate bar and pie diagram. The qualitative variables were summarised in frequency and percentage while the quantitative variables weresummarised in the form of mean and standard deviation.

Results

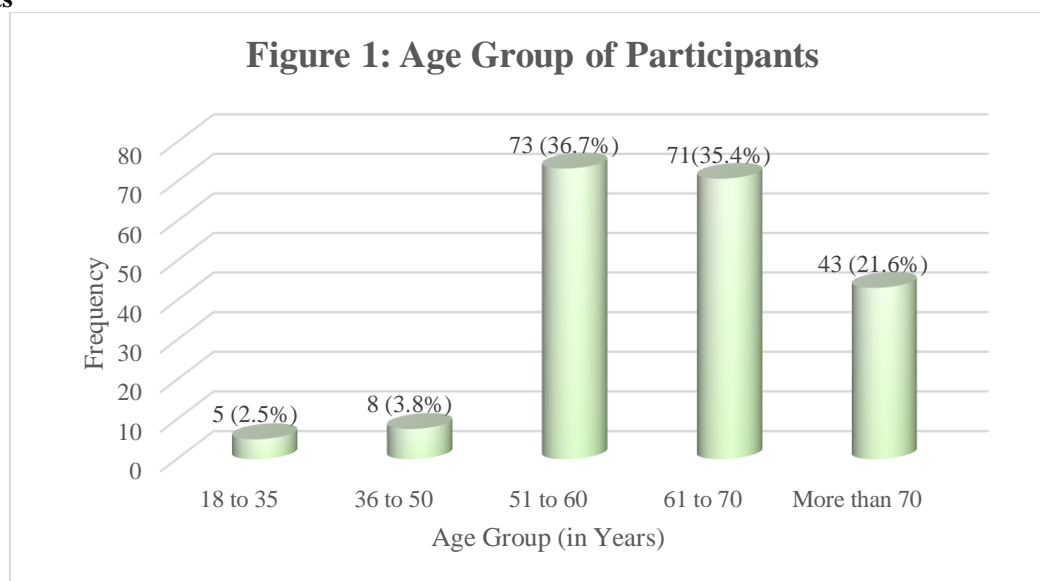

Figure 1: Age Group of Participants

Figure 1 shows the majority of participants, comprising 72.6%, were between 51 to 70 years old, while those aged 18 to 35 and over 70 represented smaller proportions at 2.5% and 21.6%, respectively, in a study involving 200 individuals.
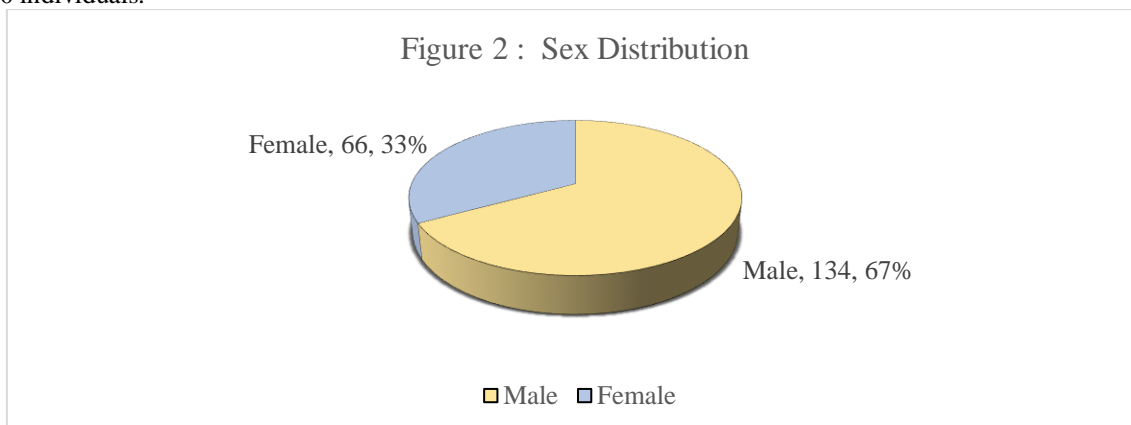

Figure 2 : Sex Distribution

Female, 66, 33%
Male, 134, 67%

☐ Male ☐ Female

Figure 2 shows that the study comprised 66 females (33%) and 134 males (67%) across the observed participants.

Table 1: Distribution of BMI		
BMI	Frequency	Percentage
Underweight	47	23.5
Normal	115	57.4
Obese	9	4.5
Overweight	29	14.6
Total	200	100

Table 1 shows that among individuals with respiratory illness, the majority (57.4%) had a normal BMI, while 23.5% were underweight. Smaller percentages were observed for obese individuals (4.5%) and those categorized as overweight (14.6%).

Table 2: Occupational work-wise classification of study participants		
Work	Frequency	Percentage
Mining	12	5.9
Farmer	51	25.3
Contractions or demolition work	31	15.5
Healthcare	3	1.3
Welding work	18	8.9
Manufacturing and industrial work	16	7.79
Auto Mechanical Work	18	9.01
Other (Housewife /self-employed / business/unemployed)	53	26.3
Total	200	100

Table 2 shows the study participants were diversified across various occupations, with farmers comprising the largest group (25.3%), followed by those categorized under "Other" (26.3%), encompassing housewives, self-employed individuals, businesspersons, and the unemployed. Occupations like mining (5.9%), construction or demolition work (15.5%), and healthcare (1.3%) represented smaller proportions in the sample.

Table 3: Distribution of Lifestyle-related factors		
Lifestyle-related factors	Frequency	Percentage
Smoking	88	44.00
Alcohol	23	11.5
Stress	12	6
allergens (pollen, dust mites)	31	15.5
occupational exposures (chemicals, dust)	44	22

Table 3 illustrates the distribution of lifestyle-related factors within a given population or sample. Smoking emerges as the most prevalent factor, accounting for 44% (88 individuals) of the group, followed by occupational exposures (22% - 44 individuals) and allergens like pollen or dust mites affecting 15.5% (31 individuals). Alcohol consumption stands at 11.5% (23 individuals),

87

while stress affects 6% (12 individuals) of the population. This breakdown highlights the varying degrees of engagement with these factors within the studied group, indicating a higher prevalence of smoking and occupational exposures compared to stress or alcohol consumption.

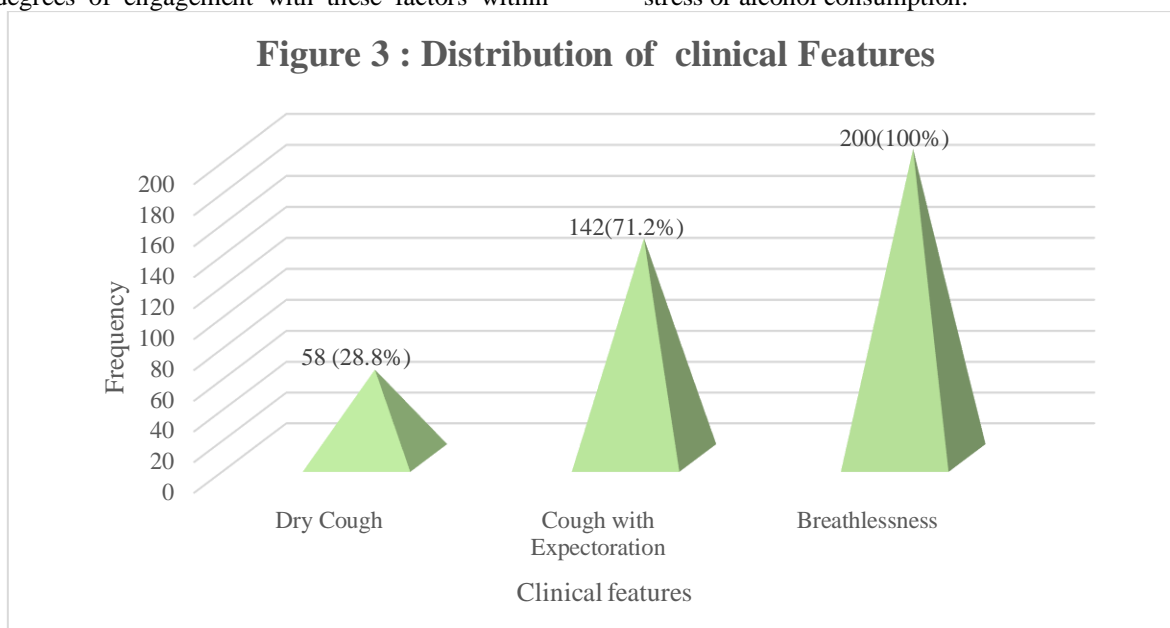Figure 3 : Distribution of clinical Features

Figure 3 shows the majority of participants (71.2%) experienced a cough with expectoration, while 28.8% reported a dry cough. Breathlessness was observed universally among all participants (100%).

Table 4: Distribution of Clinical Parameters		
Parameters	Mean	Standard Deviation
Age	61.69	8.05
Height(cm)	159.22	7.79
Weight (Kg)	53.31	12.44
BMI	21.03	3.8
SpO2	90.92	3.35
Waist Circumference (cm)	78.11	15.01
FBS	117.17	38.25
Sr TG	134.93	43.19
Sr HDL	44.86	13.51

Table 4 illustrates the clinical parameters distribution among the study population. On average, the patients were approximately 61.7 years old with a standard deviation of 8.05 years. Their height averaged 159.2 cm (SD = 7.79), weight at 53.3 kg (SD = 12.44), and body mass index (BMI) at 21.0 (SD = 3.8). Oxygen saturation (SpO2) levels were around 90.9% (SD = 3.35), while waist circumference averaged 78.1 cm (SD = 15.01). Additionally, fasting blood sugar (FBS) levels were recorded at an average of 117.2 mg/dL (SD = 38.25), triglycerides (Sr TG) at 134.9 mg/dL (SD = 43.19), and high-density lipoprotein (Sr HDL) cholesterol at 44.9 mg/dL (SD = 13.51). These figures provide insights into the typical ranges and variabilities of these clinical metrics within the patient cohort.

Figure 4: Distribution of Respiratory disease
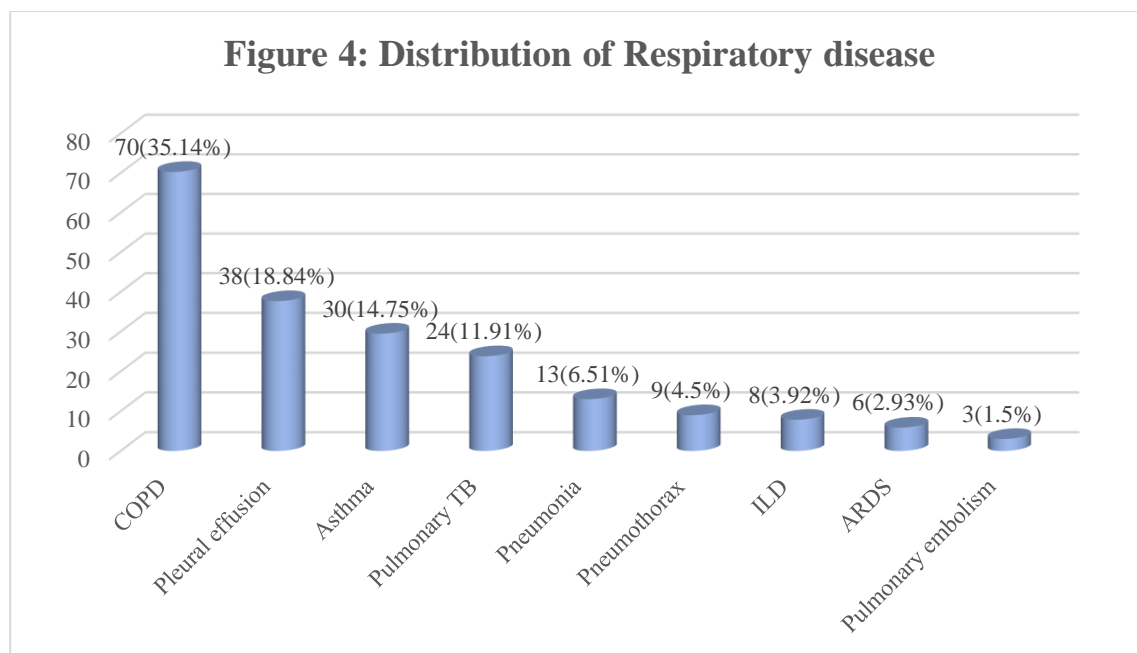
In Figure4, COPD stood as the most prevalent respiratory condition at 35.14%, followed by pleural effusion (18.84%) and asthma (14.75%). Pulmonary TB, pneumonia, pneumothorax, ILD, ARDS, and pulmonary embolism were less frequent in the studied population, ranging from 1.5% to 11.91%.

Table 5: Distribution of Proportion of Co-morbidities		
Co-morbidities	**Frequency**	**Percentage**
Diabetes	93	46.50
Hypertension	71	35.50
Septicaemia	9	4.50
Chronic Liver Disease	16	8.00
Chronic kidney Disease	12	6.00
Ischemic Heart Disease	33	16.50
Malignancy	4	2.00

Table 5 shows that diabetes was the most prevalent co-morbidity at 46.50%, followed by hypertension (35.50%). Ischemic heart disease (16.50%), chronic liver disease (8.00%), and chronic kidney disease (6.00%) were also observed, while septicaemia and malignancy had lower prevalence at 4.50% and 2.00%, respectively.

Discussion

Respiratory diseases encompass a spectrum of conditions affecting individuals across various age groups and lifestyles. Our study, conducted at a prominent tertiary hospital in Central India, aimed to delve into the prevalence and influential factors of comorbidities among patients diagnosed with respiratory diseases.

Demographic Profile and Lifestyle Factors:

Clinical manifestations (Table 6) depicted prevalent symptomatology, with a substantial majority experiencing cough with expectoration (71.2%) and a notable proportion

Examining the demographic profile, it's evident that a significant proportion of participants fell within the age brackets of 51 to 70 years, accounting for over 70% of the cohort. Additionally, the study population was predominantly female (67%) (Table 2). Such demographic insights underline the need for tailored interventions and care strategies considering the age and gender distribution. Lifestyle factors (Table 5) such as occupational exposures and allergens played a considerable role, with over 44% reporting occupational exposures to chemicals and dust and approximately 28% citing allergens like pollen and dust mites. These findings underscore the significance of environmental factors in respiratory health. Similar results were found in the study conducted by Raj [9]

Clinical Presentation:

reporting breathlessness (100%) within the studied cohort. Almost similar findings were reported in a study conducted by Miravitlles[10]

Health Parameters and Disease Correlation:

Analysing health parametersrevealed a mean age of 61.69 years, highlighting the predominance of elderly individuals in this respiratory disease cohort. Moreover, the mean BMI of 21.03 and SpO2 levels averaging 90.92% hint at potential risk factors for disease severity.In 2006, Dominici and his team highlighted the hazardous impact of brief contact with fine particle air pollution, demonstrating a significant escalation in the likelihood of cardiovascular and respiratory diseases among individuals aged 65 and older [11].

Distribution of respiratory disease in study participants:

In this study,COPD stood as the most prevalent respiratory condition at 35.14%, followed by pleural effusion (18.84%) and asthma (14.75%). Pulmonary TB, pneumonia, pneumothorax, ILD, ARDS, and pulmonary embolism were less frequent in the studied population, ranging from 1.5% to 11.91%. Madhuragauri and colleagues (2015) [12]identified the predominant chronic respiratory diseases (CRDs) as Chronic Obstructive Pulmonary Disease (COPD) at 29.6%, Tuberculosis (TB) at 23%, Asthma at 22.5%, and Allergic Rhinitis at 8.4%. Likewise, Dubey *et al*. (2015) found a comparable prevalence, with COPD detected in 15.92% of their study participants[13].

Comorbidity Profile and Disease Association:

The study unravelled a complex web of comorbidities, notably chronic obstructive pulmonary disease (COPD), pleural effusion, and hypertension emerging as prevalent conditions among the participants. Furthermore, diabetes and ischemic heart disease were significantly represented, indicating the intricate interplay between respiratory ailments and systemic health issues.These findings align with the results observed in the study conducted by Sonisha Gupta *et al*. (2016) [14], among the participants10 (35.7%) had diabetes, 16 (57.1%) were hypertensive, 6 (21.4%) had cardiac issues, and 17 (60.7%) reported joint pain (Table 9).

Implications And Future Directions

Understanding the prevalence of comorbidities in respiratory disease patients holds paramount importance in guiding holistic healthcare approaches. Tailoring interventions to address lifestyle factors, environmental triggers, and the management of concurrent conditions is imperative. Additionally, future research could delve deeper into the interrelation between specific respiratory diseases and the prevalence of comorbidities, aiding in personalized patient care.

Conclusion

Our study sheds light on the multifaceted nature of respiratory diseases and their association with various comorbidities. These findings emphasize the need for comprehensive healthcare strategies focusing on early identification, management, and preventive measures targeting not only respiratory ailments but also interconnected comorbid conditions.

Limitation of Study

Limitations may arise from conducting the study solely within one tertiary hospital, potentially restricting the applicability of the results to a more extensive demographic. The sample might lack a comprehensive representation of the diverse population of respiratory disease patients seen in various regions or healthcare facilities.

Conflict Of Interest

The authors declare no conflict of interest in conducting this research or presenting its findings. This study was conducted impartially and without any external influences that could potentially bias the results or interpretations.

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