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FREQUENCY OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)AND IT`S DETERMINANTS IN SELECTED POPULATION OF TWIN CITIES

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Abstract

Background: *Chronic Obstructive Pulmonary Disease (COPD) is a significant public health concern in Pakistan, with a high Frequency and mortality rate.*

Objectives: *To investigate the Frequency symptoms, and determinants of COPD in selected population of Rawalpindi and Islamabad, Pakistan.*

Methods: *A cross-sectional study was conducted, to investigate the Frequency , symptoms, and determinant of COPD in selected population of Rawalpindi and Islamabad, Pakistan, recruiting 100 confirmed COPD patients from various hospitals in both cities*

Results: *The study found a higher frequency of COPD in females (55%) and in the 55-75 age group. Significant associations were found between COPD and emphysema, diabetes, hypertension, and smoking history.*

Conclusion: *This study concludes that COPD is a significant health issue in Rawalpindi and Islamabad, with a higher frequency in females and older adults, and strong associations with other comorbidities such as emphysema, diabetes, hypertension, and smoking history, highlighting the need for targeted interventions and comprehensive management strategies to reduce the burden of COPD in these cities.*

Implications: *The findings have significant implications for public health practice and policy in Pakistan, emphasizing the need for greater awareness and education about the disease, especially among high-risk groups such as smokers and those with diabetes and hypertension*

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) continues to be one of the leading causes of morbidity and mortality globally, increasing increasingly burden as compared other various chronic diseases ranking fifth in contributing towards mortality and disability adjusted life years lost in developed countries with its profound

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quality of life, economic, social impact on patients and health systems at large. Particularly ferocious is the end-stage disease trajectory: progressive airflow obstruction, impaired functional capacity, chronic respiratory failure and the comorbidity burden exacerbated by age and severe systemic complications. It is, however, this absence of a straightforward test in which clinicians have complete confidence that has made accurate and timely diagnosis of chronic obstructive pulmonary disease (COPD) a recurrent challenge for health care.

In recent years, the epidemiological profile of COPD has changed. Due to shifting patterns of exposure to its main risk factors, the disease is no longer primarily associated with one gender and is increasingly being found in younger populations. The development of COPD is still primarily caused by cigarette smoking, with occupational exposures and ambient air pollution coming in second and third, respectively. Even though severe alpha-1 antitrypsin deficiency is known to be a genetic cause of the illness, it only makes up a small percentage of cases. It is now known that a number of other genetic variations can alter an individual's susceptibility when paired with environmental risk factors. For any patient who presents with dyspnea, productive coughing, or persistent coughing, imaging—especially standardized computed tomography (CT)—has become a crucial diagnostic tool because it enables medical professionals to describe structural lung changes that spirometry might miss.

While tobacco use is the primary cause of COPD in developed nations, a growing body of research shows that this is not always the case worldwide. People who have never smoked account for a significant percentage of COPD cases in many developing countries, and indoor air pollution from burning biomass fuel has emerged as a significant alternative cause of the illness. This is particularly important in nations like Pakistan and India, where a sizable portion of households still use biomass fuels like wood, dung, and crop residue for heating and cooking, resulting in high indoor concentrations of harmful gases and particulate matter. COPD is best understood as a multifactorial disease shaped by the interaction of genetic predisposition and cumulative environmental insult rather than smoking status alone. The risk landscape is further compounded by occupational exposure to organic and inorganic dusts, prior tuberculosis infection, recurrent childhood respiratory infections, and socioeconomic disadvantage.

COPD is now understood to be a systemic illness that affects many organ systems in addition to its pulmonary symptoms. Patients frequently exhibit a variety of comorbidities, such as respiratory comorbidities like asthma-COPD overlap and pulmonary fibrosis; metabolic disorders like diabetes mellitus and metabolic syndrome; cardiovascular conditions like hypertension, congestive heart failure, coronary artery disease, atrial fibrillation, and pulmonary arterial hypertension; an increased risk of lung cancer, venous thromboembolism, stroke, and mental health conditions like anxiety and depression. Because pharmacological and non-pharmacological interventions must be customized to take into account overlapping disease processes, these comorbid conditions do more than just coexist with COPD; they actively worsen prognosis, raise hospitalization rates, and complicate clinical management.

In this regard, the current study aims to fill a significant knowledge gap in regional epidemiology. There is relatively little information on the prevalence and contributing factors of COPD specifically in the twin cities of Rawalpindi and Islamabad, despite the fact that the global burden of COPD and its associated risk factors have been thoroughly documented in international literature. The purpose of this study is to determine how common CT-diagnosed COPD is in this community and to describe the demographic trends, lifestyle factors like smoking, and important comorbidities that go along with it, such as diabetes, hypertension, emphysema, septal wall thickening, and cystic lesions. This study intends to improve early diagnosis, inform targeted public health interventions, and ultimately improve long-term outcomes for COPD patients in this area by producing locally grounded epidemiological evidence.

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Material and Methods

3.1: Study design:
Cross-sectional study (analytical study)

3.2: Study setting:
The study was conducted among confirmed COPD patients from Rawalpindi and Islamabad, across various hospitals in both cities.

3.3: Sample size:
Due to specific criteria this study had a sample size of 100 participants(n=100). Although this sample size is limited, it still provides valuable insights.

3.4: Sampling technique:
Purposive Sampling, specifically criterion sampling, a non-probability approach.

3.5: Inclusion Criteria:
To participate in this study, individuals must:
1. Patients of all ages are included
2. A radiologist has confirmed that you have Chronic Obstructive Pulmonary Disease (COPD).
3. Have experienced respiratory symptoms consistently over the past 6 months.

3.6: Exclusion criteria:
Patients excluded from this study:
1.Pregnant women
2.Individuals experiencing acute COPD exacerbation's or other acute respiratory conditions

3.7: **Equipment**:
A high-resolution computed tomography (CT) scanner is utilized due to its capability to produce detailed, high-quality images of internal structures, making it an effective tool in diagnosing Chronic Obstructive Pulmonary Disease (COPD)

3.8: Ethical Considerations:

- The Mid West Institute of Sciences Bara Kahu Islamabad's Internal Research Committee(IRC) guidelines were adhered to when conducting the study, and research participants' rights were upheld.
- Every participant provided written informed permission.
- All information and data collection were kept confidential.
- Throughout the study, participants maintained their anonymity.
- The participants were made aware that the study's methodology carried no risks or drawbacks.
- They were also told that they were free to leave the study at any point while it was being conducted.
- There were no known hazards connected to this research.
- The participants did not receive any advantages.
- Every effort was exerted to preserve privacy. Identity was not disclosed in any publications that came out of this research.
- Voluntary involvement was required for this research project. The patient was free to decline participation at any moment or to change their mind. If the patient decided not to participate in this study or withdrew, they did not face any consequences.

3.9: Statistical Analysis
SPSS V.26 was used for statistical data analysis. IN first phase,Frequency of COPD was analyzed on the basis of gender and age in twin cities. Data was categorized into different groups on the basis of demography. while in 2nd phase, CT scan derived matrices like emphysema and septal wall thickening presence and severity was assessed by dividing into different categories and frequency of other variables like hypertension, smoking history, diabetes, cystic lesion etc were assesed. At last,relationship between CT scan derived matrices was assessed through cross tabulation. Data results were represented in the form of cumulative percentage (CP) and frequency (CF).

RESULT

This cross-sectional study used CT-based diagnosis to evaluate 100 confirmed COPD patients in Rawalpindi and Islamabad. COPD was more prevalent in females (55%) compared

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to males (45%), with most patients (68%) aged between 55 and 75, indicating a predominance in older adults. Regarding risk factors, 42% had a smoking history while 58% did not, and 55% had hypertension compared to 45% without, suggesting that factors other than smoking, such as biomass fuel exposure or occupational dust, contribute significantly to COPD in this population. Diabetes was present in 39% of patients.

On CT imaging, bronchiectasis was the most common finding (63%), followed by septal wall thickening (52%), pneumonia (42%), emphysema (39%), and cystic lesions (43%). Smoking history correlated with higher rates of emphysema, pneumonia, and bronchiectasis, but many non-smokers also exhibited these abnormalities, reinforcing the impact of non-smoking risk factors. Both hypertension and diabetes were linked to increased frequencies of emphysema, bronchiectasis, septal thickening, and cystic lesions, supporting the conclusion that COPD in these twin cities is closely associated with cardiovascular and metabolic comorbidities rather than smoking alone.

Table No. 1 Frequency of COPD on the basis of gender

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
	Female	55	55.0	55.0	55.0
	Male	45	45.0	45.0	100.0
	Total	100	100.0	100.0	

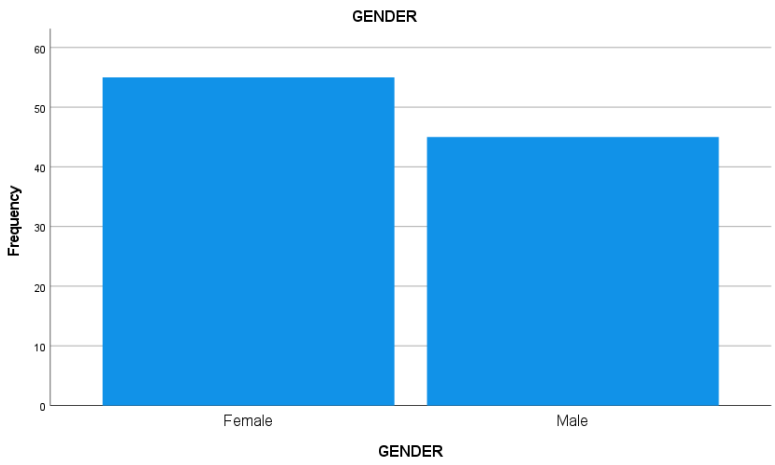

FIGURE: Graphical Representation of COPD on the basis of gender

Table No. 2 Frequency of COPD on the basis of age

AGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<55	15	15.0	15.0	15.0
	>75	16	16.0	16.0	31.0
	55 Y	1	1.0	1.0	32.0
	55-75	68	68.0	68.0	100.0

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	Total	100	100.0	100.0	100.0

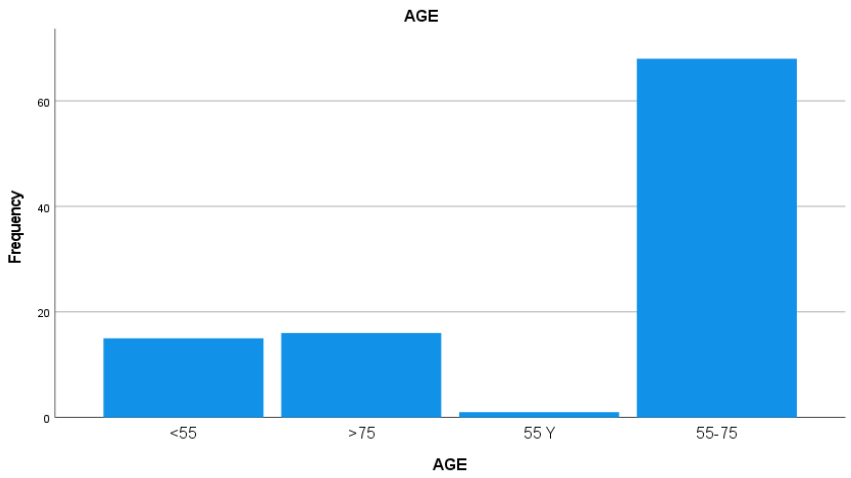

FIGURE: Graphical Representation for Prevalence of COPD on the basis of age

Table No. 3 Frequency on basis of Hypertension history in both cities

HYPERTENSION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	45	45.0	45.0	45.0
	Yes	55	55.0	55.0	100.0
	Total	100	100.0	100.0	

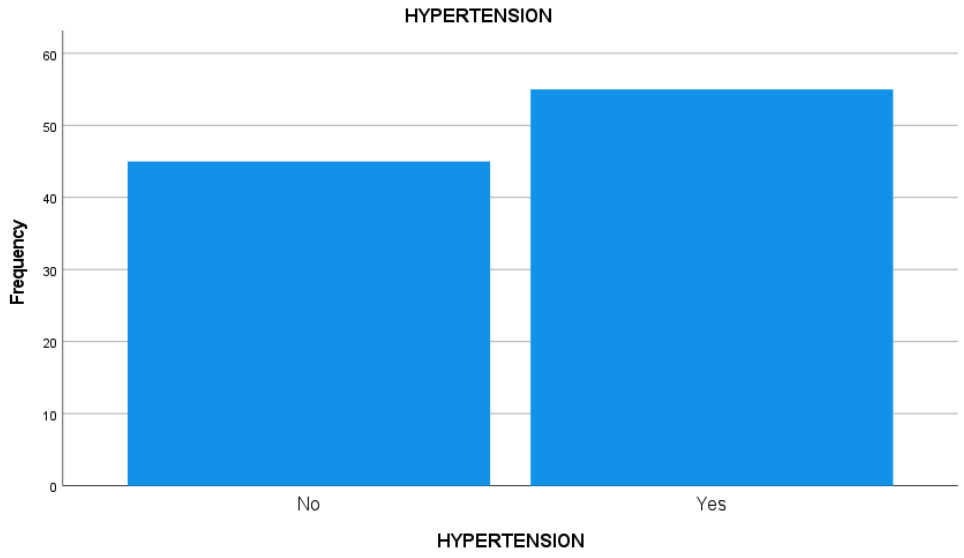

FIGURE: Graphical Representation of Frequency on basis of Hypertension history in both cities

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Table No. 4: Frequency on the basis of smoking history in both Rawalpindi and Islamabad

SMOKING HISTORY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	58	58.0	58.0	58.0
	Yes	42	42.0	42.0	100.0
	Total	100	100.0	100.0	

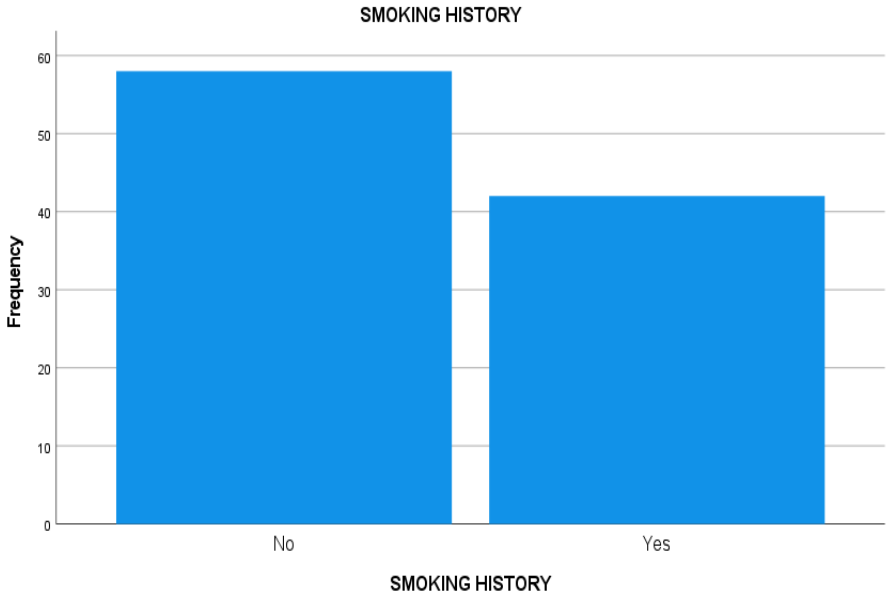

FIGURE: Graphical Representation of Frequency on the basis of smoking history in both cities

Table No. 5 Frequency of Emphysema patients having COPD

EMPHYSEMA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	61	61.0	61.0	61.0
	Yes	39	39.0	39.0	100.0
	Total	100	100.0	100.0	

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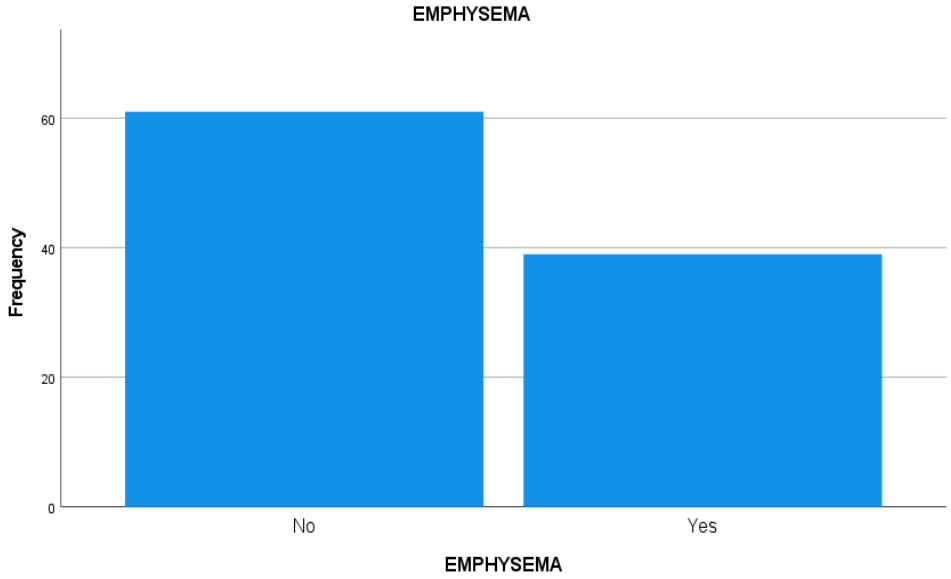

FIGURE: Graphical Representation of Emphysema Severity

Table No 6: Frequency of Pneumonia in COPD patients

PNEUMONIA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	58	58.0	58.0	58.0
	Yes	42	42.0	42.0	100.0
	Total	100	100.0	100.0	

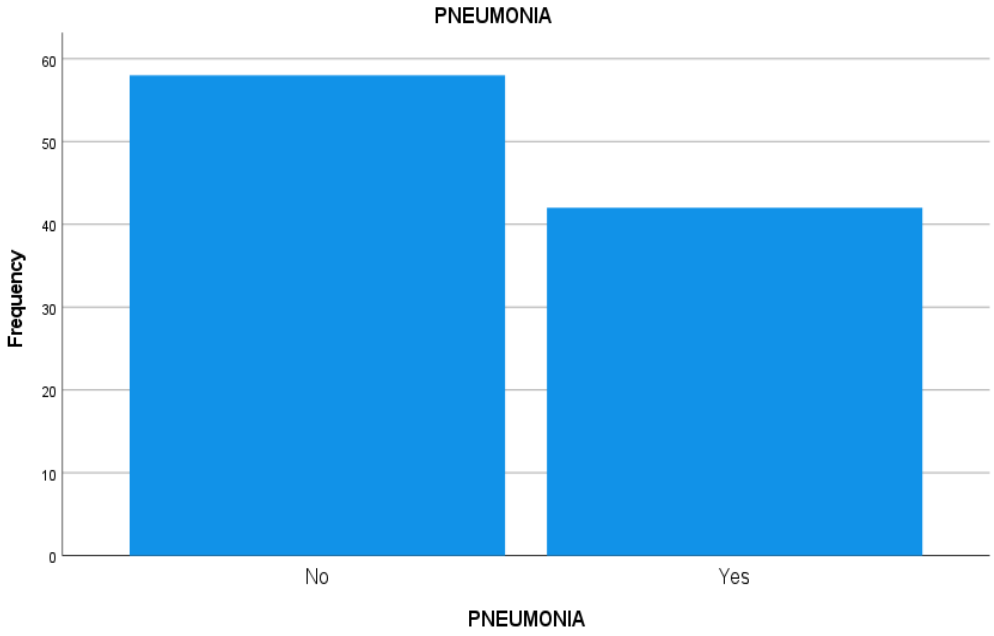

FIGURE: Graphical Representation of Frequency of Pneumonia in COPD patients

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Table No.7: Statistical analysis of septal wall thickening

SEPTAL THICKENING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	48	48.0	48.0	48.0
	Yes	52	52.0	52.0	100.0
	Total	100	100.0	100.0	

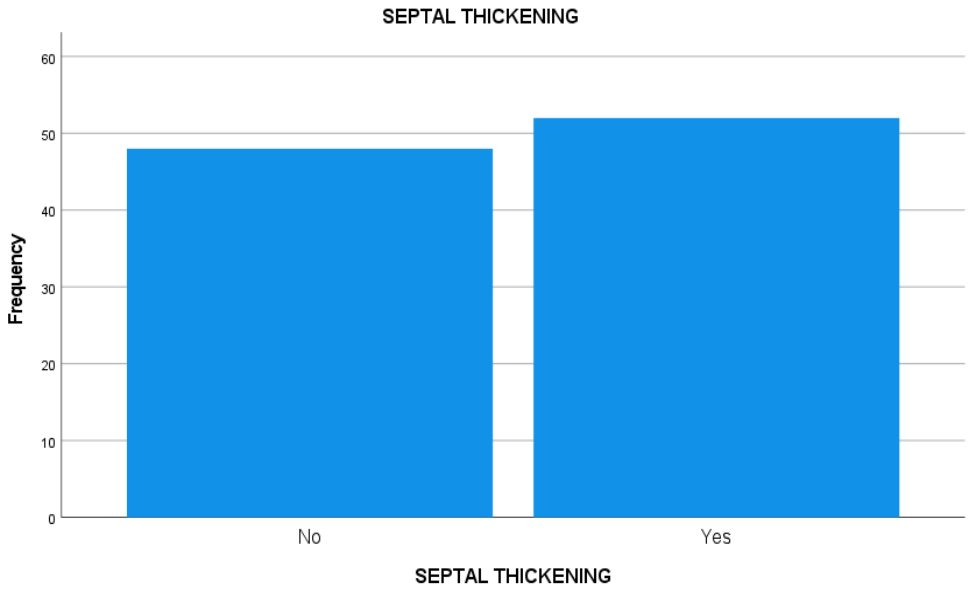
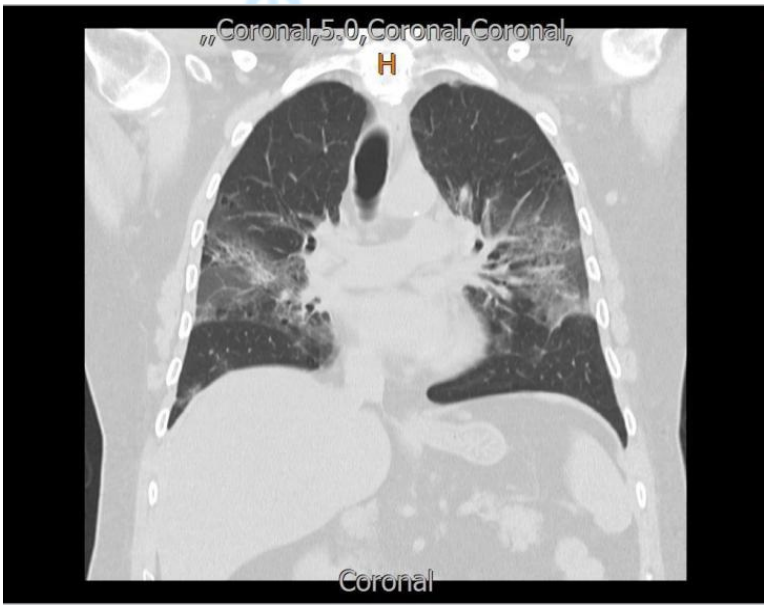


FIGURE: Graphical Representation of Septal wall thickening severity

Case#01



A 55-years-old patient with septal thickening, centriacinar and paraseptal emphysematous changes and multifocal dense ground glass opacification are noted

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Table No.8: Frequency of Bronchiectasis in COPD patients

BRONCHIECTASIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	37	37.0	37.0	37.0
	Yes	63	63.0	63.0	100.0
	Total	100	100.0	100.0	

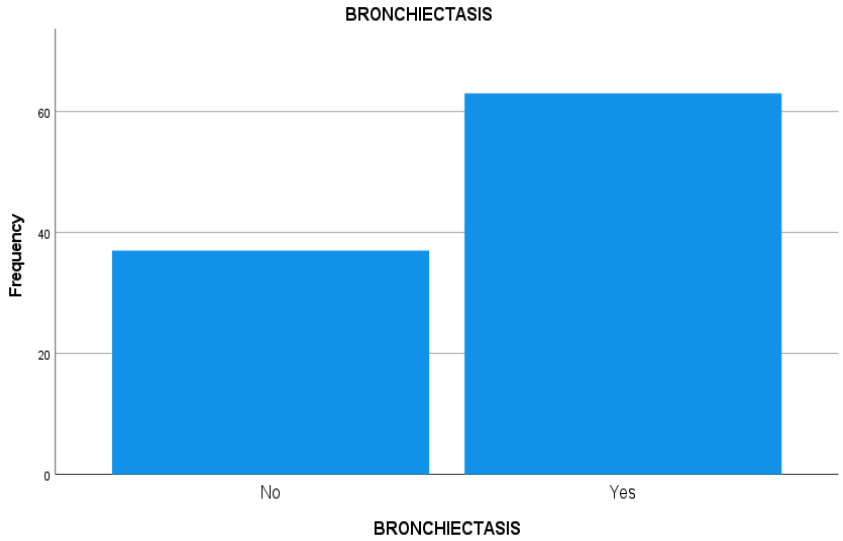

FIGURE: Graphical Representation of Frequency of Bronchiectasis in COPD patients

Case#02

A 76-years-old patient with cystic and tubular bronchiactatic changes in bilateral lungs more in left lower lobe.

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Table 9: Frequency of Diabetes in COPD patients

DIABETIC					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	61	61.0	61.0	61.0
	Yes	39	39.0	39.0	100.0
	Total	100	100.0	100.0	

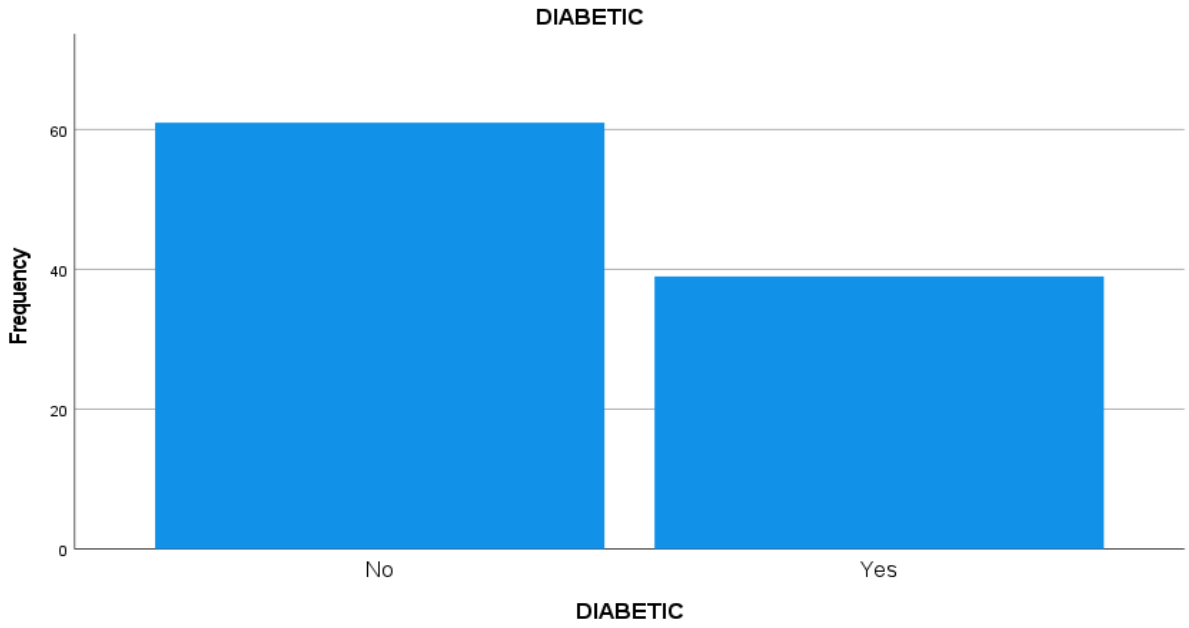

FIGURE: Graphical Representation of Frequency of Diabetes in COPD patient

Case#03

A 74 -years-old patient with bi-apical pleural thickening, traction bronchiactatic changes and segmental and sub-segmental consolidation is present

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DISCUSSION

This study on COPD frequency and features in Rawalpindi and Islamabad found women had higher COPD rates than men (55% vs. 45%), consistent with prior research on higher urban COPD incidence in women (Krismanuel, 2024). Prevalence increased with age, peaking at 55–75 years, aligning with established age-COPD correlations (Murtaza, 2024).

A significant association was found between smoking history and COPD frequency (May 2000), with smokers showing higher rates of emphysema, pneumonia, and bronchiectasis — consistent with prior findings (Eom, Apr–Jun 2015; Boschetto, June 12, 2006). Hypertension was also strongly correlated with COPD frequency, with hypertensive patients showing elevated rates of these same conditions (Krismanuel, 2024). Similarly, diabetic patients showed significantly higher prevalence of emphysema, pneumonia, and bronchiectasis, supporting earlier reported links between diabetes and COPD (Gläser, February 13, 2015).

These findings underscore the value of targeted health promotion, awareness campaigns, and early diagnosis in reducing COPD burden in urban populations (Boschetto, June 12, 2006).

CONCLUSION

This study reveals a high COPD incidence in Rawalpindi and Islamabad, particularly among women and individuals aged 55–75. Strong associations between COPD and emphysema, diabetes, hypertension, and smoking history highlight the need for a comprehensive treatment approach. The findings reinforce the importance of increased awareness, early diagnosis, and effective interventions to reduce COPD burden and improve health outcomes in this region.

RECOMMENDATIONS

1. Increase awareness and education about COPD, particularly among high-risk groups.
2. Promote early detection and management of emphysema and COPD.
3. Adopt a comprehensive management approach integrating smoking cessation, diabetes and hypertension control, and pulmonary rehabilitation.
4. Conduct further research to better understand COPD epidemiology and risk factors in this region.

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