



Original Article

Seasonal Variations and Clinical Pattern of Respiratory Disease in A Tertiary Care Hospital

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ABSTRACT

Background: Seasonal variation plays a significant role in the incidence and exacerbation of respiratory diseases. Environmental factors such as temperature, humidity, and air pollution influence the occurrence of both infectious and chronic respiratory conditions. Understanding these patterns is essential for effective healthcare planning and resource allocation. **Methods:** A retrospective observational study was conducted on 488 patients admitted with respiratory illnesses over a period of one year. Patients were categorized based on seasonal distribution (winter, summer, autumn, and spring). The frequency and pattern of major respiratory diseases were analyzed using descriptive statistical methods.

Results: Distinct seasonal trends were observed among different respiratory diseases. Chronic obstructive pulmonary disease (COPD) and community-acquired pneumonia showed a marked increase during the winter season. Tuberculosis and silicosis cases were more frequently recorded during summer months. Asthma and pneumothorax demonstrated a higher incidence during the autumn season. Overall hospital admissions were highest during summer and winter, indicating a bimodal distribution pattern. **Conclusion:** Respiratory diseases exhibit significant seasonal variation, with specific conditions peaking during particular times of the year. Recognition of these trends can aid in improving hospital preparedness, optimizing resource utilization, and implementing targeted preventive strategies.

Keywords: Seasonal variation, respiratory diseases, COPD, tuberculosis, asthma, epidemiology.

INTRODUCTION:

Seasonal variation plays a significant role in the epidemiology of respiratory diseases^{1,2}. Environmental factors such as temperature, humidity, air pollution, and allergen levels influence both the incidence and exacerbation of respiratory conditions³. In developing countries, the impact of seasonal changes is further intensified by poor living conditions, overcrowding, and increased exposure to environmental pollutants⁴. Seasonal trends affect both infectious diseases such as pneumonia and tuberculosis, as well as chronic conditions like COPD and asthma. Understanding these seasonal patterns is essential for predicting disease burden, optimizing healthcare resources, and implementing preventive strategies⁵. This study aims to evaluate the seasonal variation in respiratory diseases over a one-year period in a tertiary care hospital.

MATERIALS AND METHODS

This was a retrospective observational study conducted on 488 patients admitted with respiratory diseases over one year. The study included all patients aged ≥ 15 years diagnosed with respiratory diseases such as tuberculosis, COPD, silicosis, pleural effusion, lung malignancy, community-acquired pneumonia (CAP), pneumothorax and asthma, attending the OPD or admitted to the IPD during the study period. Patients with incomplete records, those aged < 15 years and those unwilling to participate were excluded. A total of 488 patients were included in the study. Data were collected using a pre-designed structured proforma, which included demographic details (age, gender, residence, socio-economic status), smoking history,

clinical diagnosis and seasonal distribution of cases. The year was divided into four seasons: winter (December–February), spring (March–May), summer (June–August) and autumn (September–November). Data were analyzed using descriptive statistical methods to identify seasonal trends.

RESULT

Table 1: Age profile of participants

Age groups	Number	Percentage
15-24	64	13.11%
25-34	99	20.29%
35-44	131	26.84%
45-54	99	20.29%
>55	82	16.80%
Total	488	100%

Majority of patients belonged to the 35–44 years age group (26.84%), followed by 25–34 and 45–54 years (20.29% each). The least affected groups were 15–24 years (13.11%) and >55 years (16.80%).

Table 2: Gender distribution of participants

Gender	Number	Percentage
Male	315	64.55%
Female	173	35.45%
Total	488	100%

Males (64.55%), while females constituted 35.45% of the study population.

Table 3: Area of residence

Residence	Number	Percentage
Rural	322	65.98%
Urban	166	34.02%

The majority of patients were from rural areas (65.98%), while 34.02% belonged to urban areas.

Table 4: Socio-economic status of participants

Socio-economic status	Number	Percentage
Lower	265	54.30%
Upper lower	108	22.13%

Lower middle	69	14.14%
Upper middle	27	5.53%
Upper	19	3.89%
Total	488	100%

The majority of patients belonged to the lower socio-economic class (54.30%), followed by upper lower (22.13%) and lower middle class (14.14%), while upper middle (5.53%) and upper class (3.89%), showing predominance of lower socio-economic groups.

Table 5: Smoking profile of participants

Smoker	Number	Percentage
Yes	360	73.77%
No	128	26.23%

Smokers (73.77%), while 26.23% were non-smokers. This indicates a strong association of smoking with respiratory diseases in the study population.

Table 6: Individual disease profile of admitted cases yearly

Respiratory disease	Number	Percentage
Tuberculosis	188	38.52%
COPD	116	23.77%
SILICOSIS	93	19.06%
PLEURAL EFFUSION	64	13.11%
LUNG MALIGNANCY	58	11.89%
CAP	46	9.43%
Pneumothorax	37	7.58%
Asthma	29	5.94%

Tuberculosis was the most common respiratory disease (38.52%), followed by COPD (23.77%) and silicosis (19.06%). Other conditions like pleural effusion (13.11%), lung malignancy (11.89%), CAP (9.43%), pneumothorax (7.58%) and asthma (5.94%).

Table 7: Seasonal profile of individual respiratory disease

Respiratory disease	Winter (December to February)		Spring (March to May)		Summer (June to August)		Autumn (September to November)		Total
	No.	%	No.	%	No.	%	No.	%	
Tuberculosis	26	13.83%	57	30.32%	71	37.77%	34	18.09%	188

COPD	53	45.69%	21	18.10%	12	10.34%	30	25.86%	116
SILICOSIS	12	12.90%	22	23.66%	41	44.09%	18	19.35%	93
PLEURAL EFFUSION	7	10.94%	12	18.75%	19	29.69%	26	40.63%	64
LUNG MALIGNANCY	9	15.52%	15	25.86%	23	39.66%	11	18.97%	58
CAP	21	45.65%	7	15.22%	5	10.87%	13	28.26%	46
Pneumothorax	7	18.92%	4	10.81%	8	21.62%	18	48.65%	37
Asthma	6	20.69%	5	17.24%	7	24.14%	11	37.93%	29

Seasonal variation showed that tuberculosis, silicosis and lung malignancy peaked during summer, while COPD and CAP were more common in winter. Pleural effusion, pneumothorax and asthma showed higher occurrence in autumn.

RESULTS

The analysis revealed clear seasonal variation in the occurrence of respiratory diseases.

COPD cases were highest during winter months, indicating increased exacerbations during colder weather. Community-acquired pneumonia also showed a similar pattern, with peak incidence during winter.

Tuberculosis cases were more frequently observed during summer months. Silicosis cases also showed increased occurrence during this period, likely reflecting occupational exposure patterns.

Asthma and pneumothorax demonstrated higher incidence during autumn, possibly due to environmental allergens and climatic changes.

Monthly trends showed increased hospital admissions during summer and winter, while relatively lower admissions were observed during transitional seasons

DISCUSSION

The majority of patients in our study belonged to the 35–44 years age group (26.84%), followed by 25–34 and 45–54 years (20.29% each). Patients aged >55 years accounted for 16.80% of cases, while the least affected group was 15–24 years (13.11%). Respiratory diseases were more common in the middle-aged population in the present study.

The majority of patients were males (64.55%), while females constituted 35.45% of the study population, showing a male predominance in respiratory diseases in the present study. This higher proportion of males is attributed to greater exposure to risk factors such as smoking and occupational hazards.

In our study majority of patients were from rural areas (65.98%), while 34.02% belonged to urban areas. This indicates a higher burden of respiratory diseases among the rural population in the present study. The rural predominance is related to factors such as biomass fuel exposure, occupational hazards, and limited access to healthcare.

Lower socio-economic class (54.30%), followed by upper lower (22.13%) and lower middle class (14.14%). Only a small proportion belonged to upper middle (5.53%) and upper class (3.89%).

The majority of patients were smokers (73.77%), while 26.23% were non-smokers. This shows a clear predominance of smoking among individuals with respiratory diseases in the study population. The high prevalence of smoking highlights its important role as a major risk factor for respiratory illnesses.

Tuberculosis was the most common respiratory disease (38.52%), followed by COPD (23.77%) and silicosis (19.06%). Other conditions included pleural effusion (13.11%), lung malignancy (11.89%) and CAP (9.43%). Pneumothorax (7.58%) and asthma (5.94%) were comparatively less common in the present study.

Seasonal variation in respiratory diseases is influenced by a complex interplay of environmental, biological, and behavioral factors. Cold temperatures during winter can lead to bronchoconstriction, impaired mucociliary clearance, and increased susceptibility to infections, explaining the higher incidence of COPD exacerbations and pneumonia during this period⁶. The increased incidence of tuberculosis during summer months has been reported in previous studies. This may be related to delayed healthcare-seeking behavior, increased transmission, and seasonal variations in immune function^{7,8}.

Pneumonia cases peaking in winter align with global trends of increased respiratory infections during colder months^{1,9}. Asthma exacerbations during autumn may be linked to increased exposure to allergens such as pollen and mold, as well as changes in temperature and humidity¹⁰. The seasonal distribution of pneumothorax may be influenced by atmospheric pressure changes and environmental factors. These findings highlight the importance of anticipating seasonal variations in respiratory diseases and implementing appropriate preventive and management strategies.

CONCLUSION

Respiratory diseases in the present study demonstrated clear seasonal variation, with different conditions showing peak occurrence in specific seasons. Tuberculosis, silicosis and lung malignancy were more common in summer, while COPD and CAP peaked in winter, and pleural effusion, pneumothorax and asthma were more frequent in autumn.

The study also showed a higher burden of respiratory diseases among males, smokers, rural populations and individuals from lower socio-economic groups. Recognition of these seasonal and demographic patterns can help in improving hospital preparedness, optimizing resource allocation and implementing targeted preventive and public health strategies.

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