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CASE REPORT

Breathing to live or Breathing to Die? Association of Air Quality index with increase burden of ENT Diseases in Lahore Punjab Pakistan: An Observational Study

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ABSTRACT:
OBJECTIVE: This study aims to find out the association between the rise in AQI levels and ENT related diseases.
METHODOLOGY: ENT OPD data of two months of 2024-October, during which the AQI was moderate. and November, when the AQI was high, was retrospectively analyzed. The data of the AQI was given by the Lahore Environmental Protection Agency but this time the analysis was done concentrating only on the days when PM2.5 and PM10 were elevated.
RESULTS: This is seen by the fact that the number of ENT patients had marked increase during the high AQI period, namely: 86% rise in the number of female and 78% rise in the number of male patients. The most common diagnoses were allergic rhinitis, Upper respiratory tract infections, rhino-sinusitis, and otitis media. This association displays a substantial relation of adverse quality of air with burden associated with ENT diseases.
CONCLUSION: The study underlines the need for urgent air quality interventions to reduce pollution's health impacts. Healthcare providers, environmental agencies, and policymakers must collaborate to improve air quality and eventually bring down ENT disease rates, thus protecting public health in Lahore.
Keywords: Air Quality index, ENT diseases, Air Pollution

Introduction:
Air pollution is a serious threat to human health all over world particularly in urban areas. Unfortunately Pakistan is among the countries with extremely poor air quality and Lahore is labeled as the most polluted city in this region. (1) All around the globe various methods are being used for continuous monitoring of his tiny, hut Air Dol Index (AQI) is the most widely used tool to make public aware of inequality at air. In Lahore the levels of Air Quality reached "Unhealthy" and hazardous" levels for multiple days with particulate matter(PM) 2.5 and particulate matter (PM) 10 being the primary pollutants, that penetrate the respiratory systems and increase spectrum of various Ear, nose and throat diseases.(3) Recent studies being conducted worldwide support strong correlation between poor air quality and respiratory diseases.(3)There was a significant rise in out patient Department of ENT with a surge observed in PM 2.5 concentration and EXT diseases such as Allergic Rhinitis, Rhino sinusitis, Otitis Media, upper respiratory tract infections and exacerbation of COPD.(4) The linear association of disease burden with air quality highlights the threat being posed to health care system.

Understanding the complexities of AQI impacts on the prevalence of ENT disorders is critical for researchers. This article aims to investigate the relationship between Lahore's worsening air quality and the resulting increase in ENT ailments by critically assessing existing data and making realistic recommendations to improve both the city's air quality and the health of its residents. (5) The Objective of this study is to highlight the relationship between the air quality index (AQI) and significant increase in ENT diseases at Lahore.Methods:

The goal of this study was to investigate for the association between the occurrence of ENT disorders in Lahore, Punjab, Pakistan, and the Air Quality Index (AQI), table 1. Using information from the ENT department outpatient department (OPD) at Lahore General Hospital, we performed a retrospective analysis. The information included medical records from two different months of 2024: October and November.

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Data Collection:
OPD data from the ENT department was collected. including information on patient visits, diagnosis, and treatments administered. To protect patient privacy, the data were analyse, ensuring that the data set contained no personally identifiable information.
LEPA Air Quality Reports:
The Lahore Environmental Protection Agency's AQI reports for the same time periods were obtained as well simultaneously .(6)
Data Analysis:
The research utilized descriptive statistics and comparative analysis methodology. We compared the number of ENT disorders reported in months with higher AQI values to the number reported in months with lower AQI values.

Table 1: Air Quality Index

AQI	Interpretation
0-50	Good
51-100	Satisfactory
101-150	Moderate
151-2	Unhealthy for sensitive group
301-400	Very Unhealthy
401-500	Hazardous

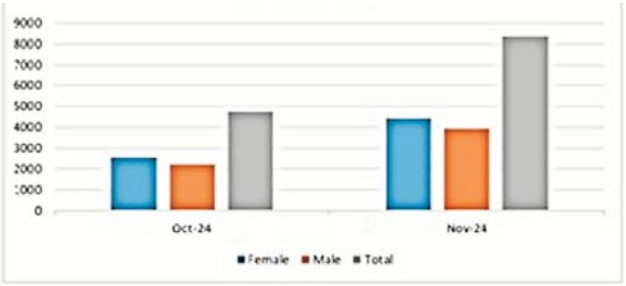
Results:

The Air Quality dias (AQI) reports frenetic Lahore Environmental Protection Agency and the Outpatient Department records from the ENT department of Lahore General Hospital were thoroughly analyzed. According to the reports provided by Lahore Environment Protection Agency (LEPA) the average AQI for October 2024 were recorded as "Unhealthy for Sensitive Groups," with occasional days crossing the limits of AQI symbolizing "Unhealthy" threshold. However, there was a drastic change in November 2024, with significantly rising values of AQI routinely dropping into the "Very Unhealthy' and 'Hazardous" categories with highest index being recorded as 546. The WHO's recommended acceptable limits for PM2.5 and PMI) pollutants were significantly exceeded by the highest reported levels during these months.

Demographic Statistics:

The OPD data from Lahore General Hospital revealed a significant increase in the number of patients presenting with ENT department in November 2024, as compared to October 2024 when air quality was comparatively better.There was an increase of 86% in number of female patients, from 2,542 in October 2024 to 4,444 in November 2024 whereas, the number of male patients raised by 78%, from 2,210 to 3,945 during the same time duration, hence there was an increase in overall nmber of patients by 76% from 4.752t by 76%, from 4.752 to 8,389. As shown in Fig 1.

Figure 1: ENT OPD Data



The prevalence of respiratory system diseases peaked during November with highest frequency of patients reporting with Allergic Rhinitis and Upper respiratory tract infections, it was also observed that there was more influx of female patients as compared to males. As shown in table 1.

Table 2: Disease and Gender Distribution

Disease	October-24			November 24		
Allergic Rhinitis	Males 406	Females 533	Total 959	Male 1007	Female 1123	Total 2130
URTI	543	334	877	1223	976	2199
Rhinosinusitis	364	332	696	678	987	1665
Otitis Media	298	321	619	549	875	1424

Discussion:

This study highlighted interaction between outdoor air quality, specifically particulate matter (PM), and its effects on ENT illnesses and other systemic health outcomes. Our research is consistent with current literature, which highlights the negative impact of air pollution on respiratory health .(6,8) According to World Health Organization research, particulate matter particularly PM2.5, has been linked to a variety of respiratory disorders, including chronic obstructive pulmonary disease (COPD), worsened asthma, and an increased prevalence of respiratory tract infections. (9,10, 11) Furthermore, the cardiovascular hazards associated with long-term exposure to poor air quality, a finding supported by recent studies that link air pollution to higher morbidity and death due to cardiovascular illnesses(12,14)

The identified indices of cardio metabolic health demonstrate the systemic character of these consequences, implying that air pollution's impact extends beyond the respiratory system. The gendered effects of air pollution, as investigated in this study, reveal a complicated pattern of sensitivity, with preliminary data suggesting that health consequences differ by gender(14, 15). This is consistent with the growing body of studies underlining the importance of taking a gender-sensitive strategy to understanding and mitigating the health effects of air pollution.

Given the major public health implications, our findings highlight the significance of strong air quality control and strict emissions limits. Such strategies have been demonstrated to improve health outcomes and lessen the burden of diseases caused by air pollution(16,17). In addition, the promotion of clean transportation and sustainable urban design, including the creation of green spaces, appears as a critical strategy for minimizing the negative health consequences of air pollution. (18, 19)

Limitations

The observational character of this research methodology prevents the determination of severity of diseases. Hence, future multi-institutional studies with more objective health metrics are suggested.

Conclusion:

The results of the study indicate the critical necessity for actions targeted at lowering air pollution levels, which may lessen the incidence of ENT disorders. This study highlights the importance to ensure efficient control measures for air quality laws as well as promote public health programs in order to lessen the harmful impacts of air pollution on human health.

The authors conclude that the environmental agencies, healthcare providers, and legislators should work together to create policies to eradicate the underlying causes of air pollution and protect public health by enhancing air quality and, in turn ensure public health safety and positive outcomes in cities such as Lahore.

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