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Effect of air pollutants on human health in Ranchi, Jharkhand, India

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Abstract-Atmospheric concentration of air pollutants increase and cause adverse effect on human health. A high incidence of pulmonary tuberculosis is seen in people. The problem gets aggravated during winter months.

Keywords : air pollutants, Ranchi, Human health

INTRODUCTION

It has long been recognized that exposure to ambient air pollutants generated from the combustion of fossil fuels can have adverse health effects. Countries all over the world have set stringent ambient air quality objectives, guidelines, and regulations in order to protect both the general population and those thought to be most at risk (children, the elderly, and those with pre-existing cardio-respiratory disease). Ambient air pollution levels have declined in many developed and developing countries because of these regulatory efforts.¹

The effects of air pollution include breathing and respiratory problems, aggravation of existing respiratory and cardiovascular disease, alterations in the body defense systems against foreign materials, damage to lung tissue, carcinogenesis premature death.²

Ecological studies done in many countries have suggested a link between active disease and ambient air pollution.

More than 123 crore residents in India are exposed to health threatening levels of air pollution. This has been due to urbanization and industrialization. Accelerating growth in the transport sector, a booming construction industry, and a growing industrial sector are responsible for worsening air pollution in Indian cities. The human population experience prolonged exposure to high concentrations of pollutants which carry carcinogenic and pathogenic components that are responsible for many diseases.³

STUDY AREA

Ranchi city, the capital of Jharkhand State lies at 23°22'N latitude 85°20'E longitude. Its municipal area is 175.12 square kilometers, and its average elevation is 651 m above sea level.

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Possible effects in three select regions:

Commercial zone

In the present study Kantatoli was selected to represent the commercial area of the city. This area is by far the busiest intersection of the city. Two national highways (NH-23, and NH-33) intersect through this area. The arterial roads remain congested even during the night hours. This area has a large number of general provision stores, sweets shops, book shops, cloth stores, automobile showrooms, road side vendors, etc. There are also many educational institutions, nursing homes and hospitals in the vicinity. The City bus stand is also located in this area. The main road in this area runs along N-E direction.

The major ecological problems being faced by the inhabitants of this area are household garbage, waste water stagnation and air pollution. The vehicles crossing this area spew large amount of organic and inorganic gases and carbon soot particles apart from particulate matter, which may have some direct effects on human health. The dust released from various sources has its own characteristics (size, shape, chemical composition, etc.) and act as a carrier of many pollutants heavy metal, gases and vapors to the lungs where they either deposited or penetrated in to other tissues, which can produce a spectrum of disease ranging from a simple cold to deadly disease like cancer.

Wastewater stagnation is a common phenomenon in this area. The throwing of solid waste to the wastewater drains help to clog the system, and encourages mosquito breeding. The flow of wastewater in drains is disrupted in the many part of the city. The solid waste dumping in the market places can create a lot of health problems, both directly and indirectly. The leakage from the dumping site can contaminate soil, and water bodies and indirectly effects human health. Dumping sites act as a source for bioaerosols, fungi and bacteria.

The gaseous pollutants inhaled by the residents of the area may produce inflammation of the lining of the lungs. This can cause breathlessness and may be fatal. The acidic dust particles can act as a solvent for the accumulated dust particles in the lungs and can cause lung tissue damage and other related disease.

The unhygienic conditions are responsible for high prevalence of pulmonary tuberculosis in the area. Pulmonary tuberculosis further might be getting

aggravated by the air pollutants. Insoluble particle may get deposited in the airways, or lungs. It may also penetrate the deeper lung tissue where they may stay for years and can cause damage to the other tissues of the body. The inhaled organic dust can cause pneumoconiosis (non-neoplastic condition).

Residential zone

Ashok Nagar was selected to represent the residential area for the present study. This part of the city was once the residential area for the elite class of the society. In the recent past this area has developed enormously and a large number of residential colonies have come up in its vicinity. Ashok Nagar, as a colony, however, retains its charm. Inside the colony there is large number of trees, and almost all houses have well maintained garden. Inside the colony banks, schools, offices, and general grocery stores are also situated. The main road in this area runs along S-W direction. The residential zone has its own peculiarities. It comprises of a mixed population in aspects like socio-economic conditions and dietary habits. People inhabiting Ashok Nagar area experience low levels of SO_x pollution as compared to the levels seen in the city. The vehicular traffic inside the colony is very less.

Industrial zone

Tupudana Industrial Area is managed by Ranchi Industrial Area Development Authority (RIADA). It is located in the fringe of the Ranchi city municipal corporation zone. There are a number of ancillary units in this industrial area. The main road in this area runs along S-W direction.

As has been observed in other industrial areas, the inhabitants of Tupudana industrial zone suffer from respiratory problems. The respiratory disease noticed in this area includes pulmonary tuberculosis, wheezing, coughing and hyperactivity of the respiratory canal. It has been reported that long-term exposure to air pollutants such as particulate matter can cause reduced lung growth in area where air pollution is higher. Other pollution related symptoms were water discharge from eyes, skin problems. The major air pollution problem is the smoke discharged from the industrial unit, which contributes to the respiratory problems of the people. The concentration of particulate matter is also very high in this area.

RESULTS AND DISCUSSION

The data on cardio-pulmonary diseases is not maintained in a systematic way in any of the government hospitals or private nursing homes in the city. The record of outdoor patients as well as in-patients is hard to obtain.

In the present investigation data of patient admitted in the Chest and T. B. ward was obtained from Rajendra Institute of Medical Sciences, Ranchi. The data is as below:

Table 1: Number of patients admitted in Chest and T.B. Ward in year 2010.

Diagnosis	J	F	M	A	M	J	J	A	S	O	N	D
Pulmonary Koch's	0	0	1	0	0	1	NA	NA	10	11	4	5
Breathlessness	1	2	0	1	0	0	NA	NA	4	0	2	2
Pneumonia	0	1	0	0	0	0	NA	NA	0	3	0	0
Bronchiectesis	1	0	0	0	1	1	NA	NA	1	0	0	0
Cough,COPD	0	0	0	0	0	0	NA	NA	1	1	1	0

Table 2 : Number of patients admitted in Chest and T.B. Ward in year 2011.

Diagnosis	J	F	M	A	M	J	J	A	S	O	N	D
Pulmonary Koch's	1	NA	1	NA	2	NA	NA	11	0	NA	12	9
Breathlessness	1	NA	2	NA	1	NA	NA	4	2	NA	3	2
Pneumonia	0	NA	0	NA	0	NA	NA	0	0	NA	0	0
Bronchiectesis	1	NA	1	NA	0	NA	NA	2	0	NA	1	0
Cough, COPD	0	NA	0	NA	0	NA	NA	3	0	NA	1	0

CONCLUSION

The record of outdoor patients as well as in-patients is hard to obtain. The data obtained from Rajendra Institute of Medical Sciences (RIMS) is not sufficient to establish any correlation between the concentration levels of gaseous pollutants and respiratory diseases. The records made available by the RIMS suggest high incidences of pulmonary tuberculosis. The associated diseases like Bronchiectesis, pneumothorax, and chronic obstructive pulmonary disease all indicate high prevalence of pulmonary tuberculosis. The records also suggest that the problem gets aggravated during the winter months. However, due to scanty data establishing any correlation would be unscientific.^{4,5}

The doctors of the city also acknowledged that number of patients suffering from pulmonary tuberculosis is very high and on the rise. Although *Mycobacterium tuberculosis* is the causative agent of pulmonary

tuberculosis, environmental factor may influence disease progression.

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