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RESEARCH ARTICLE

AIR POLLUTION AND INDIA: CURRENT SCENARIO

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ABSTRACT

The capital city of India, New Delhi has been recognized as the most polluted city in the world. World Health Organization (WHO) has reported this as per their findings in 2014. Bandyopadhyay *et al.,* 2014. It is indeed an alarming issue for the health of our future generations in India. We are aware of the ill effects of environmental pollutants and toxicants on health status of human as well as other living organisms and the environment (Ghosh and Parida 2015). The most vulnerable to the toxic effects of the pollutants are children and old people. Some significant measures should be taken and some strict laws should be made to prevent environmental pollutions in the major cities of India. Deadly diseases like cancer and asthma etc. are increasing in Indian population. Pollution is indeed responsible for such increasing incidences of diseases.

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INTRODUCTION

It is shocking to know that out of the top twenty most polluted cities in the world, thirteen are in India (https://agenda.weforum.org/2015/06/which-is-the-worlds-most-polluted-city). Allahabad, Agra, Lucknow, Kanpur, Amritsar etc. are among the list of top 20 most polluted cities in the world (https://agenda.weforum.org/2015/06/which-is-the-worlds-most-polluted-city/). Other major cities of neighboring countries of India i.e. Karachi, Rawalpindi and Peshawar in Pakistan, Beijing in China are also in the list (https://agenda.weforum.org/2015/06/which-is-the-worlds-most-polluted-city/). Pollution is a real threat to health and well being of mankind. Studies by WHO reveal that globally seven million people died because of exposure of air pollution. Those include death due to exposure to toxic pollutants both inside house and in the environment (http://www.niehs.nih.gov/health/topics/agents/air-pollution/).

Major Air Pollutants

The major sources of air pollution in India and around the globe are automobile exhaust and industrial emissions (http://www.niehs.nih.gov/health/topics/agents/air-pollution). The prime air pollutants have been broadly classified as outdoor and indoor pollutants (Fig.1). Outdoor pollutants include remains of fossil fuel, carbon particles and metallic particles in the atmosphere from industrial and automobile emissions, toxic gases i.e., nitrogen dioxide, carbon monoxide, sulfur dioxide etc. and ozone, tobacco smoke etc. On the other hand indoor pollutants include toxic gases produced from kitchen fuels, building materials i.e., asbestos, lead etc. tobacco smoke etc. (http://www.niehs.nih.gov/health/topics/agents/air-pollution). Delhi has been found to have the highest concentration of "Respiratory Suspended Particulate Matter" (RSPM) in the air. The concentration of RSPM in the air of Delhi is highest than that found in the air of the other metro cities of India (http://urbanemissions.blogspot.in/2014/01/delhi-ranks-1st-among-world-cities-with.html).

The Most Polluted City In The World Is In India!

New Delhi is a busy metropolitan city, the capital of India. In May 2014, Particle Matter (PM) of size less than 2.5 micrometers in diameter measured concentrations was found to be greater than 350 micrograms per cubic meter of air in the city of New Delhi, making the city the most polluted city in the world as per WHO (http://www.theguardian.com/news/

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datablog/2015/jun/24/air-pollution-delhi-is-dirty-but-how-do-other-cities-fare). This enhanced concentration of PM of various sizes in atmosphere is due to increasing automobile exhaust and increase of coal fueled factories in the cities. According to WHO report, Delhi is the worst polluted city in the world and the major source of the particulate matter i.e. solid and liquid particles of diameter less than 2.5 micro meter are the smoke coming out from industries in the city (https://agenda.weforum.org /2015/06/which-is-the-worlds-most-polluted-city/; http://www.theguardian.com/news /datablog/2015/jun/24/air-pollution-delhi-is-dirty-but-how-do-other-cities-fare; http://time.com/ 3608534/india-new-delhi-worlds-most-polluted-city/).

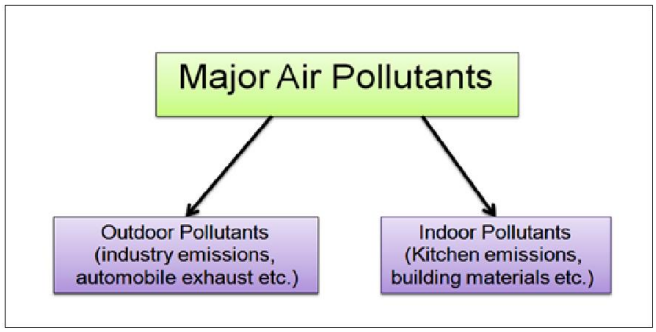

Fig.1. Major Air pollutants

Physiological Disorders and Air Pollution

A Workshop on 'Burden of Disease: Air Pollution among top killers' was organized at New Delhi on February 13, 2013 by the Centre for Science and Environment (CSE) in collaboration with the Indian Council of Medical Research, New Delhi and Health Effects Institute, Boston US. Their report showed that air pollution is one among the top ten killers in the world (http://www.cseindia.org/content/workshop-global-burden-disease-air-pollution-amongst-top-killers-india). Air pollution is the 6th most deadly killer in South East Asia and has been recognized as the 5th largest killer in India (http://time.com/3608534/india-new-delhi-worlds-most-polluted-city/). Hypertension and associated risk of cardiovascular disorder has been found to be linked with exposure to polluted air (Debasish Bandyopadhyay *et al.*, 2014; http://www.medicinenet.com/script/main/art.asp?articlekey=105529). Particles less than 2.5 micrometer in diameter are small enough to enter into respiratory system and cause fatal physiological consequences (http://www.ibtimes.co.uk/world-environment-day-10-most-polluted-cities-world-1504260).

Particles of this small size originate from dirt and dust on road, grinded by vehicles[6]. Those small sized particulate matters are the most harmful ones. Because of their small size they can easily enter circulation and reach tissues. Air pollutions leads to various types of pathological conditions including pulmonary carcinoma, COPD and skin problems as well. Disorders like bronchitis, respiratory distress, dermatitis etc. are very common with exposure to toxic environmental pollutants (https://agenda.weforum.org/2015/06/which-is-the-worlds-most-polluted-city/).

According to WHO more than 80% death occurs due to pollution induced ischemic heart disease (http://urbanemissions.blogspot.in/2014/01/delhi-ranks-1st-among-world-cities-with.html). Pregnancy complications may also arise due to regular exposure to toxic environmental pollutants (http://urbanemissions.blogspot.in/2014/01/delhi-ranks-1st-among-world-cities-with.html).

Particulate matter of small size in respiratory air has been found to be responsible for hypertension in individuals (http://www.cseindia.org/content/workshop-global-burden-disease-air-pollution-amongst-top-killers-india). Delhi has been recognized as the "asthma capital" of India (http://www.medicinenet.com/script/main/art.asp?articlekey=105529). Studies by WHO reveal that the professionals like traffic cops are at high risk of respiratory disorders due to their unavoidable and regular exposure to pollutants (http://timesofindia.indiatimes.com/city/nagpur/Traffic-cops-falling-prey-to-lung-diseases/articleshow/47620826.cms). Oxidative stress and pollution induced oxidative stress mediated disorders has also been found to be more in those traffic cops (http://timesofindia.indiatimes.com/city/nagpur /Traffic-cops-falling-prey-to-lung-diseases/articleshow/ 47620826.cms).

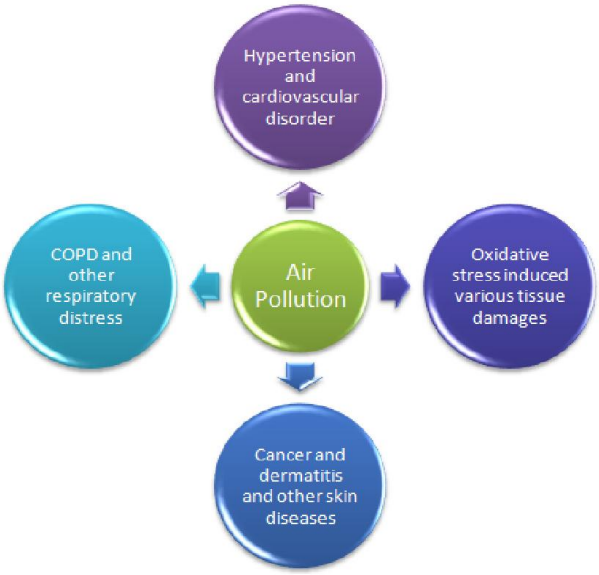

Fig. 2. Health impact of Air pollution

Most Vulnerable Ones

Professionals like traffic cops, hawkers are regularly exposed to air pollutants. Besides, people who have to travel regularly for professional requirement in metropolitan cities are also exposed to air pollutants. Shopkeepers of shops located at large crossings and road side of large cities are as well exposed to air pollutants. Hawkers and drivers of public transport vehicles i.e., bus, auto, taxi, rickshaw etc., are also vulnerable to the consequences of air pollution. Residents of houses located at busy roads are regularly exposed to air contaminants and suffer the consequences (http://timesofindia.indiatimes.com/city/ nagpur/Traffic-cops-falling-prey-to-lung-diseases/articleshow /47620826.cms).

Conclusion

Government of India has already taken several measures to prevent and control air pollution in the country. Further, the government needs to enact laws for prevention of this increasing air pollution and emission standard of air pollutants. Already more than 15 years old vehicles have been banned from running on the roads of Delhi by Government (http://urbanemissions.blogspot.in/2014/01/delhi-ranks-1st-among-world-cities-with.html). Steps have also been taken for reducing vehicles using diesel as fuel on roads of Delhi (http://www.theguardian.com/news/datablog/2015/jun/24/air-pollution-delhi-is-dirty-but-how-do-other-cities-fare).

Electrostatic precipitators have been added to chimneys of industries to prevent emission of particulate matters in the environment. We should also seriously consider alternative energy and renewable energy use to reduce pollution. Using respiratory mask should be encouraged among traffic cops and others who get regularly exposed to toxic air contaminants.

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