



## Effect of Air Pollution on Critical Care Patients

Seyed Mohammadreza Amouzegar Zavareh<sup>1</sup>, Masoud Latifi-Pour<sup>2\*</sup>

<sup>1</sup> Arthrosclerosis research center, Clinical Sciences Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran.

<sup>2</sup> Chemical Injuries Research Center and Systems Biology and Poisonings Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran.

\* **Corresponding Author:** Masoud Latifi-Pour, Chemical Injuries Research Center and Systems Biology and Poisonings Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran; Email: latifi3t@gmail.com.

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### Abstract

Several large cities in Iran, especially Tehran, recently observed peak air pollution. That has exceeded the acceptable concentration of air pollutants, especially particulate matter, black carbon, sulfur dioxide, and ozone levels. The primary origins of air pollutants in Tehran include human activities, such as road transportation, oil refineries, industrial bases, and mines, as well as natural origins, such as local and regional dust events, which can expose citizens to high levels of air pollutants. Although guidelines are in position and massive actions are being taken to manage air pollution issues in Iran, performance and enforcement could be more practical. The significant challenges are the inefficiency of policies and management approaches, the requirement for more air quality monitoring techniques and technology, especially in industrial cities rather than Tehran, and the demand for examinations on the efficiency of principles. Screening such information can carry possibilities for global cooperation, which is essential in addressing air pollution worldwide. It is critical to be aware of the hazards of air pollution and report them to people to minimize their exposure threats by supplying air purifiers, clean spaces, and masks.

**Keywords:** Air Pollution, Critical Care, Patients.

### Dear Editor,

Air pollution is a primary concern of the new civilized world, which has a profound toxicological impact on human health and the environment. It has several emission sources, but motor vehicles and industrial processes contribute to significant air pollution<sup>1</sup>. The World Health Organization stated that climate change is "the single biggest health threat facing humanity."<sup>2</sup> Fossil fuel, the primary source of climate-warming greenhouse gases, also produces poisonous air pollution, now considered among the most significant risk factors contributing to premature mortality. Climate change impacts non-communicable and infectious diseases through severe temperature and weather events, increased air pollution from both biological and human origins, developed habitats for illness vectors like mosquitoes and ticks, undernutrition, and extended and more severe pollen seasons. Air pollution and

climate change may impact every organ system, including the heart, lungs, kidneys, and brain<sup>1, 3</sup>.

Several large cities in Iran, especially Tehran, observed peak air pollution. That has exceeded the acceptable concentration of air pollutants, especially particulate matter, black carbon, sulfur dioxide, and ozone levels. The primary origins of air pollutants in Tehran include human activities, such as road transportation, oil refineries, industrial bases, and mines, as well as natural origins, such as local and regional dust events, which can expose citizens to high levels of air pollutants. Studies demonstrated that Tehran's respiratory deaths were associated with O<sub>3</sub>, NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> air pollutants. Decreasing ambient air pollution can protect lives in Iran<sup>4, 5</sup>.

Air pollution has occurred in developing countries due to industrial activities, and the number of emission sources, such as inappropriate vehicles, has increased. Seasonal long-term and short-term exposure to air pollutants were discovered to be related to increased mortality among severe patients and community residents, with varying results on cardiovascular, severe acute respiratory, and cerebrovascular illnesses. Studies have established relationships between acute or chronic exposure to air pollution and mortality and morbidity. Investigations have established relationships between air pollution exposure, critical care admissions, and respiratory, cardiovascular, and cerebrovascular disease emergency hospitalization. Moreover, reports have demonstrated an association between air pollution and non-accidental mortality<sup>1, 6-8</sup>.

A study reported that atherosclerosis and long-term exposure to air pollution determined that NO<sub>x</sub>, PM<sub>2.5</sub>, and ozone were related to the advancement of coronary artery calcification, compatible with the progress of atherosclerosis. Also, higher grades of particulate matter and exposure to air pollution were related to systolic and high diastolic blood pressure. However, short-term exposure to air pollution can influence cardiovascular deaths. In the air, NO<sub>2</sub>, SO<sub>2</sub>, and PM can raise heart failure, hospital admissions, and mortality<sup>6-9</sup>.

Children and adolescents are more vulnerable, and exposure to air pollution can raise the hazard of generating respiratory illness, especially asthma. An extended follow-up cohort study found a relationship between more elevated PM<sub>10</sub> and NO<sub>2</sub> exposure at childbirth and greater chances for asthma outcome by age 20 years<sup>10</sup>. Another study demonstrated a relationship between allergic asthma, traffic-related NO<sub>2</sub> exposure, and air pollution characteristics<sup>11</sup>.

Improved systemic inflammatory pathways and oxidative stress-activated using free oxygen radicals from air pollutants can penetrate in-depth into alveoli were declared to recreate a critical

function in the pathophysiology of many heart and pulmonary diseases, likely raising the frequency of nonaccidental deaths<sup>12-14</sup>.

Although guidelines are in position and massive actions are being taken to manage air pollution issues in Iran, performance and enforcement could be more practical. The significant challenges are the inefficiency of policies and management approaches, the requirement for more air quality monitoring techniques and technology, especially in industrial cities rather than Tehran, and the demand for examinations on the efficiency of principles. Screening such information can carry possibilities for global cooperation, essential in addressing air pollution worldwide. It is critical to be aware of the hazards of air pollution and report them to people to minimize their exposure threats by supplying air purifiers, clean spaces, and masks.

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### Authors' contributions

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