

Ambient Air Pollution: A Major Modifiable Cardiovascular Risk Factor in the UAE?

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ABSTRACT

With rapid urbanization in UAE, results in higher air pollution from fossil fuel-powered electricity and increases the risk of heart diseases. It is clear that regular exposure to ambient air pollutants contributes to increased odds of cardiovascular diseases (CVD) and cardiometabolic disease. Air pollution from particulate matters size 2.5 Mm (PM_{2.5}) increases the risk of premature death from stroke (19%) and coronary heart disease (13%). The overall absolute risk for mortality due to particulate matter (PM) exposure in UAE may be higher for cardiovascular disease after short- and long-term exposures. With higher levels of ambient air concentration in UAE, regulatory authorities must bring forward robust legislation to protect the health, promote precise air needs, and comprehensive strategies to prevent and control CVD. Importantly, air pollution should be considered as one of several major modifiable risk factors in the prevention and management of CVD in UAE and globally.

Key words: Cardiovascular risk, Air pollution, UAE.

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REVIEW

With an increase in ambient air levels and change in anthropogenic emission of greenhouse gases have a variety of adverse effects on health, including cardiac health. Globally, cardiovascular disease (CVD) is one of the leading causes of death worldwide, with an estimated 17.9 million (31%) of people die every year¹. In the United Arab Emirates (UAE), CVD is also a significant cause of mortality accounted for 37.1% in 2016². In particular, ischemic heart diseases (25%) and stroke (24%) accounts for around 50% of all premature deaths directly or indirectly from air pollution³. With rapid urbanization in UAE, results in higher air pollution from fossil fuel-powered electricity and increases the risk of heart diseases. It is also estimated that population-weight average of PM_{2.5} (vehicular emissions) in UAE was more than three times greater (63.9 µg/m³) than global population-weight mean of 20 µg/m³⁴.

Evidence from prior studies has shown that long-term exposure to high levels of air pollution can spur the development of cardiovascular risk factors.^{5,6} Emerging evidence suggests that people with cardiometabolic risk factors such as hyperbetalipoproteinemia, hypertension, and type II diabetes are more susceptible to the cardiovascular effects of air pollution compared to the people without these risk factors⁷. Similarly, it is identified that exposure to higher levels of ambient air pollution could significantly impair high-density lipoprotein cholesterol function, reduction in apolipoprotein A-I (apoA-I), low-density lipoproteins, and high-sensitive C-reactive protein⁸. Thereby can increase the incidence of cardiovascular mortality and coronary artery atherosclerosis. It is clear that regular exposure to ambient air pollutants contributes to increased odds of CVD and cardiometabolic disease. However, it is unclear whether the pollutants themselves could have some direct effects on the development of disease or may have some cumulative effect when added to CVD risk factors.

Avoiding exposure to air pollutants is especially crucial for susceptible individuals with chronic CVD, children, and elderly. Air pollution from particulate matters size 2.5 Mm (PM_{2.5}) increases the risk of premature death from stroke (19%) and coronary heart disease (13%)⁸. A recent study showed the levels of hyperbetalipoproteinemia association with daily exposure to aerodynamic particles with a diameter of ≤1.0 Mm (PM_{1.0})⁷, suggests that lipid metabolism is sensitive to long-term exposure to air pollution. Furthermore, a 10-Mg/m³ increase in PM_{1.0} was associated with 36% increased odds of having hyperbetalipoproteinemia, 15% of hypertension in men, and 4% in women⁷. Unfortunately, air-quality standards for PM_{1.0} is not developed in any country or organization, and research evidence on PM_{1.0} and health remains scarce.

The overall absolute risk for mortality due to PM exposure in UAE may be higher for cardiovascular disease after short- and long-term exposures. Notwithstanding in UAE, measures to early detection of CVD and policy measures to reduce the effect of air pollution are still at a nascent stage, but the most significant benefits are to be expected from measures that reduce emissions including the air concentrations and regulatory measures. With higher levels of ambient air concentration in UAE, regulatory authorities must bring forward robust legislation to protect the health, promote precise air needs, and comprehensive strategies to prevent and control CVD. Interventions to reduce ambient air pollutions should be prioritized, especially in cities with high PM_{2.5} levels. Furthermore, individuals with or at higher risk of CVD should be advised to limit exposure to pollutants, and also the awareness of outdoor air pollution and its adverse effect on CVD should reach everyone in the UAE. Health professionals, including cardiologists, have an essential role to play in educating and counseling the patients. Importantly, air pollution should be considered as one of several major modifiable risk factors in the prevention and management of CVD in UAE and globally.

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