Health Science News Page

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# MICRONUTRIENTS MAY MITIGATE THE ADVERSE EFFECTS OF AIR POLLUTION

PART 1

Air pollution is one of the most serious environmental problems in today's world. Except for occasional natural events such as volcanic eruptions and wildfires, human activities are the sole contributor for the disastrous levels of particulate matter that is present in the air. Air pollution is the presence of excessive biological or chemical compounds in the air due to many things such as transportation, industrialization, agriculture, dust, household energy consumption, waste production and so on. Ozone emission is a major part of air pollution in cities and creates smog. In general, a modern life style and urbanization has resulted in more than 91% of the world's population living in places where the air quality is detrimental to health.

According to the World Health Organization (WHO), it is estimated that air pollution causes one in nine deaths. Upwards of 3.8 million premature deaths occur due to exposure to household air pollutants and approximately 5 million premature deaths are attributed to outdoor or ambient air pollution. The most common diseases and deaths caused due to air pollution are chronic obstructive pulmonary diseases (COPD), lung cancer, cardiovascular diseases, stroke, and acute lower respiratory infections in children.

Several natural, artificial, indoor, and outdoor compounds are released into the air. These pollutants are either classified as indoor and outdoor pollutants, or as primary (directly emitted from the source) and secondary (formed in the air as a result of further chemical reactions). Compounds such as gases from volcanoes and wildfires, dust, pollen, industrial burning of coal, burning wood, industrial, and household wastes, transportation, household air conditioning, cooking, cleaning, construction and construction materials, office equipment, and smoking are some of the factors decreasing the air quality to hazardous levels. The six common air pollutants known as "criteria air pollutants" regulated by the U.S. Environmental Protection Agency (EPA) and other governmental institutions around the world include sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), ozone ($O_3$), lead (Pb), and other particles known as particulate matter. The particulate matter or the pollutants act as free radicals and cause inflammation especially in smaller air ducts in the lungs. The smaller the particulate matter size, the higher the capacity to deposit in the lungs and cause inflammatory injury. Such ultrafine particles are abundantly present in indoor and outdoor air, especially in the urban environment. These pollutants cause structural damage to most basic cellular components such as lipids, proteins, and DNA leading to a variety of diseases.

The upper and lower respiratory tracts are the first target for air pollutants and the first line of defense against it. Therefore, respiratory diseases ranging from allergies, asthma, frequent infections, pneumonia, COPD and lung cancer are some of the consequences of air pollution. Moreover, people with an impaired immune system, including children and the elderly, are at a greater risk. Systemic inflammation caused by air pollution is also associated with various cardiovascular diseases such as atherosclerosis, heart failure, stroke, peripheral arterial and venous diseases, cardiac arrhythmia, and cardiac arrest.

Air pollution has become a major environmental risk factor to human health and wellbeing. However, laboratory and clinical studies indicate that a healthy diet supported by micronutrients with antioxidant, anti-inflammatory, and detoxifying properties may protect us from the harmful health effects caused by polluted air. We will elaborate on these helpful micronutrients in the next issue of our Health Science News Page.

*Ref: W. Sumera, Cellular Medicine and Natural Health Journal, Sept.2017*