

Ambient Air Pollution and Bone Health

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Air Quality is deteriorated by ambient air pollution having particulate matter (PM), black carbon and noxious gases. Ambient air pollution has been reported to affect the bone health globally in longitudinal studies [1], and few geographical locations are notorious for air pollution globally and specifically in India. Such places are having hazardous and very severe levels of air quality [4]. Delhi NCR has witnessed some of the alarming waves of air pollution recently. Air quality index (AQI) – particulate matter may vary from hazardous (300 and above) to good (below 50). It is easy to monitor AQI using data from reliable sources like government installed panels. There is also a seasonal variation in air pollution levels and musculoskeletal complaints that may be mediated by vitamin D levels [2].

Many anthropological activities like burning of agricultural residue are known to acutely deteriorate the air quality in a large area. Living in a location with hazardous air quality makes one prone for musculoskeletal complaints. Air pollutants have both organic and inorganic components. Black carbon, PM_{2.5}, PM₁₀ and ozone levels are confounders whose causality is being reported and explored for bone health [3]. Hormonal variations under immune influence may be one mechanism linking particulate matter pollution to bone health markers overtime. Oxidative damage is a known feature of many air pollutants. It becomes a modifiable risk factor which may be checked in routine visits. Ambient air pollution may interfere with ultraviolet radiation (ultra violet index) mediated and vitamin D controlled osteoblastic function as well. Hazardous PM_{2.5} levels can interfere with the repair mechanisms with synovial joints.

Supplementations with vitamin D and calcium are reported to lower the adverse effects of air pollution on bone and joints. Preventive strategies like use of masks specific to PM pollutants, avoiding outdoor activities, exercises in polluted areas and preventing/modifying outdoor occupational activities are few measures that may be utilized for susceptible populations (elderly, postmenopausal women and osteoporotic individuals) already suffering from bone diseases (OA, RA and metabolic bone diseases) or prone for it (malnutrition, obesity and outdoor occupations). However,

limiting activities makes one prone for hypokinetic diseases and deconditioning, therefore specific exercises for compensation in a cleaner environment have to be prescribed. Growth and development of children is yet unexplored aspect of ill-effects of ambient air pollution, as it influences peak bone mass.

Further, research on ambient air pollution and bone health and strategies to deal with it may be useful to explore local and regional factors which require the attention of health care providers, agencies and patients. Better air quality for the healthier bones is the new paradigm.

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