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Impact of air pollution on risk of dementia: A systematic review and meta-analysisat

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Abstract

Statement of the Problem: Ambient outdoor Air Pollution (AP) is an important global environmental concern. It contributes to 1 in 9 deaths worldwide. AP increases the risks of cardiovascular disease, chronic obstructive pulmonary disease, mental disorders, as well as memory deficit and cognitive impairment. However, it is unclear whether AP increased the risk of dementia and which pollutants of AP play the role in dementia. The purpose of this study is to assess the impacts of AP exposure and different AP pollutants on the risk of dementia. Method: According to a standard method of systematic literature review which we did previously, we searched PubMed, CINAHL, Embays and web of knowledge up to September 2018 and identified 10 articles for the review. We pooled available data from them to calculate Relative Risk (RR) of incident dementia in relation to AP exposure. Result: Of the 10, six were cohort designed (of which two produced different components of AP exposure) and one was case-control. They were undertaken in Canada, USA, UK, Sweden and Taiwan, respectively. The quality assessment of these studies suggested that overall they were in good quality. All studies showed some associations between AP exposure and dementia, varying with different pollutants. Pooled data from these studied populations showed that the adjusted RR for overall AP exposure (or highest vs. lowest exposure) was 1.26 (95% CI, 1.13-1.40). The RR for ozone exposure 1.02 (0.92-1.12) (n of population studied=5), for PM2.5 1.06 (0.995-1.13) (n=4), for NO2 1.02 (0.92-1.12) (n=3), for NOx 1.50 (1.16-1.95) (n=2) and for residential distance from major roadways 1.07 (1.06-1.108) (n=2). Conclusion: Published literature to date provides evidence of a heightened risk of dementia with increasing AP exposure. AP could be as an avoidable risk factor for dementia interventions.

Air pollution is a major concern of new civilized world, which has a serious toxicological impact on human health and the environment. It has a number of different emission sources, but motor vehicles and industrial processes contribute the major part of air pollution. According to the World Health Organization, six major air pollutants include particle pollution, ground-level ozone, carbon monoxide, sulphur oxides, nitrogen oxides, and lead. Long and short term exposure to air suspended toxicants has a different toxicological impact on human including respiratory and cardiovascular diseases, neuropsychiatric complications, the eyes irritation, skin diseases, and long-term chronic diseases such as cancer. Several reports have revealed the direct association between exposure to the poor air quality and increasing rate of morbidity and mortality mostly due to cardiovascular and respiratory diseases. Air pollution is considered as the major environmental risk factor in the incidence and progression of some diseases such as asthma, lung cancer, ventricular hypertrophy, Alzheimer's and Parkinson's diseases, psychological complications, autism, retinopathy, fatal growth, and low birth weight. In this review article, we aimed to discuss toxicology of major air pollutants, sources of emission, and their impact on human health. We have also proposed practical measures to reduce air pollution in Iran.

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