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Invited Review Article

Current understandings and perspectives on non-cancer health effects of benzene: A global concern

Haji Bahadar [a,b], Sara Mostafalou [b], Mohammad Abdollahi [b,*]

[a] International Campus, Tehran University of Medical Sciences, Iran
[b] Pharmaceutical Sciences Research Center and Faculty of Pharmacy, Tehran University of Medical Sciences, Iran

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ABSTRACT

Objective: Benzene, as a volatile organic compound, is known as one of the main air pollutants in the environment. The aim of this review is to summarize all available evidences on non-cancerous health effects of benzene providing an overview of possible association of exposure to benzene with human chronic diseases, specially, in those regions of the world where benzene concentration is being poorly monitored.
Methodology: A bibliographic search of scientific databases including PubMed, Google Scholar, and Scirus was conducted with key words of "benzene toxic health effects", "environmental volatile organic compounds", "diabetes mellitus and environmental pollutants", "breast cancer and environmental pollution", "prevalence of lung cancer", and "diabetes prevalence". More than 300 peer reviewed papers were examined. Experimental and epidemiologic studies reporting health effects of benzene and volatile organic compounds were included in the study.
Results: Epidemiologic and experimental studies suggest that benzene exposure can lead to numerous non-cancerous health effects associated with functional aberration of vital systems in the body like reproductive, immune, nervous, endocrine, cardiovascular, and respiratory.
Conclusion: Chronic diseases have become a health burden of global dimension with special emphasis in regions with poor monitoring over contents of benzene in petrochemicals. Benzene is a well known carcinogen of blood and its components, but the concern of benzene exposure is more than carcinogenicity of blood components and should be evaluated in both epidemiologic and experimental studies. Aspect of interactions and mechanism of toxicity in relation to human general health problems especially endocrine disturbances with particular reference to diabetes, breast and lung cancers should be followed up.
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Abbreviations: AChE, Acetyl cholinesterase; ADA, Adenosine deaminase; ALP, Alkaline phosphatase; ALT, Alanine aminotransferase; AST, Aspartate transaminase; BUN, Blood urea nitrogen; DNA, DeoxyRibo Nucleic Acid; DOPA, Dopamine; EDCs, Endocrine disrupting chemicals; ERK1/2, Extracellular signal-regulated kinases 1 and 2; Hb, Hemoglobin; IL-2, Interleukin 2; Kg, kilogram; LDH, Lactate dehydrogenase; LINE-1, Long interspersed nuclear element-1; MCHC, Mean Corpuscular Hemoglobin Concentration; MPV, Mean platelet volume; Mg, Milligram; OSHA, Occupational Safety and Health Administration; ROS, Reactive oxygen species; VOCs, Volatile Organic Compounds; WBCs, White blood cells.

* Corresponding author at: Department of Toxicology and Pharmacology, Faculty of Pharmacy and Pharmaceutical Sciences Research Center, Tehran University of Medical Sciences, Tehran 1417614411, Iran. Tel./fax: +98 21 66959104.
E-mail addresses: Mohammad.Abdollahi@UToronto.Ca, Mohammad@TUMS.Ac.Ir (M. Abdollahi).

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