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Insulin resistance susceptibility is associated with BPA exposure

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Abstract

Bisphenol-A (BPA) is one of the most harmful endocrine-disrupting chemicals (EDC) which is extensively being used for the preparation of resins and plastic products. BPA is widely found in resinous lining of beverages, juice cans, water containers and baby bottles. We aimed to investigate the exposure of BPA in human population and its association with multiple risk factors that may cause impairment in insulin secretion from β -cells of pancreatic islets and insulin resistance in peripheral tissues accompanying various with metabolic disorders. A total of 400 participants, with or without diabetes mellitus (DM), were recruited in this cross-sectional study. A structured questionnaire was employed to obtain the sociodemographic data from study participants. The blood and urine samples were collected from participants and biochemical analysis was performed to determine the risk factors capable of increasing the insulin resistance in peripheral tissues and impaired insulin secretion from β -cells of pancreatic islets. From the results, we have outlined multiple underlying mechanisms that support the key role of BPA exposure in insulin resistance notably oxidative stress, lipid peroxidation and inflammation. We also determined the Pearson correlation coefficient for observing the relationship between BPA exposure and risk factors that can induce the insulin resistance in peripheral tissues. In this scenario, we found a significant negative correlation between human BPA exposure and the levels of antioxidant enzymes i.e., superoxide dismutase (SOD) and Glutathione (GSH) among diabetic participant as compared to non-diabetic participant who showed a non-significant correlation. However, the level of malondialdehyde (MDA) exhibited a significant positive correlation with urinary BPA exposure in both participants with and without DM. The exposure of BPA can also provoke some predefined inflammatory mediators i.e., C-reactive protein (CRP) and interleukine-6 (IL-6) significantly among diabetic participants, resulting increased insulin resistance. Hence, the significant positive correlation of glycemic control parameters i.e., random blood glucose (RBC) and glycosylated haemoglobin (Hb1Ac) with Urinary BPA exposure provided a clear indication that individuals with DM were more prone to develop insulin resistance due to BPA exposure as compared to non-diabetic participants.

Keywords: Bisphenol-A, oxidative stress, inflammation, glycemic parameters, insulin resistance.

Abbreviations:

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