Abstract

Introduction: Diabetes, characterized by abnormalities in insulin production and secretion, is a global public health concern. Azelaic acid (AZA) has been shown to have antioxidant and anti-inflammatory effects; hence it may protect against arsenic-induced diabetes. This study was to investigate whether sodium arsenite (SA) metabolic toxicity toward islets of Langerhans isolated from rat pancreas could be ameliorated by AZA.

Method: Islets of Langerhans were isolated from the pancreas of 15 male rats and divided into three groups of 10: control, SA, and SA plus AZA. 24 hours after incubation, biochemical tests including cell viability, cell death pathways, reactive oxygen species (ROS), gene expression of inflammatory cytokines and insulin secretion were done.

Results: SA dose-dependently (LC50, 100 Micromolar) decreased cell viability, and increased apoptotic events (Pvalue <0.001), ROS generation (Pvalue <0.001), expression of proinflammatory cytokines TNF (Pvalue <0.01), IL-1β (Pvalue <0.001) and NF-κB (Pvalue <0.05), and secretion of insulin under basal glucose stimulation. AZA ameliorate all these effects so that viability and function of pancreatic islets were recovered and normalized near to the control group.

Conclusion: our results indicates that SA has the potential to disrupt cellular homeostasis and function in the islets of Langerhans, and can increase the risk of developing metabolic disorders such as diabetes. On the other side, AZA protected islets of Langerhans against metabolic toxicity of SA mainly due to its antioxidant, anti-inflammatory and anti-apoptotic effects indicating the AZA may have a potential to run intracellular mechanisms beneficial for coping with diabetogenic toxicants such as arsenic.

Keywords: Arsenic, Azelaic Acid, Islets Of Langerhans, Oxidative Stress, Apoptosis, Insulin, Diabetogenic