

Role of hyperglycemia in the progression of β cell dysfunction in cultured pancreatic hamster cells and to determine the effect of the phenolic compounds extracted from Gelam honey

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Abstract

The hallmark of type 2 diabetes (T2DM) is pancreatic β cell dysfunction and insulin resistance. Loss of β cell function caused by reduced secretory capacity and enhanced apoptosis is a key event in the pathogenesis of T2DM. Oxidative stress induced by reactive oxygen and nitrogen species is critically involved in the impairment of beta cell function during the development of diabetes. This is due to the relatively low expression of antioxidant enzymes such as catalase and glutathione peroxidase. It has been reported that extracellular hyperglycemia causes intracellular hyperglycemia in β cells leading to the induction of ROS in pancreatic islets of diabetic animals. Transient exposure of beta cells to oxidative stress interrupts the transduction of signals normally coupling glucose metabolism to insulin secretion. We set up an in-vitro culture system with pancreatic hamster cells (HIT-T15) which were cultured under normal and hyperglycemic conditions for 24, 48, and 72 hrs. There was an increase in the production of ROS up to 24 hrs after which it reached a plateau. In a 24 hr culture, the secretion of insulin was inversely related to the production of ROS. The pre treatment of the cells with the phenolic extracts from the local Malaysian honey (Gelam honey), and the phenolic compounds (chrysin, luteolin, and quercetin) for 24 hrs showed a significant decrease in the production of ROS and a significant increase in the secretion of insulin. This finding suggest a potential use of the phenolic compounds extracted from Gelam honey in treating the diabetes, and provides further support for the implication of oxidative stress, in β cell dysfunction.

Biography

RajesQvist obtained her Phd from University of Strasbourg, France Besides her Phd She has several other degrees which gives her a broad training in several areas of biological sciences:- Bsc University of Melbourne, Australia; BscHons Biochemistry, University of Singapore; BscHons Virology, University of Western Australia, Msc Clinical Biochemistry University of Singapore; Post Graduate Diploma in Immunology; Monash University, Australia. Post doctoral work in Denmark, Japan and Australia where she specialised in several areas with the main focus on Diabetic research.