

High Glycemic Index Diet Decreases Insulin Secretion without Altering Akt and Pdx1 Expression on Pancreatic Beta Cells in Mice

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ABSTRACT

This study aims to determine the effect of high glycemic index (GI) diet on blood glucose, serum insulin, number of islet cells, Akt, and Pdx1 expression in beta cells. Eight weeks-old healthy male Balb/c mice were divided into two groups. The control group was given standard diet. The high glycemic index (highGI) group was given standard diet added with oral gavage of glucose solution everyday for 4 weeks. The dose of glucose solution was 0.013 g/gBW or 3-5% additional calories each day. Random blood glucose (BG) was taken before (pre) and after (post) treatment from tail vein. Serum insulin (SI) was taken after treatment from blood cardiac. Islet was removed after treatment. The number of islet cells was counted in HE staining. Akt and Pdx1 were analyzed in IHC staining. The results revealed that the changes of body weight before and after treatment were significantly different between groups ($P=0.025$). BG post in the highGI increased significantly compared to that in the control ($P= 0.032$). However, SI in the highGI decreased significantly compared to that in the control ($P=0.003$). The number of islet cells in the highGI decreased insignificantly ($P=0.346$). Meanwhile, Akt and Pdx1 in the highGI increased slightly ($P=0.729$; $P=0.701$). It can be concluded that a high GI diet can increase blood glucose level but reduce serum insulin level. However, there is no evidence of underlying mechanism of this chronic condition via Akt and Pdx1. Thus, further research is needed, especially for observing apoptosis and other modulators on beta cells.

Keywords: Glycemic index, Glucose, Insulin, Akt, Pdx1, Beta cells