ASSESSMENT OF THE ROLE OF DAIRY FOODS IN DIABETES AND LACTOSE INTOLERANCE INTERVENTION

By

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B.Sc.Agric.Sc. (Dariy Science and Technology),Ain shams University, 2006

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ABSTRACT

Asmaa Ahmed Esmat: Assessment of the Role of Dairy Foods in Diabetes and Lactose Intolerance Intervention. Unpublished M.Sc. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2014

Diabetes mellitus (DM) is one of the most common metabolic diseases. Milk and milk product play an important role in the human diet. The aim of this study is to throughout some light on Intervention between diabetic and lactose intolerance as carbohydrate disorder and to assess the impact of selected dairy products on blood glucose. The glycemic index was determined. Milk proteins (whey, casein, skim milk, and lactose) were evaluated concerning their influence on postprandial responses of glucose. Pasteurized skimmed milk, whey were tested as a drink, whereas casein was administrated in the form of cheese (kariech type).

Second part was designed to examine the effect of administration of dietary lactose and cow's milk in healthy and alloxan-induced diabetic rats. On the body weight, serum biochemical profiles (serum glucose, triglycerides, cholesterol, HDL, LDL, VLDL, HTR % and AI), intestinal lactase activity and histopathological examination of pancreas tissue was. One hundred and forty-five male albino rats were randomly divided into six groups each of thirty six rats and were fed on experimental diet for 28 days, G1 (control negative), healthy rats fed on basal diet; G2, healthy rats administrated repeated dose of dietary lactose (5 ml/rat/twice daily); G3, healthy rats administrated repeated dose of cow's milk (5 ml/rat/twice daily); G4 (control positive, alloxanized diabetic rats), fed on basal diet ; G5, diabetic rats administrated repeated dose of dietary lactose (5 ml/rat/twice daily); G6, diabetic rats administrated repeated dose of cow's milk (5 ml/rat/twice daily).

Obtained results revealed that, the GI has a value of 100 for glucose, 45 for lactose, 15 for whole buffalo’s milk, 28 for whole cow’s milk, 22 for skim milk, 24 for yoghurt, 43 for flavored yoghurt, 34 for ice cream, 17 for karish cheese and 10 for whey + whey protein. Glycemic

load of milk and milk products ranged from 3 to 11. Whey + whey protein recorded the lowest GL followed with Whole buffalo's milk and yoghurt gives moderate GL. The highest GL was recorded for flavored yoghurt and ice cream due to its high sugar contents.

A drastic significant ($p<0.05$) decrease in body weight (-19.79 %) and increase in serum glucose from 87.69 mg/dl to 381.32 mg/dl was obtained in alloxan-induced diabetic rats fed on basal diet (control positive, G4) during 28 days. However, diabetic rats fed either on dietary lactose (G5) or cow's milk (G6) gained 27.64 % and 35.12 % of their initial body weight, respectively.

Feeding the diabetic rats on dietary lactose (G5) and cow's milk (G6) significantly reduced serum glucose level; (184.63 and 165.97 mg/dl, respectively) than those of the (371.10 mg/dl, control positive group, G4).

The rise in blood sugar is accompanied by increase in serum lipid profile. Diabetes rats administrated cow's milk showed more response towards lowering the serum lipid profile than the dietary lactose. Likewise, significant reduction in serum total cholesterol (TC), triglycerides (TG), low density lipoprotein-cholesterol (LDL-c), very low density lipoprotein-cholesterol (VLDL-c) and increase in high density lipoprotein-cholesterol (HDL-c), was observed in diabetic rats fed with either cow's milk or dietary lactose.

Hyperglycemia is also accompanied by increase in TC/HDL-c, LDL-c/HDL-c ratios and atherogenic index (AI) and decrease in HTR %. Diabetic rats administrated either with cow's milk or dietary lactose (G6 and G5) for 28 days showed significant ($p<0.05$) reduction in TC/HDL-c, LDL-c/HDL-c ratios and AI and significant ($p<0.05$) increase in HTR%.

A significant increase in the intestinal lactase activity was observed in diabetic rats alloxanized diabetic rats fed on either cow's milk or dietary lactose (G6 and G6) showed a significant reduction in the intestinal lactase activity, however, the reduction in values of the intestinal lactase activity in diabetic rats administrated cow's milk (G6)

was significantly ($p<0.05$) higher than that administrated dietary lactose (G5).

Histopathological examination showed oral administrated of cow's milk improved the injury in pancreatic tissue and brought back the normal architecture, however administration of dietary lactose improved the injury in pancreatic tissue.

It can be concluded that milk proteins differ in their capacity to stimulate insulin release. Milk proteins have insulinotropic properties; In addition, administration of cow's milk exhibited significant hypoglycemic activity in alloxanized diabetic rats, and also improvement in lipid profile and body weight as well as regeneration of β-cell of pancreatic tissue and so might be of value in treatment of diabetes. In diabetic rats hyperglycemia directly increases intestinal disaccharidase activities, if patients with diabetes have increased intestinal activities of lactase, those with high lactose consumption would be exposed to greater amounts of the monosaccharides glucose and galactose, and this may result in greater difficulty in achieving adequate blood glucose control, on the other hand lactose intolerance as carbohydrate disorder will be disappeared in diabetic patients.

Key Words: Alloxan, Cow's milk, Diabetic rats, Diabetes, Glycemic index, Lactose, Lactase activity, Lactose intolerance, Proteins.

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