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Effect of caloric restriction on sirtuin-1 disorders associated with Diabetes in male rats

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Background: Type 2 Diabetes Mellitus (T2DM) is characterized by insulin resistance, hyper-insulinaemia and hyperglycaemia. Increased glucose production through abnormally elevated hepatic gluconeogenesis is central to the manifestation of hyperglycaemia in T2DM. Also, obesity is associated with hyper-insulinemia and insulin resistance (IR). So, the effects of caloric restriction (CR) on Diabetes have been documented extensively. Even in short term studies, CR exhibited improvement of hyperglycemia and insulin level before changes in body composition and fat distribution. Sirtuin 1 (SIRT1) has been identified as regulator of gluconeogenic gene expression. The present study aimed to evaluate the effect of caloric restriction on SIRT1 level and activity in liver and pancreas of diabetic rats. Further, the possible role of SIRT1 on metabolic disorders associated with Diabetes Mellitus, including serum levels of glucose, insulin, triglyceride (TG) and high density lipoproteins (HDL), will be explored.

Methods: Thirty two male albino rats were divided into control group (GpI), diabetic (DM) group (GpII), (CR+DM) group (GpIII) subjected to 30% caloric restriction program for 1 month before the induction of Diabetes, (DM+CR) group (GpIV) subjected to 30% caloric restriction program for 1 month after induction of Diabetes. At the end of the study, BMI%, serum levels of glucose, insulin, TG and HDL, HOMA, SIRT1 level and activity in liver and pancreas and pancreatic DNA ladder were assessed.

Results: Our results showing caloric restriction either before or after induction of Diabetes was associated with significant improvement of serum glucose, insulin, TG and HDL levels, HOMA-IR, SIRT1 level activity in liver, pancreas and pancreatic tissue. Although BMI% was significantly decreased in GpIV, yet it did not show any significant change in GpIII when compared to GpII. Remarkably, we did not detect any significant difference between the effects of CR either pre or post Diabetes.

Conclusion: Lowered SIRT1 in Diabetes was improved by 30% caloric restriction. Consequently, the patho-physiological disorders associated with T2DM were improved.

Biography

Manal Mahmoud has completed her PhD from Faculty of Medicine Cairo University and she is preparing for Postdoctoral studies. She has Diploma of clinical nutrition from European Society for Clinical Nutrition. She is Lecturer of Physiology Cairo University.

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