Effect of hypothalamic-pituitary-adrenal axis alterations on glucose and lipid metabolism in diabetic rats

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Received December 4, 2014
Accepted April 7, 2015
Published August 14, 2015
DOI http://dx.doi.org/10.4238/2015.August.14.19

ABSTRACT. This study investigated the relationship between alterations in the hypothalamic-pituitary-adrenal (HPA) axis function and glucose and lipid metabolism in diabetic rats. To accomplish this a diabetes model was established by jointly administering a long-term high-fat diet plus Streptozotocin (STZ; 50 mg/kg ip). The rats were randomly divided into four groups: 1) a normal control group, 2) a model group, 3) astragalus polysaccharide (APS) group, and 4) a metformin group. APS and metformin hydrochloride were administered intragastrically (100 mg·kg⁻¹·d⁻¹). Rat blood glucose and body weight were measured once per week, and urine was collected for 24 h after 30 days of administration of APS. The levels of blood lipids, insulin, and corticosterone (CORT), as well as hypothalamic CRH, pituitary ACTH, urine sugar and CORT were measured. Compared with the normal control group, the levels of blood sugar, urine sugar, TC, and TG significantly increased in the model group, and the levels of hepatic glycogen and HDL-C decreased. Administration of APS was shown to reverse these changes. Furthermore, as compared with the normal control group, the levels of insulin and hypothalamic CRH in the model...
group decreased significantly, while the levels of plasma ACTH and CORT, pituitary ACTH, and urine CORT were elevated. Again, APS administration improves these outcomes and returns their levels to normal. Thus, the glucose and lipid metabolic disorder in the high-fat diet and STZ-induced diabetes model may be related to increased HPA axis activity. The hypoglycemic effect of the traditional Chinese medicine, ASP, may improve HPA axis functioning and aid in the treatment of diabetes.

**Key words:** Streptozocin; HPA axis; Astragalus polysaccharide; Diabetes; Glucose and lipid metabolism