

Antidiabetic Effect of Flaxseed (*Linum usitatissimum* L.) on Hepatic Lipid Metabolism of Alloxan-Induced Diabetic Rats

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Abstract

Medicinal plants and their constituents have long been regarded as a safe treatment for a variety of diseases, particularly diabetic complications. Flaxseed (*Linum usitatissimum* L.) was used to investigate the hyperglycemic and hyperlipidemic effects based on its antioxidant content because of its Herbacetin, a dietary flavonoid with many pharmacological activities. Thirty-five male albino rats weighing 180 ± 5 g were used and divided into 5 groups, each of 7 rats for 30 days. The first group fed on a basal diet, served as a normal control group. Twenty-eight rats were injected with alloxan with a single intravenously (40 mg/kg b.w) to induce diabetes and randomly classified in to four groups, diabetic (untreated), the other three groups treated with oral administration of flaxseed extract (FE) at a dose of 150 ml/kg BW and (10% and 20%) flaxseed powder (FP), for a period of 30 days, flavonoids, total phenols and Scavenging activity were detected. Also, changes in body weight, feed efficiency ratio (FER), blood glucose, insulin, lipid peroxidation and the antioxidant defense system and lipid-regulating enzymes were evaluated. FE followed by FP groups showed significant improvement in diet consumption parameters compared to diabetic control, flaxseed administration caused a significant reduction in plasma glucose and plasma insulin. Furthermore, significant amelioration in tissue liver lipid peroxidation (MDA) was conducted in treated-diabetic rats however, SOD, GPx and GSH antioxidant enzymes increased significantly compared to the negative control group. High flavonoid contents with total phenols tend to make significantly mended the hepatic lipid-regulating enzymes such as glucose 6-phosphate dehydrogenase (G6PD), β -oxidation activity and fatty acid synthase (FAS) near- normal levels especially PE group followed by FP 20% then FP 10% compared to non-treated diabetic control. In conclusion, Oxidative damage associated with diabetes was ameliorated with treatment with flaxseed extract and powder. The attenuate effects are mainly attributed to antioxidant properties and the presence of bioactive and nutraceutical compounds especially flavonoid contents in high amounts.

Key Words: Glucose 6-phosphate dehydrogenase, Antioxidant enzymes, Insulin, Glucose and Fatty acids.