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Beneficial effects of *Zingiber officinale* on goldthioglucose induced obesity

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Abstract

Goldthioglucose induces in mice a significant increase in body weight, glucose, insulin and lipid levels. Treatment with 250mg/kg of methanol and ethyl acetate extracts of *Zingiber officinale* for 8 weeks produces significant reduction in body weight, glucose, insulin and lipid levels as compared to obese control mice. The reduction in elevated glucose along with elevated insulin levels indicates that the treatment with *Z. officinale* improves insulin sensitivity.

Introduction

The prevalence of obesity in the United States and world wide is increasing. More than one half of U.S. men and women aged ≥20 years are considered over weight [Body mass Index (BMI) in kg/m^2 ≥25] and nearly one fourth are clinically obese [BMI in kg/m^2 ≥30]. A moderate obesity can contribute to chronic metabolic abnormalities characteristic of insulin resistance syndrome, such as dyslipidemia, hypertension, insulin resistance and glucose intolerance [1]. Environmental factors such as the general availability of high calorie food or the limited need for physical exercise and genetic factors that predispose to weight gain contribute to the development of obesity [2]. Drugs like fenfluramine and dexfenfluramine used in earlier days for treating obesity act by modulating 5-hydroxytryptamine (5-HT) actions like release of 5-HT, inhibition of its reuptake or both. Sibutramine an inhibitor of both norepinephrine reuptake and serotonin that also weakly inhibits dopamine reuptake is used in the treatment of obesity [3]. 5-HT plays a crucial role in controlling appetite, hence drugs modulating 5-HT functions are among good candidates for screening for their efficacy in obesity.

Zingiber officinale commonly known as ginger is one of the commonly used spices in India and around the world. Ginger is reported to have various pharmacological activities like antiemetic, antiulcer, anxiolytic, antiinflammatory and antipyretic activities [4], [5], [6], [7], [8], [9]. Majority of the pharmacological activities reported for *Z. officinale* can be explained by its effect on 5-HT

receptor modulation. Earlier studies from our laboratory had demonstrated that fresh juice of *Z. officinale* reduces the elevated lipid levels associated with hyperglycemia in streptozotocin-induced type I diabetic in rats. It was also correlated that reduction in the serum glucose levels are mediated by 5-HT receptor antagonism [10]. However, in our earlier studies reduction in serum glucose levels were seen in conditions of hypoinsulinemia. In the present study *Z. officinale* is evaluated for its beneficial effects in conditions of hyperglycemia associated with hyperinsulinemia, hyperlipidemia and increased abdominal fat deposition which represents obesity.

Section snippets

Plant material

Dried rhizomes of *Z. officinale* Roscoe (Zingiberaceae) were purchased from a local market. They were identified by morphologic and microscopic comparison according to different standard texts by Prof. O. P. Saxena, Head of the Botany Department, Gujarat University, Ahmedabad, India. A specimen was deposited in the Botany Department, Gujarat University, Ahmedabad, India.…

Preparation of methanolic and ethyl acetate extracts

Dried and powder rhizomes were extracted with MeOH under reflux for 6 h. After filtration and concentration in vacuo the…

Results

Animals of group II (obese control) showed significant increase in body weight, serum glucose and insulin levels as compared to normal control mice. Treatment with methanolic and ethyl acetate extracts significantly reduced body weight from 41.6 to 32.5 and 35.8 g, respectively. The treatment significantly reduced the serum glucose and insulin levels (Table 1).

Obese control mice (group II) also showed significant increase in serum cholesterol, triglyceride, LDL-cholesterol, VLDL-cholesterol…

Discussion

Goldthioglucose induced obesity model is one among the accepted models for screening of drugs useful in obesity. Goldthioglucose induces destruction of hypothalamic and extra hypothalamic areas of the brain and induces obesity [11], [12], [13], [14]. In the present study, obese control mice showed significantly higher levels of fasting glucose and insulin levels as compared to control mice. This is consistent with earlier reports [11], [12], [13], [14]. Treatment with methanolic and ethyl…

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2023, Journal of Ayurveda and Integrative Medicine

> *Citation Excerpt :*
>
> ...The GTG-induced mouse model of obesity was established as indicated previously [39]. GTG causes necrosis of the ventromedial portion of the hypothalamus, leading to obesity [40,41]. Young healthy Swiss albino mice of either sex weighing 30–40 g were used for the pre-clinical study and were randomly grouped for the experiment....

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…The results revealed that both methanol and acetate extracts resulted in effective weight loss, whereas, the glucose level was normal compared with that in the control mice. An increase in insulin level was observed in the treated mice, and this was attributed for the weight loss in obese mice (Goyal and Kadnur, 2006). Lei et al. (2007) evaluated the effect of pomegranate plant leaf extract on high fat diet-induced obese mice.…

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2019, Saudi Journal of Biological Sciences

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…According to the presence of oxygen groups in ginger constituents, it behaves like a ligand and prevents cadmium accumulation within kidney via complexation mechanism (Telisman, et al., 2007). Also, it was proposed that vitamin content of ginger especially vitamin A, B6, and retinoids, play a vital role in body growth, fat reserves, and protein synthesis (Ali et al., 2008; Goyall, and Kadnur, 2006). Similarly, phenolic compounds of ginger may increase appetite and stimulate the feeding control in the central nervous system followed by body weight gain (Goyall, and Kadnur, 2006).…

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…This is because food consumption, in the treated groups, was shown to be improved, with a corresponding increase in body weight. Ginger, by its active components (6–gingerols, 6–shogaols and 6–paradol), has been proposed to modulate serotonin concentrations [53]. Serotonin plays a vital role in appetite control.…

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