

Evaluation of antiobesity and cardioprotective effect of *Gymnema sylvestre* extract in murine model

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ABSTRACT

Objective: Obesity plays a central role in the insulin resistance syndrome, which is associated with hyperinsulinemia, hypertension, hyperlipidemia, type 2 diabetes mellitus, and an increased risk of atherosclerotic cardiovascular disease. The present study was done to assess the effect of *Gymnema sylvestre* extract (GSE) in the high fat diet (HFD)-induced cellular obesity and cardiac damage in Wistar rats.

Materials and Methods: Adult male Wistar rats (150–200 g body weight) were used in this study. HFD was used to induce obesity. Body mass index, hemodynamic parameters, serum leptin, insulin, glucose, lipids, apolipoprotein levels, myocardial apoptosis, and antioxidant enzymes were assessed. Organ and visceral fat pad weights and histopathological studies were also carried out.

Results: Oral feeding of HFD (20 g/day) for a period of 28 days resulted in a significant increase in body mass index, organ weights, visceral fat pad weight, cardiac caspase-3, cardiac DNA laddering (indicating apoptotic inter-nucleosomal DNA fragment), and lipid peroxide levels of cardiac tissues of rats. Further, mean arterial blood pressure, heart rate, serum leptin, insulin, LDH, LDL-C, total cholesterol, triglycerides, and apolipoprotein-B levels were enhanced significantly, whereas serum HDL-C, apolipoprotein-A1 levels, and cardiac Na⁺ K⁺ ATPase, antioxidant enzymes levels were significantly decreased. Furthermore, treatment with standardized ethanolic GSE (200 m/kg/p.o.) for a period of 28 days resulted in significant reversal of above mentioned changes in the obese Wistar rats.

Conclusion: The present study has demonstrated the significant antiobesity potential of GSE in murine model of obesity.

KEY WORDS: Cardiomyocyte apoptosis, *Gymnema sylvestre*, insulin, leptin, obesity

Introduction

Obesity, the most common nutritional disorders in humans, is a major problem not only in Asia but also in all over the world.^[1] According to World Health Organization (WHO), the prevalence of obesity is rapidly rising at an alarming rate to epidemic proportion globally. The International Obesity Task Force estimates that more than 300 million individuals worldwide are obese with body mass index (BMI) \geq 30 kg/m² and 800 million are overweight (BMI between 25 and

29.9 kg/m²). Currently, 66% of US adults are overweight or obese, 16% of US children and adolescents are overweight, and 34% are at risk of becoming overweight.^[2]

Obesity poses a major risk for serious diet-related chronic diseases, including type 2 diabetes, hyperlipidemia, cardiovascular disease, hypertension and stroke, obstructive sleep apnea, asthma, orthopedic disorders, social and mental health problems, and certain forms of cancer.^[3] Cardiac apoptosis plays a critical role in the development and progression of obesity^[4] and a significant positive correlation has been observed between mean dietary fat intake and the incidence of obesity and its related complications and risk factors.^[5]

Gymnema sylvestre extract (GSE) (Asclepiadaceae), a plant native to the tropical forests of India, has been used frequently in traditional medicine for the treatment of diabetes. Maji *et al.*^[6] have reported that water soluble portion of the alcoholic extract of *G. sylvestre* leaves has a significant glucose lowering effect compared with standard hypoglycaemic

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