

Research Article

Effect of mahagoni seed extract on blood glucose level in non-diabetic ratsHasan Smmma¹, Fatema Zerine Khan²*, Syeda Papia Sultana³, Zafor Sadeque⁴

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Diabetes mellitus is a heterogeneous group of metabolic disorder characterized by an elevation of blood glucose caused by a relative or absolute deficiency of insulin. The incidence of diabetes is growing rapidly worldwide causing high morbidity and mortality. Drug treatment for diabetes mellitus is expensive and carries risks for many adverse effects. Nature has gifted Bangladesh with a rich emporium of medicinal plants. Many of them are highly efficacious and are recognized source of useful drugs. Moreover, most of the antidiabetic drugs reduce the blood glucose below the lower normal limit. It is a necessity now to invent more drugs that reduce increased blood glucose to the normoglycaemic level and will have no effect in normal blood glucose level. Twelve healthy Long Evans Norwegian strain of rats were divided into two groups (A and B) comprising 6 rats each. Administration of ethanolic extract of *Swietenia mahagoni* seeds in group-B produced no significant reduction in blood glucose level as compared to normal control (group-A). These observations and results provide information that ethanolic extract of *Swietenia mahagoni* seeds has no effects in non-diabetic rats which requires further investigation.

Keywords: Diabetes mellitus, *Swietenia mahagoni*, Rat, Blood glucose.

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Introduction

Diabetes mellitus is a metabolic disorder resulting in raised blood glucose (hyperglycaemia) from defects in insulin secretion, insulin action or both that arise from genetic as well as environmental factors. It is defined by documenting raised blood glucose in fasting state (≥ 7.0 mmol/L) or 2 hours after an oral standard glucose drink (≥ 11.1 mmol/L)¹. The chronic hyperglycaemia is associated with long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, liver, heart and blood vessels². The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030³.

Traditional medicine is fostered particularly in countries where scientific medicine is not accessible to large populations for economic reasons. Complementary and alternative medicine does not compete with the successful main stream of scientific medicine. Users of complementary and alternative medicine commonly have chronic conditions and have tried conventional medicine but found that it has not offered a satisfactory solution, or has caused adverse effects⁴. Bangladesh is a rich emporium of medicinal plants, some of which are used therapeutically in the treatment of various diseases by both traditional healers and local people. Many of them are highly efficacious and are internationally recognized as useful drugs⁵. Herbal medicines have several advantages such as

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fewer side-effects, better patient tolerance, relatively less expensive and well accepted due to a long history of use. The more important cause is that herbal medicines provide rational means for the treatment of many diseases that are obstinate and incurable in other systems of medicine⁶.

Swietenia mahagoni (mahagoni) is one of the most significant plants of the family, Meliaceae. This plant has various types of medicinal values like antimalarial and antidiarrhoeal effects. The plant extracts have been accounted to possess antibacterial and antifungal activities. Limonoids obtained from *Swietenia mahagoni* have antifungal activity⁷. Study has clearly indicated the significant antidiabetic activity of *Catharanthus Roseus* (Nayantara), *Azadirachta Indica* (Neem) and *Allium sativum* (Garlic) and supports the traditional usage of the herbal preparations by Ayurvedic physicians for the therapy of diabetics⁸. The seed of *Swietenia mahagoni* is a natural agonist of peroxisome-proliferator activated receptor (PPAR γ)⁹. The functions of these peroxisome-proliferator activated receptor (PPAR) after activation by drugs include an increase in lipid and cholesterol metabolism, adipocyte differentiation, and improvement in insulin sensitivity. It has been demonstrated that peroxisome-proliferator activated receptor (PPAR γ) is the receptor of the thiazolidinedione (TZD) class ligands. Among the TZD type antidiabetic drugs, Rosiglitazone and Troglitazone are potent adipocyte-differentiating agents, which activate $\alpha 2$ gene expression in a peroxisome-proliferator activated receptor (PPAR γ) dependent manner⁹. In addition, most of the antidiabetic drugs reduce the blood glucose below the lower normal limit. Now it is of great importance to invent more drugs that reduce increased blood glucose to the normoglycaemic level and will have no effect in normal blood glucose level.

With this background information, in this study, attempt has been made to evaluate the effect of *Swietenia mahagoni* seeds in non-diabetic rats.

Materials and Methods

This experimental study was carried out at the Department of Pharmacology and Therapeutics, Dhaka Medical College (DMC), Dhaka, during the period July 2009 to June 2010.

Twelve Long Evans Norwegian strain rats of either sex were used for the present study. The rats were fed with normal diet and allowed to drink water ad libitum. The rats were divided into two groups (A and B). Each group consists of six rats.

Experiment design

Twelve rats were divided into 2 groups in this part of experiment, each having 6 rats (Group-A and Group-B). Group-A (Control group) received standard rat food for 14 days. Group-B received ethanolic extract of *Swietenia mahagoni* seeds 1000 mg/kg orally along with standard rat food for 14 days. Blood was collected from veins of rats after giving incision. Fasting blood glucose (FBG) levels were estimated on day 1 and day 15 of the experiment by using glucometer. All the rats were fasted overnight before collection of blood.

Observations and Results

Effect of EESM (ethanolic extract of *Swietenia mahagoni*) seeds on blood glucose level in non-diabetic rats

In group-A, blood glucose levels (mean \pm SD) were 5.80 ± 0.52 mmol/L and 5.80 ± 0.46 mmol/L on day 1 and day 15 respectively. Percentage change was 2.31%. In group-B, blood glucose levels (mean \pm SD) were 5.50 ± 0.39 mmol/L and 5.60 ± 0.46 mmol/L on day 1 and day 15 respectively. Percentage change was 2.17%. Unpaired t test was done between group A and group B. The change was not significant statistically ($p > 0.05$) (Table 1).

Table 1. Effect of EESM (ethanolic extract of *Swietenia mahagoni*) seeds on blood glucose level in non-diabetic rats.

Parameters	Group A (n=6)	Group B (n=6)	Percent Change
FBG (mmol/L) on day 1 (Mean \pm SD)	5.80 ± 0.52	5.50 ± 0.39	+ 2.31%
FBG (mmol/L) on day 15 (Mean \pm SD)	5.80 ± 0.46	5.60 ± 0.46^{ns}	+ 2.17%

ns: not significant

Discussion

The present study was carried out to evaluate the effect

of ethanolic extract of *Swietenia mahagoni* seeds in non-diabetic rats. The ethanolic extract of *Swietenia mahagoni* seeds was given for 14 days in non-diabetic rats.

The dose of EESM (ethanolic extract of *Swietenia mahagoni*) (1000 mg/kg body weight), used in this study was selected in keeping conformity with the dose used in different research work by Li DD et al⁹. The duration (15 days) of study was selected according to Bokaeian et al¹⁴.

There was no significant change ($p > 0.05$) in the mean value of blood glucose level of non-diabetic rats treated with EESM (ethanolic extract of *Swietenia mahagoni*) seeds as compared with normal control. It may be concluded that *Swietenia mahagoni* seeds have no effect on lowering the blood glucose level in non-diabetic rats. Therefore, the findings of this study are in well agreement with the findings of other researcher Li DD et al⁹. It may be concluded ethanolic extract of *Swietenia mahagoni* seeds do not produce hypoglycaemia in non-diabetic rats.

Maiti et al¹⁵ isolated the hypoglycaemic phytoconstituent named Swietenine from seeds of a related species *Swietenia macrophylla* and the effect was comparable to that of human insulin.

Conclusion

It was observed that the EESM (ethanolic extract of *Swietenia mahagoni*) seeds has no effect on blood glucose level in non-diabetic rats. The result suggested that the ethanolic extract of *Swietenia mahagoni* seeds may be a useful normoglycemic agent in the treatment of diabetes mellitus. It is recommended that further studies regarding pharmacokinetics, pharmacodynamics, toxicology and posology of extract of *Swietenia mahagoni* seeds should be undertaken to develop it as a useful antidiabetic agent for human.

Conflict of Interest

The authors have no conflict of interest.

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