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ANTIDIABETIC ACTIVITY OF *MORUS ALBA* IN STREPTOZOTOCIN INDUCED DIABETIC RATS

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ABSTRACT

Many Indian medicinal plants were investigated in streptozotocin induced diabetic rat model and provided scientific validation to prove their antihyperglycemic activity. In view of alleged antidiabetic potential, effect of the methanol and aqueous extracts of *Morus alba* (Moraceae) leaves, was observed on fasting blood sugar levels in streptozotocin induced diabetic rats.

Key words: Antidiabetic activity, Antihyperglycemic activity, *Morus alba*, Streptozotocin.

INTRODUCTION

Diabetes mellitus is a metabolic disorder in the body[1]. The β-cells secrete less amount of insulin so that glucose can not be converted into the source of energy and its level rises in the blood. Currently available synthetic antidiabetic agents produce serious side effects like hypoglycemic coma[2] and hepatorenal disturbances.[3] Diabetes may be insulin dependent or non-insulin dependent. In insulin dependent diabetes mellitus, the β-cells of Islets of langerhans of pancreas of patients are either malfunctioning or destroyed. In non-insulin dependent diabetes mellitus, the patient exhibits insulin resistance and then concomitantly develops insulin secretory defect[4]. Type 1 diabetes is treated with exogenous insulin and type 2 diabetes is treated with oral hypoglycemic agent (sulphonylureas, biguanides)[5]. Diabetes mellitus is a condition in which the pancreas no longer produces enough insulin or when cells stop responding to the insulin that is produced, so that glucose in the blood can not be absorbed into the cells of the body. The body will attempt to dilute the high level of glucose in the blood, a condition called hyperglycemia.

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EXPERIMENTAL

Materials and methods

Plant material

Morus alba of family moraceae was collected from the Govt. Sericulture Deptt., Sanchi (M.P.) India. The collection was made in winter season. The plant leaves were dried in shade for 20 days, at Pest Control Laboratory, S. S. L. Jain P. G. College, Vidisha. After identification from the Botany Deptt. of S. S. L. Jain P. G. College, Vidisha, a voucher specimen was preserved in the laboratory for future reference.

Preparation of extract

The plant material (tender leaves) were washed thoroughly with tap water and air dried in shade at room temperature. They were then mechanically powdered and sieved. 100 g of powdered plant material was extracted with methanolic Soxhlation and dried in a rotary evaporator at 40^{o}C. Another 150 g of the powdered plant material was decocted in a 1000 mL of water. The liquid aqueous extract obtained was concentrated in vacuum at 40^{o}C.

The extractive yields were found to be 32.4% and 36.8% for methanolic and aqueous extract of *Morus alba*, respectively.

Preliminary phytochemical screening

A preliminary phytochemical screening was carried out for the extracts employing the standard procedure to reveal the presence of alkaloids, steroids, flavonoids, saponins, tennins and glycosides.

Induction of diabetes

The animals were starved overnight and then diabetes was induced by a single intravenous injection of a freshly prepared streptozotocin (STZ) solution (50 mg/kg body wt). Streptozotocin was dissolved in 0.1 m freshly prepared citrate buffer solution (pH 4.5). The animals were allowed to drink 5% glucose solution overnight. After 5 days, streptozotocin administration, rats showed diabetes. Control rats were injected with citrate buffer alone. The leaf powdered extract in aqueous solution was administered orally through gastric catheter at a concentration of 200 mg/kg body weight/rat, twice a day for 15 days.

Experimental design

The animals were divided into four groups for the analysis of biochemical parameter. Each group has 6 animals.

Group I : Normal control rats.

Group II : Diabetic control rats.

Group III : Diabetic rats treated with *Morus alba* extract 200 mg/kg body wt orally.

Group IV : Diabetic treated with standard drug.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized here:

Table 1: Percentage loss in water

Wet weight of the plant	Dry weight of the plant	Total weight loss in after drying	Percentage of weight loss
1550 g	1240 g	310 g	20%

Table 2: Percentage yield of *Morus alba* by Soxhlet apparatus in different solvents

Solvent used	Weight of plant material powder	Temp.	Weight of extract	Percentage yield
90% Alcohol	100 g	40^{o}C	16.2 %	32.4 %
Water	100 g	40^{o}C	18.2 %	36.8 %

Table 3: Percentage reduction of blood glucose level in STZ induced diabetic albino rats

Sample	Blood glucose level (Before treatment)	Blood glucose level (After treatment)	Percentage reduction in blood glucose level
Control	268.67 ± 5.13	267.67 ± 6.89	0.37 %
Methanolic extract	264.17 ± 9.60	214.33 ± 5.33	18.88 %
Aqueous extract	263.34 ± 4.33	237.23 ± 6.89	9.91 %

The plant leaves (*Morus alba*) after shade drying showed 20% loss in weight as indicated in Table 1. The powdered material, when Soxhleted in different solvents of increasing order of polarity gave maximum yield of crude material in water extract, which accounted for 36.8%. The alcoholic extract showed 32.4% in each (Table 2).

In the present work, we have described the antidiabetic activity of the methanolic and aqueous extracts of the *Morus alba* in STZ induced diabetic rats. As shown in Table 3, the methanolic and aqueous extracts significantly reduced the blood glucose level in STZ induced diabetic rats. The antidiabetic activity of methanolic extract observed was better compared to same dose of aqueous extract. In diabetic albino rats, maximum percentage reduction was found to be 18.88% and 9.91%, respectively for methanolic and aqueous extracts. Barik et al.[6] have discovered the antidiabetic activity of root extract of *Ichnocarpus frutescens*. They have observed maintenance of blood glucose level in normal and streptozotocin induced diabetic rats.

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