



PHYTOCHEMICAL EVALUATION AND CHARACTERIZATION OF HYPOGLYCEMIC ACTIVITY OF VARIOUS EXTRACTS OF *ABELMOSCHUS ESCULENTUS* LINN. FRUIT

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ABSTRACT

Diabetes is a widely spreading disease. It is the sixth leading cause of death in India and US. It causes several hormonal imbalances; heart related problem is most common cause of death in diabetes. The present study was done with an objective to explore the biological use of *Abelmoschus esculentus* Linn., which is a commonly used plant throughout the world. In the present study hypoglycemic effect of ethanolic and aqueous extract of *Abelmoschus esculentus* Linn fruit was evaluated. The powdered drug along with its ethanolic and aqueous extract were subjected to phytochemical investigation which showed the presence of carbohydrate, gums and mucilages, proteins, phytosterols, flavonoids, tannins, phenolic compounds and volatile oil. The extracts were then evaluated for the hypoglycemic activity in alloxan induced diabetes mice model. The results revealed that aqueous extract of powdered drug had maximum effect when Glibenclamide was used as a standard.

Keywords: Hypoglycemic activity, *Abelmoschus Esculentus*, Soxhlet, Phytochemical.

INTRODUCTION

Diabetes¹ is a chronic condition which affects over 150 million people in the world today. The percentage of people suffering from diabetes is increasing rapidly to the point that many medical authorities are referring to it as an epidemic.

There are two main types of Diabetes, Type-1 Diabetes and Type-2 Diabetes other than gestational diabetes. Each has its own causes and risk factors, although both are characterized by high blood sugar.

Type-1 diabetes², which used to be called Juvenile-onset diabetes or Insulin-Dependent Diabetes Mellitus (IDDM), occurs when the pancreas stops producing insulin.

Type-2 diabetes³, which used to be called adult-onset or Non-Insulin-dependent Diabetes Mellitus (NIDDM) typically occurs later in life, develops due to a combination of genetic factors and life style and accounts for about 90-95% of all diagnosed cases of diabetes.

Gestational diabetes, which affects pregnant women in the later stages of pregnancy. If a woman develops gestational diabetes, which normally ceases after giving birth, she has about a 40% chance of contracting type-2 diabetes later in life.

Various parts of the plant *Abelmoschus esculentus* Linn. used traditionally as emollient, demulcent, diuretic, cooling, aphrodisiac, antiseptic and in gonorrhoea.

Abelmoschus esculentus Linn. is a plant of family Mallow (Malvaceae). It is Naturalized in all tropical countries and grown abundantly through out India. The plant prefers acid, neutral and basic (alkaline) soils and can grow in very alkaline soil. Stem is erect, aerial, herbaceous or woody, usually solid, cylindrical and branched. Herbaceous portion of stem is covered with scaly hairs, woody part is fibrous. Leaves are Alternate and stipulate and its fruit is loculicidal Capsule.

Beside this it is used for various other purposes like fiber obtained from plant stems are used as the substitute for jute and for the making paper and textile.

A review of past work done on *Abelmoschus esculentus* Linn. has indicated that it needs a thorough investigation.

MATERIALS AND METHOD

Collection of plant material

The fruits of *Abelmoschus esculentus* Linn. were obtained from local area of Behrampur and authenticated by a botanist for which herbarium was submitted.

Method

Extraction

The fruits of *Abelmoschus esculentus* linn were dried in shade and grinded to coarse powder.

About 500 gms. of dried fruit powder was extracted with Ethanol (40-60°C) by continuous hot percolation using soxhlet apparatus. The extraction was continued for 72 hours. The ethanolic extract was filtered and concentrated to a dry mass. A greenish - brown extract (2.460 gm.) was obtained. The marc left after ethanolic extraction was dried and extracted with water by simple maceration.

The maceration was continued for 48 hours. The water extract was filtered and concentrated. A brown extract (2.120 gm.) was obtained.

Phytochemical screening⁴⁻⁸

The powder drug of fruits of *Abelmoschus esculentus* linn. along with its ethanolic and aqueous extracts were subjected to qualitative tests for the identification of various phytochemical constituents.

Pharmacological Investigation^{9,10}

Different extracts of fruit of the plant *Abelmoschus esculentus* (L) were screened for its anti-diabetic activity.

50 adult albino wistar rats (150-180 g) of either sex were taken for the experiment.

The experimental animals were fasted for 18 hrs. before alloxan injection.

Alloxan monohydrate 150 mg./kg. body weight was dissolved in normal saline and injected intraperitoneally after 18 hrs. fasting to induce hyperglycemia. After 1 hr. of alloxan administration the animals were fed on standard pellets and water libitum.

The blood glucose level was monitored Alloxanization in blood samples was collected by tail tipping method using Glucometer.

After 72 hours the rats having BGL (Blood Glucose Level) above 150 mg/L of blood were selected for study and divided them into four groups (A, B, C, D) of 6 rats each.

Group I was considered as control group and received the vehicle only. Group II and Group III received aqueous and ethanolic extract respectively, orally at a dose of 300 mg/kg.

The standard drug Glibenclamide (0.5 mg/kg) was administered orally to animals in group IV.

The blood glucose level was monitored after 1,3, 6 and 12 hours of administration of single dose of the extract (for acute study) and at the end of 1, 2, 3 and 7 days (For prolonged treatment).

RESULTS AND DISCUSSION

Phytochemical evaluation

The phytochemical screening shows the presence of various phytoconstituents. Results shown in Table.I

Table 1: Phytochemical profile of extracts

Plant constituents test / Reagent used	Powder drug	Ethanolic extract	Aqueous extract
1. TEST FOR CARBOHYDRATES			
a. Molisch's Test	+	+	+
b. Fehling's Test	+	+	+
c. Benedicts' Test	+	+	+
d. Barfoed's Test	-	-	-
e. TEST FOR STARCH	+	+	+
2. TEST FOR GUMS & MUCILAGES	+	+	+
3. TEST FOR PROTEIN AMINO ACID			
a. Ninhydrin's Test	+	+	+
b. Millon's Test	+	+	+
c. Xanthoproteic Test	+	+	+
d. Tannic acid (10% W/W)	-	-	+
e. With Heavy metal	+	+	+
f. Biuret Test	-	-	-
4. TEST FOR FIXED OILS & FAT			
a. Spot Test	-	-	-
b. Saponification Test	-	-	-
5. TEST FOR FLAVONOIDS			
a. Fluoresence Test	+	+	+
b. Reaction with alkali & acid	+	+	+
c. FeCl ₃ Test	+	+	+
6. TEST FOR TANNINS & PHENOLIC COMOUND			
a. 5% FeCl ₃ Solution	+	+	+
b. Reaction with CuSO ₄	-	-	-
c. Reaction with lead acetate	+	+	+
d. Reaction with pot. dichromate	-	-	-
e. Drug + K ₃ Fe (CN) ₆ + NH ₃	+	+	+
7. TEST FOR SAPONINS			
a. Foam Test	-	-	-
8. TEST FOR ALKALOIDS			
a. Dragendorffs Test	-	-	-
b. Mayer's Test	-	-	-
c. Wagner's Test	-	-	-
d. Hager's Test	-	-	-
e. Phosphomolybdic acid	-	-	-
f. Tannic acid	-	-	-
9. TEST FOR GLYCOSIDE			
a. Legal's Test	-	-	-
b. Borntrager's Test	-	-	-
c. Keller killiani Test	-	-	-
d. Test for Cyanogenetic Glycoside	-	-	-
10. TEST FOR PHYTOSTEROLS			
a. Libermann's Test	-	+	+
b. Libermann-Burchard's Test	+	+	+
c. Salkowski's Test	-	+	+
11. TEST FOR VOLATILE OILS	+	+	+

Pharmacological activity

The aqueous extract of fruits of *Abelmoschus esculentus*, at a dose level of 300 mg/kg. Showed significant activity (P< 0.001) when

compared with control group. The results are given in the table.II. Comparatively aqueous extract have shown better activity than the ethanolic extract.

Table 2: Results of antidiabetic activity

Group	Treatment	Dose (mg/kg)	Blood glucose concentration (mg/kg)		
			0 days	3 day (alloxan)	7 day (drug)
I	Vehicle (CMC 1%)	1 ml	95.68 ± 3.61	289.66 ± 24.33	341.83 ± 30.73
II	Aqueous Ext.	300 mg/kg	100.35 ± 4.15	290.45 ± 29.8	194.4 ± 8.63 *
III	Alcoholic ext.	300 mg/kg	92.8 ± 4.0	270.90 ± 23.12	185.42 ± 12.62 *
IV	Glibenclamide	0.5 mg/kg	89.5 ± 2.43	302.66 ± 22.18	170.5 ± 12.53 *

Vehicle 1% W/V of CMC, n=6, Data are expressed in Mean ± SEM,

*P < 0.001

CONCLUSION

Powder of fruit part of plant was subjected to successive extraction by taking two solvent in increasing order of polarity i.e. ethanol, water and chemical tests on various extracts and powder material showed the presence of carbohydrate, gums and mucilages, proteins, phytosterols, flavonoids, tannins and phenolic compounds and volatile oil.

The different extracts were studied for hypoglycemic effect and was found that aqueous extract was showing maximum effect, using Glibenclamide as standard. Future Pharmacological investigations are suggested on the basis of the isolation principles and their mechanisms of the anti hyperglycemic effect.

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