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## Antidiabetic activity of Luffa aegyptica (Mill) in alloxan induced diabetic rats

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**ABSTRACT**

*The alcoholic and aqueous extract of Luffa aegyptica was studied for antidiabetic activity In alloxan induced diabetic rats by oral administration of extract 100mg/kg body weight for 15 days. The effect was compared with oral dose of 4.5mg/kg Glibenclamide. The alcoholic and aqueous extract of luffa aegyptica leaves significantly decrease the blood glucose of hyperglycemic rats. Phytochemical study showed the presence of flavonoids. It is concluded that Luffa aegyptica leaf extract has significant antidiabetic activity, which lowered the fasting blood glucose level in alloxan induced diabetic rats.*

**Keywords** : Antidiabetic activity, alloxan, Glibenclamide.

### INTRODUCTION

Diabetes mellitus is the most important non - infective epidemic to hit the globe in the present millennium . By the year 2025, India shall have the maximum number of diabetes in the world making it, the" Diabetes capital of the world".[1] Despite the great strides, made in understanding and management of diabetes, the disease and disease related complications are increasing unabated due to multiple defects , in its pathophysiology.[2] Parallel, to this , the holistic approach of herbs has accelerated the global efforts to harness and harvest medicinal plants having multiple beneficial effects .[3] Some of them have been evaluated and active principles isolated ; however , the search for novel antidiabetic drugs continues.[4]

## EXPERIMENTAL SECTION

**Plant material** : Fresh tender leaves of Luffa aegyptica (Mill) Family – cucurbitaceae have been collected from the garden nearby college campus and identified at Agharkar Research Institute (Pune) Maharashtra.

**Extraction** : The leaves were washed thoroughly with tap water and air dried in shade at room temperature . They were then mechanically powdered and sieved. 100gm. of powdered leaves were extracted using continuous hot extraction method. The extracts were evaporated to dryness. Another 150gm. of powdered plant material was decocted in 1000ml. of water. The liquid aqueous extract obtained was concentrated in vacuum at 40°C.

The extractive yield were found 7.36% and 17.17% for ethanolic and aqueous extract of *Luffa aegyptica* respectively. Then phytochemical screening were performed.

**Animals** : Sprague Dawley rats of male sex weighing 150 – 200 gm. were employed for antidiabetic study. They were housed in standard environment condition and fed with standard pellets and water ad libitum . The study was carried out in the National Toxicology Centre , pune (maharashtra) . Ethical clearance for the animal study was obtained from Institutional Animal Ethical committee Reg. no. 804/03/CA/CPCSEA.

**Induction of Diabetes** : A single dose (80mg/kg bw. s.c.) of alloxan monohydrate (Spectrochem Pvt. Ltd., Mumbai , india) dissolved in ice cold normal saline was used for induction of diabetes in rats after overnight fasting . After 1hr of alloxan administration , the animals were fed standard pellets and water ad libitum . The rats were then kept for the next 24hr on 20% glucose solution bottles , in their cages , to prevent hypoglycemia . After 72hr of Injection , fasting blood glucose level (estimated by GOD -POD method) was measured. The animals showing blood glucose level more than 200 mg/dl were selected for the s-tudy.

**Experimental design** : A marketed preparation of Glibenclamide and extract of Luffa aegyptica were used for this study . The human dose of 5mg was converted to a rat dose of 4.5mg/kg . In the experiment rats were divided into four groups with six animals each

*Group I : Diabetic control rats.*
*Group II : Standard drug (Glibenclamide – 4.5mg/kg) orally for 15 days.*
*Group III : Diabetic rats treated with alcoholic extract (100mg/kg) orally for 15 days.*
*Group IV : Diabetic rats treated with aqueous extract (100mg/kg) orally for 15 days.*

Rats were fasted overnight and the blood was collect from the retro orbital plexus to determine blood glucose by GOD – POD kit method . The change body weight was observed once a week.[5]

After 15 days , body weight were determined and the animals were sacrificed under the influence of anesthetic ether . The blood was collected by heart puncture. The blood

sample withdrawn from the sacrificed animals was centrifuged at 3000 rpm for 15 min .[6] and was analyzed for lipid profiles (s.cholertrol , s. triglyceride , HDL cholestrol ) s. creatinine , s. urea and s. blood glucose.[7]

**Statistical analysis :** All values were expressed as Mean ± SD . The differences between Diabetic control and treatment group were tested for significance using ANOVA followed by Dunnet'S t test. $P<0.05$ were considered significant.

## RESULTS

In the antidiabetic activity , the effects of *Luffa aegyptica* leaf extract on body weight is measured on $7^{th}$ and $14^{th}$ day of post induction and were compared with diabetic control groups . The values are shown in table -1. Alloxan induced diabetic rats showed a significant decrease ($P<0.05$) in body weight . Oral administration of leaf extract at the dose of 100mg/kg showed a significant increase ($P<0.05$) in body weight on $7^{th}$ and $14^{th}$ day of post induction when compared to untreated diabetic rats .

The effect of *Luffa aegyptica* leaf extract on fasting blood glucose level is measured on $7^{th}$ and $14^{th}$ day of post induction and compared with diabetic control groups . The values are shown in table -2 . Alloxan induced rats showed a significant Increase ($P<0.05$) in fasting blood glucose level . Oral administration of leaf extract at the dose of 100 mg/kg body weight showed a significant decrease ($P<0.05$) in blood glucose level in $7^{th}$ and $14^{th}$ days treatment . The fasting blood glucose of alcoholic extract on $7^{th}$ day of post induction was 196.33 ± 19.19 mg/dl compared to fasting blood glucose of standard drug treated rats 260.66 ± 30.06 mg/dl and aqueous extract on $7^{th}$ day of post induction was 203.0 ± 21.35 mg/dl compared to standard drug treated rats . The standard drug treated with Glibenclamide 4.5 mg/kg showed fasting blood glucose level of 175.66 ± 11.07.

$14^{th}$ day of post induction the alcoholic leaf extract treated group showed a fasting blood glucose level 161.33 ± 16.57 mg/dl, compared to standard drug treated rats which showed a fasting blood glucose level of 270.83 ± 20.01 mg/dl, and aqueous extract on $14^{th}$ day of post induction was 136.83 ± 20.60 mg/dl compared to standard drug treated rats . The standard drug treated with Glibenclamide 4.5 mg/kg orally showed fasting blood glucose level of 139.83 ± 21.45 mg dl . Both the plant extract, the aqueous extract was more significant than the alcoholic extract of *Luffa aegyptica.*

**Table-1 : Effect of *Luff aegyptica* leaf extract on body weigh in alloxan induced diabetic rats.**

| Group | 0 day | 7 day | 14 day |
|---|---|---|---|
| Diabetic control | 214.66±30.44 | 210.0±28.99 | 206.33±29.28 |
| Diabetic rats + Glibenclamide | 190.83±32.28 | 202.0±31.48 | 207.83±30.39 |
| Diabetic rats + Alcoholic extract | 177.0±8.74 | 188.16±10.00 | 198.33±17.23 |
| Diabetic rats + Aqueous extract | 203.5±14.84 | 212.66±11.80 | 218.83±11.94 |

*Values are expressed as Mean ±SD , n = 6 Body weight in gram (Mean ±SD)*
*P<0.05 Experimental groups were compared with diabetic control group.*

**Table-2 : Effect of *Luffa aegyptica* leaf extract on blood sugar level in alloxan induced diabetic rats.**

| Group | 0 day | 7 day | 14 day |
|---|---|---|---|
| Diabetic control | 245.16±40.98 | 260.66±33.06 | 270.83±20.01 |
| Diabetic rats + Glibenclamide | 248.33±25.00 | 175.66±11.07 | 139.83±21.45 |
| Diabetic rats + Alcoholic extract | 251.33±52.09 | 196.33±19.19 | 161.33±16.57 |
| Diabetic rats + Aqueous extract | 259.66±73.08 | 203.0±21.35 | 136.83±20.60 |

*Values are expressed as Mean ±SD , n = 6 Blood Glucose level in mg/dl (Mean ±SD)*
*P<0.05 Experimental groups were compared with diabetic control group.*

## DISCUSSION

In the present study the Hypoglycemic activity of Ethanolic and Aqueous extract of *Luffa aegyptica* leaves was evaluated in alloxan induced diabetic rat. The continuous treatment of leaf extract for a period of 15 days produced a significant decrease in blood glucose level in diabetic rats which is comparable to that of standard drug Glibenclamide which is used in treatment of Type II diabetes mellitus. The standard drug Glibenclamide stimulates insulin secretion form beta cells of islets of l angerhans . From the study , it is suggested that the possible mechanism by which the plant extract decrease the blood glucose level may be by potentiation of insulin effect either by increase in pancreatic secretion of insulin form beta cells of islets of langerhans .

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