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# ANTIDIABETIC ACTIVITY OF BUTANOL FRACTION OF MURRAYA EXOTICA SEEDS IN STREPTOZOTOCIN INDUCED DIABETIC RATS

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## ABSTRACT
The objective of the study was to evaluate the antidiabetic activity of butanol fraction of seed methanolic extract on *Murraya exotica*; family Rutaceae in streptozotocin induced diabetic rats. By oral administration of extract 400mg/kg body weight for 15 days. The effect was compared with oral dose of 0.5mg/kg Glibenclamide. The determination of blood glucose level by GOD-POD kit method. The result shows the butanol fraction on fasting blood glucose level on 15th day of post induction (10 days of treatment) was 135.4±13.99 mg/dl compared to fasting blood glucose of diabetic control animal 270.2±0.31mg/dl. The group treated with Glibenclamide 0.5 mg/kg showed fasting blood glucose level of 117.06±0.02* mg/dl. On 20th day of post induction (15days of treatment), the seed butanol fraction treated group showed a fasting blood glucose level of 69.01±0.20 mg/dl, compared to untreated diabetic animal which showed a fasting blood glucose level of 258.4±0.20mg/dl. The group treated with Glibenclamide 0.5 mg/kg orally showed fasting blood glucose level of 68.06±0.21mg/dl the blood glucose of hyperglycemic rats. From the toxicity study it was observed nontoxic upto 5g/kg body weight.

**KEYWORDS:** Anti diabetic activity, *Murraya exotica*, butanol, methanol, streptozotocin, GOD-POD.

## INTRODUCTION
Diabetes mellitus is considered the commonest endocrine disorder and it is the sixth leading cause of death globally. Increase in blood glucose damages many of the body's and nerves. The hyperglycemia caused due to decreased insulin production is called Type-1 diabetes and hyperglycemia due insufficient insulin utilization is called Type-2 diabetes.[1] It is estimated that diabet es in adults is over 170 million worldwide and its prevalence is likely to increase to over 300 million by the year 2025.[2,3] Since ancient times, plants have been an exemplary source of medicine. Ayurveda and other Indian literature mention the use of plants in treatment of various human ailments. India has about 45000 plant species and among them, several thousands have been claimed to possess medicinal properties.[4] The commonly practiced treatment of diabetes includes oral antidiabetic drugs, insulin injection and management through diet and physical exercise. Apart from currently available therapeutic for the treatment of diabetes, traditional plant medicines are also used throughout the world for treatment of diabetes. The use of these plants is based on the belief that they have low toxicity and cost less than the semi-synthetics or synthetics. This species is used sometimes as an ornamental plant in India and has a medicinal use. *Murraya exotica* or Curry plant, which is used as a spice in Indian foods. The plant is native to India. It is an aromatic, medicinally important species. It is used as an antidote for snake bites, due to its anti-spasmodic activity. It is also used as an insecticide, as an aphrodisiac and in perfume industry. (Source: Flowers of India) Joint pain, Body aches Venereal disease Dysentery Wound Diarrhea Abortion Pains and Inflammation Infectious diseases Common ailments. Kamini (Hindi); Kamini kusum (Manipuri); Vengarai (Tamil); Nagagolungu (Telugu); Kunti (Marathi); Kadu karibevu (Kannada); lMaramulla (Malayalam) Family-Rutaceae The plant is rich in coumarins, car- bazole alkaloids and flavonoids. The leaves contain a number of coumarins, the major ones being murrangatin and phebalosin. Murrangatin, derived from the precursor phebalosin. Hence, the present study focuses on the scientific investigation of antidiabetic activity of butanol fraction of *Murraya exotica* seeds.[5]

## MATERIALS AND METHODS

### *(i) Plant material*

***Plant material*:** The dried *Murraya exotica* seeds were purchased from the choudapudi herbal store and was identified by Dr N.Raju Department of botany kakatiaya university, Warangal, telanagana, India.

***(ii) Preparation of extract:*** The coarsely powdered *seeds* (500g) of *Murraya exotica* were extracted to exhaustion in a soxhlet apparatus at 50$^{o}$C with 500ml of methanol. The extract was filtered through a cotton plug, followed by what$^{s}$man filter paper (no.1) and then concentrated by using a rotary evaporator at a low temperature (40-60$^{o}$C) and reduced pressure to provide methanolic extractive of 12.4g, and fractionated by column chromatography with butanol as a solvent residue weigh of 5.2 g.

### *(iii) Animals*

Swiss albino mice of female sex weighing 20-25gms were employed for toxicity study. Albino wistar rats of male sex weighing 200-250 gms were employed for antidiabetic study. They were housed in standard environment condition and fed with standard rodent diet with water and ad libitum. Ethical clearance for the animal study was obtained from Institutional Animal Ethical Committee (114/bcp/CPCSEA).

### *(iv) Toxicity Study*

An acute oral toxicity study was performed as per OECD guidelines 423. By Acute toxic class method Swiss albino mice of female sex weigh in g 20-25gms were used for the study. Acute toxic class method is a stepwise procedure with use of three animals of a single sex per step. Depending on mortality or morbidity status of the animals. Average 2-4 steps may be necessary to allow judgment on the acute toxicity of the substance. Three animals were used for each step. The animal were placed individually and observed for any sign of toxicity, morbidity or mortality during the first 24hrs, with special given attention during the first 4 hours and daily thereafter for a total of14 days.[6]

### *(v) Induction of diabetes*

All the rats were fasted overnight before the administration of Streptozotocin. Diabetes was induced in rats by intra peritoneal injection of streptozotocin dissolved in 0.1Msodium citrate buffer pH4.5 at the dose of 50mg/kg body weight. After the injection they had free access to food and water. The animals were allowed to drink 5% glucose solution overnight to overcome hypoglycaemic shock. The development of diabetes was confirmed after 48hrs of Streptozotocin injection. The animals having fasting blood glucose level more than200mg/dl were considered as diabetic ratsand used for the experimentation.[7] Diabetic animals were grouped five days after induction of diabetes Effect of butanol fraction of *Murraya exotica seeds* in streptozotocin induced diabetes in rats.

### *EXPERIMENTAL DESIGN*

In the experiment rats were divided intothe following groups with six animals each

***Group I*:** Normal control received 1% w/vgum acacia 1ml/kg for 15 days orally.

***Group II*:** Diabetic control received 1% w/v gum acacia 1ml/kg for 15 days orally.

***Group III*:** Diabetic rats received seed butanol fraction of *Murraya exotica* 100mg/kg body weight once a day orally for 15 days.

***Group IV*:** Diabetic rats treated with Glibenclamide 0.5mg/kg orally once a day for15 days. Rats were fasted overnight and the blood was withdrawn from the orbital sinus of the eye on the 5th day, 15th day and 20th day post induction to determine blood glucose by GOD-POD kit method. The change bodyweight was observed throughout treatment period in experimental animals.

### *STASTISTICAL ANALYSIS*

All values were expressed as Mean ±S.D. The differences between control and treatment groups were tested for significance using ANOVA followed by Dunnet's t test. P<0.001 were considered significant.

## RESULTS

In acute toxicity study the methanolic extract of *Murraya exotica* did not produce lethality up to the dose level of 2000mg/kg.

**Table 1: *Effect of* seed butanol fraction of *Murraya exotica* on *body weight in Streptozotocin induced diabetic rates.***

| Groups | Body weight in gms(Mean±SEM) | | |
|---|---|---|---|
| | Post induction day | | |
| | 5$^{th}$ day | 15$^{th}$ day | 20$^{th}$ day |
| Control | 121.2±3.25 | 133±0.14 | 142±0.11 |
| Diabetic control | 165.2±0.31 | 121.8/±0.10* | 104.3±0.31* |
| Diabetic rats+ Control | 151.1±0.11 | 161.3±0.144* | 171.1±0.41* |
| Diabetic rats+ glibenclamide | 141.51±0.14 | 161.1±0.61* | 175.5±0.36 |

*Values are expressed as Mean ± S.E. n=6.*

*P*<0.001 Experimental groups were compared with diabetic control.*

*P*<0.001 Diabetic groups were compared with control group.*

In the antidiabetic activity, the effects of butanol fraction of *Murraya exotica* on body weight is measured on 5$^{th}$, 15$^{th}$ and 20$^{th}$ day of post induction and were compared with normal andiabetic control groups. The values are

shown in Table No-1. Streptozotocin induced diabetic rats showed a significant decrease (P<0.001) in body weight compared to normal rats. Ora administration of leaf extract at the dose of 100mg/kg showed a significant) increase (P<0.001) in body weight on 15th and 20th day of post induction when compared to untreated diabetic rats.

**Table 2:** ***Effect of Murraya exotica seed butaol fraction on blood sugar level in streptozotocin induced diabetic rats.***

| **Groups** | **Body weight in gms(Mean±SEM)** | | |
|---|---|---|---|
| | Post induction day | | |
| ***Dose 100mg*** | 5th day | 15th day | 20th day |
| Control | 82.1±024 | 81.12±0.10 | 79.04±0.17 |
| Diabetic control | 291.02±0.27 | 270.2±0.31* | 258.4±0.20* |
| Diabetic rats+ Control | 251.10±0.04 | 121.4±0.91* | 69.01±0.20* |
| Diabetic rats+ glibenclamide | 203.10±0.51 | 117.06±0.02* | 68.06±0.21* |

*Values are expressed as Mean ± S.E. n=6.*
*P*<0.001 Experimental groups were compared with diabetic control.*
*P*<0.001 Diabetic groups were compared with control.*

The effect butanol fraction of *Murraya exotica* on fasting blood glucose level is measured on 5th, 15th and 20th day of post induction and compared with normal and diabetic control groups. The values are shown in table No-2. Streptozotocin induced rats showed a significant increase (P<0.001) in fasting blood glucose level compared to normal rats. Oral administration of leaf extract at the dose of 100mg/kg body weight showed a significant decrease (P<0.001) in blood glucose level in 10 and 15 days of treatment. The fasting blood glucose level on 15th day of post induction (10 days of treatment) was 135.4±13.99 mg/dl compared to fasting blood glucose of diabetic control animal 270.2±0.31mg/dl. The group treated with Glibenclamide 0.5 mg/kg showed fasting blood glucose level of 117.06±0.02* mg/dl. On 20th day of post induction (15days of treatment), the seed butanol fraction treated group showed a fasting blood glucose level of 69.01±0.20 mg/dl, compared to untreated diabetic animal which showed a fasting blood glucose level of 258.4±0.20mg/dl. The group treated with Glibenclamide 0.5 mg/kg orally showed fasting blood glucose level of 68.06±0.21mg/dl.

## DISCUSSION

In the present study the hypoglycemicnactivity of butanol fraction methanolic extract of *Murraya exotica* seeds was evaluated in Streptozotocin induced diabetic rats. The continuous treatment 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 from beta cells of islets of langerhans. From the study, it is suggested that the posible mechanism by which the plant extract decreases the blood glucose level may be by potentiating of insulin effect either by increase in pancreatic secretion of insulin from beta cells of islets of langerhans or by increase in peripheral glucose uptake.

## CONCLUSION

The butanol fraction of methanolic extract of *Murraya exotica* seeds exhibited significant hypoglycemic activity in streptozotocin induced diabetic rats. Further pharmacological and biochemical investigations are underway to find out the active constituents responsible for antidiabetic activity and to elucidate its mechanism of action.

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