IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
May 2023 Vol.:27, Issue:2

Hypoglycemic Activity on *Putranjiva roxburghii* Bark. in Alloxan Induced Diabetic Rats

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Deependra Singh[1*], Ram Milan Vishwakarma[2], Jeetendra Kushwaha[2], Neelesh Anuragi[2]

[1]Associate Professor, [2]Associate Professor, [2]Assistant Professor, [2]Assistant Professor
Shri Krishna University Chhatarpur M.P. India.

Submitted: 20 April 2023
Accepted: 26 April 2023
Published: 30 May 2023

HUMAN JOURNALS
www.ijppr.humanjournals.com

Keywords: Alloxan, Diabetes mellitus, *Putranjiva roxburghii.*

ABSTRACT

Diabetes mellitus is the most common endocrine disorder that impairs glucose homeostasis resulting in severe diabetic angiopathy retinopathy, neuropathy, nephropathy, and causing neurological disorders due to anxiety in utilization of glucose. I present diabetes study was induced in albino rat models with the alloxan monohydrate. *Putranjiva roxburghii* bark has been claimed to possess antidiabetic properties by some investigators. The present study was undertaken to screen the hypoglycemic activity of ethanol extracts of leaves of *Putranjiva roxburghii*. The results showed that it has significant anti-hyperglycemic effect in experimental model of diabetes mellitus.

INTRODUCTION:

Diabetes is a major degenerative disease it affected tissue, cell and organs, now a day in the world today, affecting at least 17 million people having complications which include hypertension, atherosclerosis and microcirculatory disorders. Diabetes mellitus is also long-term complications, including angiopathy nephropathy, neuropathy, retinopathy and several others. India has today become the diabetic capital of the world with over 20 million diabetics and this number is set to increase to 57 million by 2024. Diabetes mellitus (DM) is defined as metabolic disease which is characterized by hyperglycemia, lipoprotein abnormalities, raised basal metabolic rate, defect in reactive oxygen species (ROS) scavenging enzymes and high oxidative stress induced damage to pancreatic beta cells. Diabetes mellitus is ranked seventh among the leading causes of death and is considered third when its fatal complications are taken into account.

Plants are well known in traditional herbal medicine and ayurvedic medicine for their hypoglycemic activities and available literature indicate that there are more than 1000 plant species showing hypoglycaemic activity. There has been increasing demand for the use of plant products with antidiabetic activity due to low cost, easy availability and less side effects. These, plant materials are continuously and carefully and explored for their effect as hypoglycemic agents. The plant is *Putranjiva roxburghii* which has been used in traditional system of medicine and ayurvedic system of medicin and chinese system of medicine for treating azoospermia, diuretic, catrrah, opthalmopathy and constipation. In addition, this plant is considered to, analgesic activity, anti-inflammatory activity and antipyretic activity. The present research programme was aimed to investigate antidiabetic activities of leaf extract of *Putranjiva roxburghii in* alloxan induced diabetic rats.

MATERIALS AND METHODS:

Plant material: The leaves of *Putranjiva roxburghii* plant was collected in the month of September from Kanpur (U.P.) and authenticated by Dr. Tariq hussain is a scientist in National Botanical Research Institute (NBRI), Lucknow (U.P.), with ref. no., NBRI/CIF/112/2009. The leaves were dried in shade at room temperature. The dried leaves were powdered by using grinder to coarse powder, packed into Soxhlet column and the extracted 70% ethanol for 48 hrs. The excess solvent was removed using with rotatory flash evaporator. The obtained crude extract was stored in airtight container in refrigerator below 100C for further studies.

Experimental Animals:

Male albino rats of (170-220 g) were used throughout the experiments. The animals were procured from Daksh institute of pharmaceutical science chhatarpur (M.P.) Before initiation of experiment, the rats were acclimatized for a period of 7-8 days. Standard environmental conditions such as temperature ($25+21^0$C), relative humidity (42-50%) and 12hrs dark/light cycle were maintained in the quarantine. All the animals were feed with rodent special diet and water was allowed *ad libitum* under hygienic conditions. On the basis of Ethical clearance for performing the experiments on animals was obtained from Institutional Animal Ethics Committee (IAEC).

Evaluation of anti-diabetic activity: The animals were allowed to fast for 12 h prior to the induction of diabetes. For Diabetes induced by single dose of intraperitoneal injection of freshly prepared alloxan monohydrate, 150 mg/kg (Sigma-Aldrich, Bangalore) in normal saline. After 1 h of alloxan administration, the animals were fed water *ad libitum* and standard pellets. The animals were stabilized in the diabetic state over a period of 21 days; the blood glucose level was estimated (by GOD-POD method) and rats with blood glucose level of 250 mg/dL or higher were considered to be diabetic and selected for the experiment. There was no mortality rate of the animals. Diabetic animals were randomly assigned to groups. The experimental rats were divided into five groups (n=5). Group I animals served as normal control. Group II served as diabetic control. Group III animals of diabetic rats were received the reference standard drug glibenclamide (5 mg/kg, i.p.) at a single dose per day (for 21 days), as positive control and groups of IV and V received the ethanolic extracts of leaves of *Putranjiva roxburghii* at the doses of 200 and 400 mg/kg, respectively.

- Group A - Served as normal control and did not receive any treatment.
- Group B - Served as diabetic control and received alloxan monohydrate and vehicle (0.2 ml of 2% aqueous gum acacia).
- Group C - Alloxan monohydrate + Glibenclamide (10 mg/kg, p.o.) and served as Standard.
- Group D - Alloxan monohydrate + Ethanolic extract (200 mg/kg, p.o.)
- Group E - Alloxan monohydrate + Ethanolic extract (400 mg/kg, p.o.)

RESULTS:

Anti-diabetic study: Effect of *Putranjiva roxburghii* Wall. leaf extract on fasting blood glucose level in diabetic rats. Ethanolic extract of *Putranjiva roxburghii* leaves was subjected to anti-diabetic activity in rats where alloxan monohydrate (120 mg/kg b.w., i.p.) used as the diabetogenic agent. A marked rise in fasting blood glucose level observed in diabetic control compare to normal control rats.

Ethanolic extract of *Putranjiva roxburghii* (at 250 and 500 mg/kg) exhibited a dose dependent significant anti-hyperglycemic activity on 4th, 7th and 10th day post treatment. The extract dose of 100 mg/kg also caused reduction in blood glucose level but the results were found statistically insignificant. The antihyperglycemic effect of ethanol extract at was found less effective than the reference standard, Glibenclamide. Glibenclamide produced a significant reduction in blood glucose compare to diabetic control. The results are shown in the **Table 1**.

TABLE NO. 1: EFFECT OF *PUTRANJIVA ROXBURGHII* LEAF EXTRACT ON FASTING BLOOD GLUCOSE LEVEL IN ALLOXAN INDUCED DIABETIC RATS

Group	Treatment	Fasting blood glucose level (mg/dl)			
		Basal value	7th day	14th day	21th day
A	Normal control	90.46 ± 3.80	92.82±2.92	92.32±1.73	88.29±3.44
B	Diabetic control (Vehicle)	293.8±5.27	286.91±5.05	291.8±5.41	289.41±9.75
C	Alloxan + glibenclamide (5mg/kg)	285.86±6.92	205.25±7.06***	183.18±6.35***	178.13±6.20***
D	Alloxan + Ethanolic extract (200 mg/kg)	291.76±4.79	277.76±5.65	266.23±8.19	255.42±7.71
E	Alloxan + Ethanolic extract (400 mg/kg)	284.48±5.32	258.23±6.66*	255.85±9.97**	252.06±9.19**

Values are mean ± S.E.M.; n = 6, *P < 0.05, **P<0.05, **P <0.01 and ***P< 0.01 vs Diabetic control; Animal: Albino Rats, Alloxan: 120 mg/kg, i.p.

DISCUSSION:

The present study investigates the anti-diabetic and hypolipidemic effect of bark of on alloxan-monohydrate induced diabetic rats. Insulin is a naturally occurring hormone in the blood which helps sugar to move through the bloodstream into the cells. When glucose cannot enter our cells, it builds up in the blood (hyperglycemia) which damages organs like eyes, kidneys, blood vessels and nerves. This is caused by deficiency, inherited and/or acquired, in production of insulin by the pancreas (type I), or by resistance to the insulin produced (type II). The basic mechanism underlying hyperglycemia in diabetes mellitus involves over-production (excessive hepatic glycogenolysis and gluconeogenesis) and decreased consumption of glucose by the tissues (Halberstam *et al.*, 1996).

CONCLUSION: This study, we can state that the Ethanolic extract of *Putranjiva roxburghii* Very beneficial effects on blood glucose levels. Again biochemical and pharmacological evaluation will clearly elucidate the mechanism of action and will be helpful in projecting this plant as a therapeutic target in diabetes research.

REFERENCES:

1. Ogbonnia SO, Odimegwu JI, Enwuru VN : Evaluation of hypoglycemic and hypolipidemic effects of ethanolic extracts of *Treculia africana* Decne and *Bryophyllum pinnatum* and their mixture on streptozotocin (STZ) - induced diabetic rats, *African Journal of Biotechnology*, 2008; 79(15): 2535-2539.
2. Edem DO: Hypoglycemic Effects of Ethanolic Extracts of *Alligator Pear* Seed (Persea Americana Mill) in Rats, *European Journal of Scientific Research*, 2009; 33(4): 669-678.
3. Kristova V, Liskoya S, Sotnikova S,Vojtko R, KurtanskyA : Sulodexide improves Endothelial Dysfunction in Streptozotocin- Induced Diabetes in Rats, *Res.*, 2008; 5: 491-494.
4. Sridhar GR: Diabetes in India: Snapshot of a panorama, *Current Sci.*, 2000; 83: 791.
5. Ugochukwu NH, Babady NE, Cobourne M, Gasset SR: The effect of *Gangronema latifolium* extracts on serum lipid profile and oxidative stress in hepatocytes of diabetic rats, *Journal of Biosciences*, 2003; 28(1): 1-5.
6. Scoppola A, Montecchi FR, Mezinger G, Lala A: Urinary mevalonate excretion rate in type 2 diabetes: role of metabolic control, Atherosclerosis, 2001; 156: 357-361.
7. Owu DU, Antai AB, Udofia KH, Obembe AO, Obasi KO, Eteng MU, Vitamin C improves basal metabolic rate and lipid profile in alloxan-induced diabetes mellitus in rats, *Biosciences*, 2006; 31(5): 575-579.
8. Kesavulu MM, Giri R, Kameswara RB, Apparao C: Lipid peroxidation and antioxidant enzyme levels in type 2 diabetic with microvascular complications, *Diabetic Metabol*, 2000; 26: 387 - 392.
9. Nayeemunnisa A: Alloxan diabetes-induced oxidative stress and impairment of oxidative defense system in rat brain: neuroprotective effects of *cichorium intybus*, *Int J Diabetes & Metabolism*, 2009; 17: 105-109.
10. Trivedi NA, Majumder B, Bhatt JD, Hemavathi KG: Effect of *Shilajit* on blood glucose and lipid profile in alloxan– induced diabetic rats, *Indian J Pharmacol*, 2004; 36: 373-76.
11. Rajagopal K, Sasikala K: Antihyperglycaemic and antihyperlipidaemic effects of *Nymphaea stellata* in alloxan-induced diabetic rats, *Singapore Med J*, 2008; 49: 137-141.
12. Sahni KC: The book of Indian tree, *Himalays Publishing House*, Second edition, 2009; 285-289.
13. Wantana R, Tassanee N, Sanan S: Antipyretic, anti-inflammatory and analgesic activity of *Putranjiva roxburghii* leaves, *Net Med (Tokyo)*, 2009; 63(3): 290-296.

14. Lenzen S: The mechanisms of alloxan and streptozotocin induced diabetes, *Diabetologica* 2008; 51: 216-226.
15. Lenzen S and Panten U: Alloxan: History and mechanisms of action, *Deabetologica*, 1998; 31: 337-342.
16. Prince SM and Menon VP: Hypoglycemic and other related actions of *Tinospora cardifolia* roots in alloxan induced diabetic rats, *Ethnopharmacol*., 2000; 70: 9-15.
17. Jelodar G, Mohsen M, Shahram S: Effect of walnut leaf, coriander and pomegranate on blood glucose and histopathology of pancreas of alloxan – induced diabetic rats, *African J. Traditional*, Complementary and Alternative Medicines, 2003; 3: 299 -305.
18. Grover JK, Vats V, Rathi SS: Antihyperglycemic effect of *Eugenia jambolana* and *Tinospora cordifolia* in experimental diabetes and their effects on key metabolic enzymes involved in carbohydrate metabolism., *J Ethnopharmacol* , 2000; 73: 461-470.
19. Shanmuga sundaram KR, Panneerselvam SP, Shanmugasundaram ERB: Enzyme changes and glucose utilization in diabetic rabbit,: The effect of *Gymnema sylvestrae*, *Br. J. Ethnopharmacol*, 1983; 7: 205-216..
20. Begum N and Shanmugasudnaram KR: Tissue phosphates in experimental diabetes, *Arogya: J. Health Sci*., 1978; 4: 29-139.