Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

Anti-diabetic properties in root extracts derived from Murraya peniculata.

Dr Manoj Kumar*

Assistant Professor, Department of Pharmacology, Rajshree Medical Research Institute, Bareilly

***Corresponding author-**

Dr Manoj Kumar*

Assistant Professor, Department of Pharmacology,

Rajshree Medical Research Institute, Bareilly

Mail:drmanojkumar.lhmc@gmail.com

Mobile:9953941945

(Received: 12 November 2022 Revised: 3 December Accepted: 07 January 2023)

KEYWORDS

root extracts, Murraya peniculata, and antidiabetic characteristics

ABSTRACT:

The *Murraya paniculata* (L.) plant, Rutaceae family, is most commonly found in the South Asia and Australia. It has been confirmed from various literature survey that plant have varoius therapeutic potential including analgesic, antioxidant, anti-diabetic, antibacterial, and antinociceptive properties, among others. Numerous chemicals, such as alkaloids, glycosides like flavonoids phenols, terpenoids, and coumarins,, have been extracted from various plant parts and analyzed for their potential to perform a wide range of biological functions. pancreata, with the intention of investigating the potential anti-diabetic effects of the active components that were extracted from this plant. This not only provides a deeper understanding but also encourages research that may lead to the development of alternative pharmaceuticals that are manufactured from the plant that are both more cost-effective and more highly effective.

Introduction

The name Murraya refers to a variety of plants with flower that is closely linked to citrus. From a strictly botanical standpoint, the distant citroid fruit trees are classified as members of the Clauseninae subtribe. As an ornamental tree or hedge, Murraya paniculata (L.) (Orange Jessamine), is a tropical coniferous plant that bears tiny, fragrant blooms that are white in color. In addition to being a member of the Rutaceae family, it is frequently discovered in Australia and South Asia together. There are respective parts of this plant that have been utilized in conventional medical practices. Orally administered M. paniculata leaf extract is used in Bangladesh for the purpose of alleviating discomfort [1]. The Philippines have traditionally used leaves as a treatment for dysentery and diarrhoea [2]. This is due to the fact that the leaves possess both stimulant and astringent characteristics. In India, the root bark of the M. paniculata plant was sometimes used as a treatment for coughing, hysteria, and rheumatism [3]. Additionally, India uses boiled twigs and cooked leaves to treat stomachaches and swollen joints, respectively [4]. They

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

are both considered to be effective remedies. There have been a great number of research findings that have been published concerning the pharmacological qualities of the plant. These properties include anti-inflammatory [1, 5], antioxidant [6, 7], and anti-diabetic [4], as well as antibacterial [4] and analgesic activity [8]. There are a number of beneficial components that have been separated from the different parts of M. alkaloids by a number of different research teams. These components include alkaloids [9], phenols [4], terpenoids [10], and flavonoids [4,11–13].

Methodology

M paniculata used as a form of medicinal treatment. In light of M, we provide a list of the analgesic, antinociceptive, antioxidant, anti-diabetic, and antibacterial actions that paniculata has. The attempt and the error Contains of Plants Putting together an extract Following the defatting of 500 grammes of powdered plant material in petroleum ether at temperatures ranging from 60 to 80 degrees Celsius, 1.5 litres of ethanol with a concentration of 95% was extracted using a soxhlet device. It was found that when the solvent was withdrawn with less pressure, a sticky residue with a greenish-black tint was left behind (the yield was 11.6% weight-to-weight in comparison to the dried plant material). In order to retain the dried extract until further analysis could be conducted, it was placed in a desiccator. Useful

Animals in Work Regardless of gender, albino wistar rats weighing between 190 and 250 grammes are the ones that are being used. Acrylic cages with temperature settings ranging from 25 to 30 degrees Celsius were utilized to hold the animals that were chosen for the experiment. The pellets that they consumed were dry and regular, and they were provided with water that flowed freely. Every experiment was carried out in conformity with the direction constituted by the Institutional Animal Ethical Committee. pharmaceuticals and other substances that are put to use Merck Ltd., Mumbai, India; haemoglobin (Loba Chemie, Mumbai, India); nitro blue tetrazolium chloride (NBT); were the materials that were utilized in this study. In addition to being of an analytical caliber, each solvent was acquired from a local vendor.

Detection and evaluation of anti-diabetic activity

The strategy that Joy and Kuttan (6) proposed was utilized by us. For a period of twenty-four hours, the animals were permitted to abstain from food and consumption of water. They were then administered an intraperitoneal injection of 150 miligram/kilogram of alloxan monohydrate in normal saline. This was done after the previous step. After an hour, the animals were allowed to eat whatever they wanted. Examining the levels of glucose in the blood was done both before and 72 hours after the administration of alloxan. There was a significant rise in the prevalence of diabetes in animals whose blood glucose levels reached more than 300 mg/dl. After seventy-two hours had passed after the administration of the alloxan, this was seen.

Implications for the oral glucose tolerance of rats

Under a light ether anesthesia for a duration of 0 minutes, a sample of blood was confiscated from the tip of the tail of each of the rats in each of the three groups after they had fasted for the previous night. In order to provide a glucose solution at a rate of 2 grammes per kilogramme, an instantaneous gavage was utilized. The glucose was given thirty minutes, sixty minutes, ninety minutes, and one hundred and twenty minutes after the initial sample was taken (7). A total of four more samples were collected. For the goal of determining the glucose level in the blood, each blood sample was taken. The haemoglucostrips that were provided by M/s Lifescan, Inc. were utilized in order to estimate the levels of glucose in the blood, as stated by the Johnson & Johnson ONE TOUCH blood glucose monitor model that was used in the United States of America.

Testing using a single dose of the chemical for the investigation

After being separated into five groups, each of which had six rats, these rats were then examined. Rats from the normal rats were given only distilled water and the extract (300 miligram/kilogram, orally administered) in order to choose the rats for Group I and Group II. These rats were chosen by a random selection process. After rats that had been exposed to alloxan were separated from animals belonging to Group III through Group V, the rats were

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

then separated. The animals that were a part of Group III served as the controls for diabetes. During the process of administering the extract, the animals belonging to Group V were given 300 milligrams per kilogramme, while the animals belonging to Group IV were given 600 micrograms per kilogramme of glibenclamide. Under the effect of light ether anesthesia, sample of blood were acquired from the tip of each rat's tail at 0, 1, 2, and 4 hours following the introduction of the test samples. This was done after the test samples had been injected into the rats. Following that, the glucose concentration of the blood samples was analyzed, just as it had been described from the very beginning of the process.

Performing simultaneous examinations of multiple dosages

During the course of the multidose experiment, test samples were administered orally for a period of ten days. Following the administration of the drug, blood instance were congregated from the tip of the tail on the first, third, seventh, and tenth day after the medication was administered. The glucose level in the blood was measured using the procedure that was described earlier. On the tenth day of the experiment, as well as before the study began, the weights of all of the animals were measured to determine whether or not there had been any changes in their overall body weight.

Analysis based on statistics

When the analysis of variance (ANOVA) in one direction was finished, Dunnet's t-test was used to ascertain whether or not the outcome were statistically significant.

Results and the Conversation

The blood glucose concentration of the individual is displayed in Table 1. animal subjects, both normal and experimental, after being given two grams of glucose through oral administration. After one hour, the peak blood glucose levels of mice that had been treated with both the extract and a conventional treatment showed a further and more noticeable decline. The extract was administered to the animals, and after two hours, the animals exhibited a tendency to recover their levels to virtually normal levels. In the trial with a single dosage, the extract importantly reduced the amount of glucose in the blood at the dose level that was evaluated in rats that had been induced with hyperglycemia by alloxan. This was in comparison to the rats that served as controls. According to Table 2, the results are equivalent to those obtained with the conventional medication glibenclamide. The antihyperglycemic capabilities of the test extract were proved by the fact that the level of glucose in blood of the diabetic rats consistently decreased significantly over the course of the trial (Table 3). As a result of the inability of the body to make use of glucose as a source of energy, individuals who have diabetes mellitus have a greater need for protein but store less of it. This, in turn, leads to a gradual increase in protein consumption and a decrease in body weight (14). According to the findings of the current research, the ethanolic extract did not cause the diabetic rats to lose weight; rather, it caused their weight to rebound to levels that were practically normal. Individuals who have diabetes are more likely to have glycosylated haemoglobin as a consequence of the interaction between hemoglobin and excessive glucose. There is a substantial correlation between the pace of glycosylation and the quantity of glucose in the blood (15), which indicates that the amount of glycosylated haemoglobin increases as glycemic management becomes more effective. On account of this, the analysis of the glycosylation of hemoglobin is a trustworthy indicator that helps in the diagnosis and management of the sickness (16).

The results of our investigation unequivocally demonstrated that the ethanolic extract effectively prevented a substantial increase in glycosylated haemoglobin in vitro. This was demonstrated by the IC50 value of 11.25 μg/ml, which falls within the same range as the IC50 value of the reference medication, α-tocopherol, as presented in Table 4. In addition, the glycosylation of haemoglobin that does not include enzymes is that of an oxidative process (17). After an oral dose of 300 miligram/kilogram of Murraya peniculata root ethanolic extract (p.o.), the results of the Implications for the oral glucose tolerance of rats with normal and diabetic rats induced by alloxan are presented in Table 1. There is a comparison made between Set I to III, as well as between Set IV and Set V and Set III for comparison. A single dose of an ethanolic extract of Murraya

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

peniculata root, 300 miligram/kilogram orally, was administered to rats that had been treated with alloxan-induced diabetes as well as normal rats. The effectiveness of this treatment is demonstrated in Table 2. Compare Set I with Set II and III, and compare Set III with Set IV and V. Set I is contrasted with Set II and III. After 15 days of repeated dosage therapy, the results of an ethanolic extract of Murraya peniculata root (300 mg/kg, orally, once daily) are presented in Table 3. This extract had an effect on the body weight and level of sugar in Blood of both normal rats and diabetic rats induced by alloxan. Group I is compared with set II and III, while set III is compared with set IV and V. The comparisons are made with regard to diabetes control, with a particular emphasis on Alloxan. The effect of an ethanolic extract from Murraya peniculata on the percentage of haemoglobin glycosylation that was inhibited in vitro is presented in Table 4.

Table 1. Effect of ethanolic extract of Murraya peniculata root (300 miligram/kilogram, p.o.) on Implications for the oral glucose tolerance of rats in normal and diabetic rats induced by alloxan.

S. N.	Groups	Treatment	Groups Treatment level of sugar in Blood (mg/dl)				
			Fasting	0.5 Hr	1.0 Hr	1.5 Hr	2.0 Hr
1	I	Normal	77.00 ±0.66	136.72 ±1.25	167.94 ± 1.37	134.28 ±1.65	91.07±1.73
2	II	Normal + Extract	74.93±1.51	153.42±1.24	161.46±0.53	131.37±1.47	71.39±1.35
3	III	Diabetic control (Alloxan only)	230.16±2.1 *	316.14±1.07 *	351.31±2.21 *	325.14±1.49*	331.23±1.16 *
4	IV	Diabetic + Exrtact	74.28±1.68 *	136.74±1.72 *	167.16±1.32 *	131.29±1.38*	96.31±1.32*
5	V	Diabetic + Glibenclamide	72.31±1.24 *	143.31±1.21 *	161.15±1.31 *	147.61±1.26*	98.61±1.46*

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

Reading are Average ± SEM for n=6; *P < 0.05 = evidential;

Table 2. Outcome of single dose treatment of ethanolic extract of *Murraya peniculata* root (300 miligram/kilogram, p.o.) on Level of glucose in Blood in normal and diabetic rats induced by alloxan.

Set II and III are compared with Set I while Set IV and V are compared with Set III.

S. N.	Sets	Care	Level of glucose in Blood (mg/dl)			
			Initial reading	1 h	2 h	4h
1	I	Normal	75.28 ±0.17	75.22±0.41	75.63±0.42	76.35±0.31
2	II	Normal + Extract	76.19±0.86	75.81±0.69	75.14±0.64	74.39±0.74
3	III	Diabetic control (Alloxan only)	346.27±1.61*	351.13±1.42*	346.62±1.51*	352.15±1.46*
4	IV	Diabetic + Glibenclamide	342.14±3.42	324.31±2.11*	293.60±1.61*	281.61±1.31*
5	V	Diabetic + Extract	335.28±1.35	267.21±1.30*	262.61±1.24*	246.31±1.43*

Table 3. Outcome of multiple dose treatment of ethanolic extract of Murraya peniculata root (0.3gram/kg, p.o., once daily) on Level of glucose in Blood and change in body weight after 15 days in normal and diabetic rats induced by alloxan.

S. N.	Set	Care	Level of glucose in Blood (mg/dl)				
			Initial reading	Day 1	Day 3	Day 7	Day 10
1	I	Normal	76.14 ±0.27	76.24±0.46	75.21±0.31	76.21±0.32	76.15±0.21
2	II	Normal + Extract	76.16±0.31	75.21±0.52	75.20±0.34	74.16±0.26	73.13±0.52*
3	III	Diabetic control (Alloxan only)	347.46±1.62*	354.63±1.43*	353.86±1.46*	351.26±1.43*	350.14±1.31*
4	IV	Diabetic + Glibenclamide	341.15±3.13	261.34±4.09*	235.82±3.56*	218.32±4.17*	207.31±3.55*
5	V	Diabetic + Exrtact	337.56±1.25	226.45±1.36*	205.14±1.64*	201.10±1.36*	185.27±1.57*

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

Reading are Average ± SEM for n=6; *P < 0.05 = evidentiary; NS = Not evidentiary;

Table 4. Outcome of ethanolic extract of Murraya peniculata on percent suppression of hemoglobin glycosylation in vitro.

S. N.	Sets	Care	Level of glucose in Blood (mg/dl)			
			Initial reading	1 h	2 h	4h
1	I	Normal	76.15 ±0.52	76.18±0.43	75.61±0.72	76.18±0.47
2	II	Normal + Extract	76.13±0.63	75.61±0.52	75.17±0.53	73.15±0.52
3	III	Diabetic control (Alloxan only)	347.34±1.74*	350.15±1.26 *	346.61±1.47 *	351.16±1.36 *
4	IV	Diabetic + Glibenclamide	341.14±1.36	316.32±1.12 *	294.61±1.53 *	282.63±1.31 *
5	V	Diabetic + Exrtact	335.22±1.34	284.33±2.75 *	263.41±1.14 *	244.61±1.42 *

Reading are Average ± S.D. for n=3; r = regression co-efficient.

Conclusion and Discussion

An investigation of the anti-diabetic properties of Murraya paniculata root extracts is presented in this paper. According to the findings, its effectiveness against diabetes caused by alloxane is only considered to be moderate. Diabetes mellitus is a hard medical condition, and human physiology is extremely complex when it comes to its complexity. This literature-based study was conducted with the intention of discovering new therapies and the potential of medicinal plants in order to devise a novel approach to the utilization of pharmaceuticals that were previously available.

References

[1] Nguyen CH, Beattie GAC, Haigh AM, Astuti IP, Mabberley DJ, Weston PH, Holford P. Molecular differentiation of the Murraya paniculata Complex (Rutaceae: Aurantioideae: Aurantieae). BMC Evol Biol. 2019;19(1):236.

[2] Cifuentes-Arenas JC, Beattie GAC, Peña L, Lopes SA. Murraya paniculata and Swinglea glutinosa as Short-Term Transient Hosts of 'Candidatus Liberibacter asiaticus' and Implications for the Spread of Huanglongbing. Phytopathology. 2019;109(12):2064-2073.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2023) 13(1), 228-234 | ISSN:2251-6727

[3] Liu H, Zhao Y, Zhou J, Ma Q, Wang X, Hua Z. Complete chloroplast genome sequence of Murraya paniculata (Rutaceae): a widely used folk medicinal herb.Mitochondrial DNA B Resour. 2020 Nov 11;5(3):3696-3697.

[4] Gautam MK, Gupta A, Vijay Kumar M, et al. Studies on the hypoglycemic effects of Murrayapaniculata Linn. Extracton alloxan-induced oxidative stress in diabetic and non-diabetic models. APJTM 2012;2:186-191.

[5] Narkhede MB, Aimire PV, Wagh AE (2012) Evaluation of antinociceptive and anti-inflammatory activities of ethanol extract of Murraya paniculata leaves in experimental rodents. IJPPS 2012;4: 247-251.

[6] Rohman A, Sugeng R (2005) Antioxidant potency of ethanolic extract of Kemuning leaves (Murraya paniculata (L) Jack) in vitro. Majalah Farmasi Indonesia 2015;16:136-140.

[7] Zhang JY, Li N, Che YY, Zhang Y, Liang SX, et al. Characterization of seventy polymethoxylated flavonoids (PMFs) in the leaves of Murraya paniculata by on-line high-performance liquid chromatography coupled to photodiode array detection and electrospray tandem mass spectrometry. J Pharm Biomed Anal 2011;56: 950-961.

[8] Podder MK, Das BN, Saha A, Ahmed M. Analgesic activity of bark of Murraya paniculata. IJMMS 2011; 3: 105-108.

[9] Proenca Barros FA, Rodrigues-Filho E. Four spiroquinazoline alkaloids from Eupenicillium sp. isolated as an endophytic fungus from leaves of Murraya paniculata (Rutaceae). Biochemical Systematics and Ecology 2005;33: 257-268.

[10] Li Q, Zhu LF, But PPH, Kong YC, Chang HT, Waterman P. Monoterpene and sesquiterpene rich oils from the leaves of Murraya species: chemotaxonomic signi?cancer. Biochemical Systematics and Ecology 1998;16: 491–494.

[11] Ito C, Furukawa H, Ishii H, Ishikawa T, Haginiwa J. The chemical composition of Murraya paniculata. The structure of five new coumarins and one new alkaloid and the stereochemistry of murrangatin and related coumarins. J Chem Soc Perkin Trans 1990;1: 2047-2055.

[12] Kinoshita T, Firman K. Myricetin 5,7,3',4',5'-pentamethyl ether and other methylated flavonoids from Murraya paniculata. Phytochemistry 1997;45: 179-181.

[13] Ferracin RJ, da Silva MGF, Fernandes JB, Vieira PC (1998) Flavonoids from the fruits of Murraya paniculata. Phyrochemistroy 1998;47: 393-396.

[14] Kong YC, Ng KH, Wat CKH, Wong A, Saxena LF, et al. Yuehchukene - a novel anti-implantation indole alkaloid from Murraya paniculata. Planta Medica 1985;49: 304-307.

[15] Wu TS, Liou MJ, Jong TT, Chen YJ, Lai JS. Indole alkaloids and coumarins from the root bark of Murraya paniculata var. omphalocarpa. Phytochemistry1989;28: 2873-2874.

[16] Wu TS, Chan YY, Leu YL, Huang SC. A flavonoid and indole alkaloid from flowers of Murraya paniculata. Phytochemistry 1994;37:287 -288.

[17] Silva LB, Silva ULL, Mahendran M, Jennings RC. Flavonoids of Murraya paniculata (Linn.) Jack. Journal of the National Science Council of Sri Lanka 1980; 8:123-125.