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

Human Journals
Research Article
September 2022 Vol.:25, Issue:2

Evaluation of Anti-Diabetic Activity of *Oligomeris linifolia* (Seeds) Methanolic Extract on Rabbits

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Submitted: 25 August 2022
Accepted: 31 August 2022
Published: 30 September 2022

HUMAN JOURNALS
www.ijppr.humanjournals.com

Keywords: Anti-diabetic activity, methanolic extract, *Oligomeris linifolia*, rabbits.

ABSTRACT

Alternative treatments are widely used these days, and self-medication with herbal medications is one of the most prevalent. The quest for novel medications to treat anxiety disorders is now receiving a lot of attention. Medicinal plants have the potential to improve the treatment of such disorders. The Resedaceae family includes *Oligomeris linifolia*. After isolation, *O. linifolia* contains eleven compounds: one sterol, five flavonols, one nucleotide, two phenolic acids, and two free sugars. Keeping in view the importance of *Oligomeris linifolia*, the present study has been conducted to evaluate the anti-diabetic activity of *Oligomeris linifolia* (seeds) methanolic extract on rabbits. The present study was conducted on Swiss albino Rabbits of both sexes of different weights (1.5–2.5 kg). *Oligomeris linifolia* plant was collected from Kalat Division of Balochistan, Pakistan. The concerned plant was identified. The extraction of the plant was performed by soaking in (Ethanol/Methanol) from seven to fifteen days. The oral administration of the *Oligomeris linifolia* extract from 100 to 3000mg/kg orally via gastric gavages was used to test acute toxicity. Lorke's approach was employed in this research. Twenty (20) mice of both sexes were divided into five (A-E) groups, each with four mice. The extracted dosage of 100, 500, 1000, 2000, and 3000 mg/kg was given orally by gastric gavage to groups A, B, C, D, and E mice, respectively. The animals had unrestricted access to food and water. The animals were monitored for indicators of toxicity and death for 24 hours. Analgesic activity was determined by tail immersion method. Anti-diabetic activity was determined by Takeuchi method. Results shows that *Oligomeris linifolia* extracts at dose of 1000mg/kg, 2000mg/kg and 3000mg/kg oral administration produced the prominent toxicity in rabbits. While the dose of 100 mg/kg and 500mg/kg oral administration did not show toxicity in rabbits. Aqueous extract of *Oligomeris linifolia* showed significant analgesic and anti-diabetic activities. However, further research is needed to determine the specific mechanism in many animals, as well as toxicological tests to determine the plant's safety profile.

BACKGROUND

Herbal medicines have been utilized to promote, maintain, and achieve excellent human health for hundreds of years in practically every nation on the planet. For example, the Chinese system of traditional medicine operates as herbal remedies have been used effectively to prevent, detect, and cure a variety of ailments for over 2500 years (Sucher and Carles 2008). Herbal medicine has played an important role in sustaining human health and enhancing human life for a long time. According to the World Health Organization, 80 percent of the world's population uses herbal medicines to improve their health, and these herbal medicines are largely made up of plant extracts and their active ingredients (Moirangthem and Laitonjam 2010). Using innovative methodologies, some essential principles of their treatment systems are still unclear (Mulu *et al.* 2015). The anti-diabetic action of medicinal plants is based on their inherent natural qualities, which may be effective for the treatment of disease complications by restoring insulin secretion by pancreatic cells, lowering blood glucose levels, or blocking glucose absorption by intestinal cells (Bibi *et al.*, 2015). Polyphenols, flavonoids, terpenoids, carotenoids, and coumarins are the most important plant compounds. Many contemporary medications have been extracted from various plants and are extensively employed in the pharmaceutical business (Jayasri *et al.*, 2008; Shinwari *et al.*, 2006).

Phytomedicine has a long history of use in both traditional and modern medicine. Herbal medicine has shown to be beneficial, and over 80% of the people in the periphery rely on it for their health care requirements (Akinyemi *et al.* 2005). Pharmaceutical companies are presently devoting a large amount of time and resources to separating natural elements from herbal floras to supply the public with safe and cost-effective drugs. The first antimicrobial activity studies of herbal elements of phytomedicine floras were documented in the late 1800s. Currently, western medications are estimated to include half of the herbal ingredients (Doughari 2006). Herbal drugs are safer than pharmaceuticals, and the key advantages of adopting herbal floras include increased curative effectiveness and more intelligent therapy. Many substances with antibacterial properties may be found in herbal floras all over the globe. Herbal flora elements have been used to cure a variety of maladies, and these treatments are an integral part of any traditional medical system (Salwa *et al.* 2011).

It is essential to understand the chemical makeup of herbal extracts to identify biological elements that have a particular therapeutic effect on the human body. Flavonoids, tannins,

alkaloids, and phenolic compounds are only a few of the fundamental biological substances found in herbal flora. Furthermore, understanding the chemical makeup of therapeutic floras would be beneficial in revealing the true relevance of herbal-derived treatments (Mojab *et al.* 2003).

The Resedaceae family includes *Oligomeris linifolia*. The Resedaceae family is organised into three sections, with 52 classes and six genera. Oligomeris species are found mostly in Pakistan, India's Middle East, North Africa, North America, and Southern Europe. It may be found in salty soils, deserts, along the shore, and in plain locations (Khan *et al.,* 2019). The *Oligomeris linifolia* plant grows to be 7-35 cm tall, with upright to ascending, ribbed stems. Leaves are 1-4 cm long, glabrous to scab-free, and arranged in clusters with 1-2 minute basal lobes about 1 mm in length. It bears many bisexual blooms. Spikes are 2-25 cm long, with 1-1.5 mm long sepals that are connate at the base. Petals 2, free or joined more than halfway up. From January through April, it blooms in the wild (Abdullah, 1967). After isolation, phytochemical analysis indicated that *O. linifolia* is made up of eleven compounds: one sterol, five flavonols, one nucleotide, two phenolic acids, and two free sugars (El-Hagrassy *et al.,* 2017). Because of the flavonoid and phenolic concentration in plant extracts, they have antibacterial properties (Baba *et al.* 2015). Fungi produce a variety of fungal illnesses in humans. Different antifungal medications are available on the market; however these pharmaceutical preparations have a variety of negative effects (Bylka and Goslinska 2001). Bioactive substances identified in medicinal flora are used to treat a variety of oxidative stress-related diseases including as cancer, heart disease, inflammation, diabetes, and infections all over the globe (Duenas *et al.* 2006; Kumar *et al.* 2016). Keeping in view the importance of *Oligomeris linifolia*, the present study has been conducted to evaluate the anti-diabetic activity of *Oligomeris linifolia* (seeds) methanolic extract on rabbits.

MATERIAL AND METHODS

The present study was conducted on Swiss albino Rabbits of both sexes of different weights (1.5–2.5 kg). *Oligomeris linifolia* plant was collected from Kalat Division of Balochistan, Pakistan. The concerned plant was identified. The extraction of the plant was performed by soaking in (Ethanol/Methanol) from seven to fifteen days (Jabbar *et al.,* 2016).

Pharmacological Studies

Acute toxicity: The oral administration of the *Oligomeris linifolia* extract from 100 to 3000mg/kg orally via gastric gavages was used to test acute toxicity. Lorke's approach was employed in this research. Twenty (20) mice of both sexes were divided into five (A-E) groups, each with four mice. The extracted dosage of 100, 500, 1000, 2000, and 3000 mg/kg was given orally by gastric gavage to groups A, B, C, D, and E mice, respectively. The animals had unrestricted access to food and water. The animals were monitored for indicators of toxicity and death for 24 hours (Lorke, 1983).

Analgesic activity

Tail immersion method: In this investigation, rats were divided into five groups and given the vehicle, Diclofenac sodium 10 mg/kg, and the test sample (aqueous extracts of 100 mg/kg and 200 mg/kg, respectively). The distal 2-3cm of the mouse's tail was soaked in hot water at 55 0.5oC for 2-3 minutes. The response time was measured as the time it took the rat to remove its tail from the boiling water (Thirumal *et al*., 2013).

Anti-diabetic activity: Male and female rabbits weighing 2.5-3kg were fed the same meal (300g soya bean curd residue and 100g fresh vegetables) and fasted for 16-20 hours before to the studies. 1g/kg of glucose was injected into the left ear vein at 3-10 minutes following the administration of priscoline (2-Benzyl-2-imidazoline) in two dosages of 20mg/kg intravenously and 10mg/kg subcutaneously. The duration of the glucose infusion was set at 1 minute. Blood was drawn from the right ear vein before and after the injection at 5, 25, 45, 65, 85, 105, and 125 minutes, and blood sugar levels were determined using Hagedorn and Jensen's technique (Takeuchi *et al.*, 1961).

Statistical analysis: Collected data was utilized for statistical analysis using one way analysis of variance by Statistix version 8.1.

RESULTS

Acute toxicity of *Oligomeris linifolia* extract in rabbits

Results regarding acute toxicity of *Oligomeris linifolia* extract in rabbits are mentioned in Table 1. Data indicates that 100% mortality of rabbits was recorded at 2000mg/kg and 3000mg/kg oral administration of *Oligomeris linifolia* extracts, respectively. Mortality of rabbits were observed as 75% and 25% at 1000mg/kg and 500mg/kg oral administration of

Oligomeris linifolia extracts, respectively. Zero mortality was recorded at 100mg/kg oral administration of *Oligomeris linifolia* extracts. Statistical outcomes of the obtained data indicated significant ($p<0.05$) difference in mortality percentage between various doses of *Oligomeris linifolia* extracts.

Toxicity signs in rabbits after oral administration of the *Oligomeris linifolia* extracts

Toxicity signs of changes in skin, hair, eyes, respiratory distress, tremors, convulsion, drowsiness or sleep, lethargy, diarrhea, salivation, and lack of movement were found present in all rabbits of group C (1000mg/kg), group D (2000mg/kg) and group E (3000mg/kg) oral administration of the *Oligomeris linifolia* extracts. While in group B (500mg/kg) oral administration of the *Oligomeris linifolia* extracts, the toxicity signs of respiratory distress, tremors, convulsion, drowsiness or sleep, lethargy, diarrhea, salivation, and lack of movement were found present in 1 rabbit. The toxicity signs were found absent in all rabbits of group A (100mg/kg) oral administration of the *Oligomeris linifolia* extracts.

Analgesic activity of aqueous extracts of *Oligomeris linifolia* in tail immersion method

Results on the analgesic activity of aqueous extracts of *Oligomeris linifolia* in tail immersion method is presented in table 3. Data indicated that aqueous extract of *Oligomeris linifolia* 100 and 200 mg/kg produced the significantly delay in response of tail withdrawal compared to control, it was higher at 200 mg/kg and the delay in response was higher by Diclofenac sodium at 10mg/kg. Statistical outcomes of the obtained data indicated significant ($p<0.05$) difference in analgesic activity between the treatments and control.

Anti-diabetic activity of aqueous extracts of *Oligomeris linifolia* on blood glucose level of rabbits

Results on the anti-diabetic activity of aqueous extracts of *Oligomeris linifolia* on blood glucose level of rabbits is mentioned in table 4. Data indicates that there was significant ($p<0.05$) effect of *Oligomeris linifolia* and Priscoline injection on blood glucose level of rabbits. The blood glucose level in diabetic control was determined to be 204.66±5.34 mg/dl. The blood glucose decreased significantly in rabbits treated with aqueous extracts of *Oligomeris linifolia* and Priscoline injection. Maximum decreased in blood glucose level was determined at dose of 200mg/kg compared to 100mg/kg oral administration of aqueous extracts of *Oligomeris linifolia.*

Table No. 1: Acute toxicity of *Oligomeris linifolia* extract in rabbits

Group	No. of animals	Mortality	Mortality %
A (100mg/kg)	4	0	0d
B (500mg/kg)	4	1	25.00c
C (1000mg/kg)	4	3	75.00b
D (2000mg/kg)	4	4	100.00a
E (3000mg/kg)	4	4	100.00a

Different alphabets among the mortality (%) values indicates significant ($p<0.05$) difference from one another.

Table No. 2: Toxicity signs in rabbits after oral administration of the *Oligomeris linifolia* extracts

Toxicity signs	A (100mg/kg)	B (500mg/kg)	C (1000mg/kg)	D (2000mg/kg)	E (3000mg/kg)
Changes in skin, hair, eyes	Absent in all rabbits	Absent in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits
Respiratory distress	Absent in all rabbits	Present in 1 rabbit	Present in all rabbits	Present in all rabbits	Present in all rabbits
Tremors	Absent in all rabbits	Present in 1 rabbit	Present in all rabbits	Present in all rabbits	Present in all rabbits
Convulsion	Absent in all rabbits	Present in 1 rabbit	Present in all rabbits	Present in all rabbits	Present in all rabbits
Drowsiness or sleep	Absent in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits
Lethargy	Absent in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits
Diarrhea	Absent in all rabbits	Present in 1 rabbit	Present in all rabbits	Present in all rabbits	Present in all rabbits
Salivation	Absent in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits
Lack of movement	Absent in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits	Present in all rabbits

Table No. 3: Analgesic activity of aqueous extracts of *Oligomeris linifolia* in tail immersion method

Treatments	Reaction time (seconds)
Diclofenac sodium 10 mg/kg	15.35±2.33a
Aqueous extract of *Oligomeris linifolia* 100 mg/kg	8.66±1.47c
Aqueous extract of *Oligomeris linifolia* 200 mg/kg	10.37±2.11b
Control (normal saline)	3.11±0.33d

Different alphabets among the mean values indicates significant ($p<0.05$) difference from one another.

Table No. 4: Anti-diabetic activity of aqueous extracts of *Oligomeris linifolia* on blood glucose level of rabbits

Treatment	Dose (mg/kg)	Blood glucose level (mg/dl)
Priscoline	20mg/kg intravenously	163.22±2.11b
	10mg/kg subcutaneously	157.41±1.62c
Aqueous extracts of *Oligomeris linifolia*	100mg/kg orally	136.64±1.88d
	200mg/kg orally	128.47±0.74e
Diabetic control	Glucose 1g/kg	204.66±5.34a

Different alphabets among the mean values indicates significant ($p<0.05$) difference from one another.

CONCLUSION

Oligomeris linifolia extracts at dose of 1000mg/kg, 2000mg/kg and 3000mg/kg oral administration produced the prominent toxicity in rabbits. While the dose of 100 mg/kg and 500mg/kg oral administration did not show toxicity in rabbits. Aqueous extract of *Oligomeris linifolia* showed significant analgesic and anti-diabetic activities. However, further research is needed to determine the specific mechanism in many animals, as well as toxicological tests to determine the plant's safety profile.

CONFLICT OF INTEREST

We have no conflict of interest to declare.

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