**Study on Diuretic and laxative activity of aerial part extract of *Mollugo pentaphylla* Linn.**

 **Sujit Kumar Sahu1\*, Prabhat Kumar Sahoo1, Soroja Kumar Patro1, Amaresh Chandra Sahoo1, Susanta Kumar Behera1.**

**Institute of Pharmacy and Technology, Salipur, Cuttack, Odisha-754202**

**\*E-mail: sujitsahu80@gmail.com**

**Mob. No. 09861952595**

**Abstract:**

A crude ethanolic extract of *Mollugo pentaphylla* Linn. (Family: Aizoaceae) was tested for its diuretic and laxative effects in albino rats at doses of 200 and 400 mg/kg p.o. This was compared to two popular drugs, Furosemide (10mg/kg, p.o.) and Agar agar (300mg/kg, p.o.). The extract was found to have potent diuretic and laxative effects at 400 mg/kg. Other phytoconstituents found in the plant include sugars, alkaloids, gums, saponins, flavonoids, tannins, and steroids.

Key words: Furosemide, agar agar, *Mollugo pentaphylla*, diuretic activity, laxative activity.

**Introduction:**

Despite having fewer side effects, herbal medications have been proved to be just as effective as synthetic ones. Herbal medicine (HM) is the cornerstone of complementary and alternative medicine (CAM), which has recently attained wide acceptability on a global scale and is gradually working its way towards inclusion into recognized healthcare systems. Herbal remedies have natural, less dangerous side effects. Carpet weed and pita-gohun are two common names for *Mollugo pentaphylla* Linn. (Family: Aizoaceae). It is an annual plant that grows to a height of 30 cm and has many branches. It can grow in both moist and dry conditions. The opposing or deceptively whorled-shaped leaves are obovate to linear-lanceolate. Flowers can be white, greenish, orange, or pink and are found in terminal compound cymes. There are numerous dark reddish-brown seeds inside the globular capsules. The roots are creepy and accidental. The plant contains potassium nitrate, carotene, saponin, traces of vitamin C, and saponin. It can be used as a stomachic, aperient, antibiotic, and emmenagogue in conventional medicine, as well as in poultices for sore legs. To stimulate menstrual discharge, women are given an infusion of the herb. Bitter, antiperiodic herbs are warmed after being coated with oil in order to alleviate earaches2. According to reports, the plant is antimicrobial3, whooping cough4, hepatitis5, and anti-inflammatory in addition to being spermicidal6, anti-inflammatory, anticancer, and hepatoproductive7. The current study's objective is to evaluate the ethanolic leaf extract of the plant's diuretic and laxative effects on several animal models.

**Materials and Methods:**

**Plant material:**

The plant *M. pentaphylla* was obtained in January from a remote region of Rayagada district in Odisha and examined by the taxonomist of the Botanical Survey of India, Howrah. To get rid of any dirt that had adhered, the plant parts were rinsed under running water and then dried. The aerial portion was subsequently crushed into a coarse powder.

**Preparation of extract:**

The defatted powered plant material was extracted with 80% ethanol using a Soxhlet device after being defatted with petroleum ether (60–80°c). To achieve dry extract, the solvent was withdrawn under reduced pressure; this left a sticky residue that was a dark greenish-black color. Desiccators were used to hold the extract before being used again.

**Phytochemical Screening:**

In this research work the ethanolic extract of both *M. pentaphylla* was qualitatively tested for the presence of chemical constituents. It shows the presence of carbohydrates, alkaloids, gums, saponins, flavonoids, tannins and steroids8,9.

**Animals:**

Adult wistar albino rats (150-200 g) of either sex were used to assess pharmacological investigations, while Swiss albino mice (20-25 g) of either sex were employed for an acute toxicity assessment. Throughout the trial, the animals were housed in typical polypropylene cages at a constant temperature of 34°C and a relative humidity of 60–65%. The experiment was carried out with the approval of the institutional animal ethics committee in the CPCSEA-approved laboratory of the Institute of Pharmacy and Technology, Salipur (Regd. No. 1053/ac/07/CPCSEA).

**Acute toxicity study:**

*M. pentaphylla* ethanolic extract's acute toxicity was assessed using the fixed dosage approach described in CPCSEA guideline no. 420. Since the test extracts did not exhibit any mortality even at a dose of 2000 mg/kg, a dose of 1/10th (200 mg/kg) and a fifth (400 mg/kg) was chosen for further investigation.

**Evaluation of diuretic activity:**

The method developed by Lipschitz *et al.* in 1943 was applied to quantify diuretic activity10, 11. Four groups of six albino rats, one of each sex, each weighing between 150 and 200 g, were produced using this approach. The animals were given unrestricted access to water for the duration of their 24-hour fast. On the day of the experiment, the animal groups received an oral primary dose of normal saline (25ml/kg) an hour prior to the delivery of the sample. The initial group of rats acted as the control and received 25 ml/kg of 1% Tween-80 in regular saline orally. The second group acted as the reference group and received oral furosemide at a dose of 10 mg/kg body weight11; Similar to Groups I and II, Groups III and IV received an oral ethanolic extract of M. pentaphylla at doses of 200 and 400 mg/kg, respectively. The animals were placed right away into metabolic cages (2 per cage), which were maintained at 200.50 C and designed to keep faces and urine apart. The amount of urine that had been gathered was measured after five hours. During this time, neither food nor water were provided for the animals. Body weight both before and after the test, total urine volume, and urine Na+, K+, and Cl- concentrations were all measured. A flame photometer was used to measure the concentrations of Na+ and K+, and a silver nitrate solution (N/50) titration was used to determine the concentration. Three drops of 5% potassium chromate solution were employed as an indicator12,13 of Cl-. The results are shown in Table-1.

**Evaluation of laxative activity:**

According to Bose *et al*., 2006 14, 19 rats of either sex underwent the laxative activity while fasting for 12 hours prior to the experiment but with unlimited access to water. Each of the four groupings of the animals contained six rats. The first group of animals received sterile saline (25 ml/kg, p.o.) as a control; the second group, which served as a reference, received agar-agar (300 mg/kg, p.o.) in saline; and the third and fourth groups, which received 200 and 400 mg/kg, respectively, of the ethanolic extract of *M. pentaphylla.* After medication, the animals were separated and placed in plastic containers designed expressly to gather faces. Eight hours after the medicine was administered, the faces were collected and weighed. All of the rats then consumed food and liquids, and feces were once more measured after 16 hours. (Table-2).

**Statistical analysis:**

All the results were statistically analyzed using one way ANOVA followed by Dunnet's t-test.

Values are expressed as Mean ± S.E..M, (n=6). \*P<0.05 and \*\*P<0.01 compared with control was considered as significant.

**Results:**

The *M. pentaphylla* ethanolic extract was found to considerably increase urine volume and eliminate sodium, potassium, and chloride ions at the highest dose tested (400 mg/kg, p.o.). However, at the lesser dose (200 mg/kg), the test extract is not significant. The reference drug's (10 mg/kg furosemide) diuretic action was more potent than the test extract's 400 mg/kg diuretic activity. A summary of the results is presented in Table 1. Rats' feces production increased significantly and dose-dependently in response to the ethanolic extract of M. pentaphylla (200 and 400 mg/kg, p.o.) (Table 2). Agar-agar (300 mg/kg, p.o.) is a typical drug with a comparable effect.

Table-1 Diuretic activity of ethanolic extract of aerial part of *M. pentaphylla*.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Group | Treatment | Dose | Urine Volume | Concentration of ions (mEq / l ) | Na+/ K+ ratio |
| Na+ | K+ | Cl- |
| I | Control | 25ml/kg | 2.41±0.50 | 47.23±1.74 | 131.64±1.99 | 99.36±0.71 | 0.35 |
| II | Furosemide | 10 mg/kg | 7.05±0.68\*\* | 98.04±1.40\*\* | 161.83±1.96\*\* | 136.21±1.15\*\* | 0.6 |
| III | Ethanolic extract of *M.pentaphylla* | 200mg/kg | 2.58±0.13 | 50.70±1.74 | 135.53±2.80 | 101.85±1.06 | 0.37 |
| IV | 400 mg/kg | 5.90±0.39\*\* | 72.38±1.65\*\* | 156.83±1.36\*\* | 129.83±0.66\*\* | 0.46 |

Values are expressed as mean±S.E. (n=6). \*P<0.05 and \*\*P<0.01 compared with vehicle control (ANOVA followed by Dunnet’s t-test).

Table- 2 Laxative activity of ethanolic extract of aerial part of *M*. *pentaphylla*

|  |  |  |  |
| --- | --- | --- | --- |
| Group | Treatment | Dose | Faecal Output (g) |
| 8h | 8-16h |
| I | Control | 25ml/kg | 0.654±0.066 | 0.471±0.076 |
| II | Agar agar | 300 mg/kg | 1.161±0.013\*\* | 0.530±0.011 |
| III | Ethanolic extract of *M. pentaphylla* | 200mg/kg | 1.178±0.023\*\* | 0.494±0.019 |
| IV | 400 mg/kg | 1.231±0.014\*\* | 0.511±0.016 |

Values are expressed as Mean ± S.E. (n=6). \*P<0.05 and \*\*P<0.01 compared with vehicle control (ANOVA followed by Dunnet’s t-test).

**Discussion:**

Orthopnea and paroxysmal nocturnal dyspnea, as well as pulmonary congestion and peripheral edema, are among the symptoms of volume overload that are helped by diuretics. Preload (venous return to the heart) is decreased as a result of them decreasing plasma volume. As a result, there is less stress on the heart and less demand for oxygen and plasma, which reduces blood pressure15–17. For patients with high blood pressure, diuretics are essential. In the present investigation, we can demonstrate that the ethanolic extract of *M. pentaphylla* considerably enhanced urine output and urinary electrolyte concentration at a dose of 400 mg/kg, p.o. When it came to raising urine output, the impact was discovered to be less effective when compared to the reference standard. Additionally, it was found that the ethanolic extract of M. pentaphylla was more effective at raising the concentration of all three tested ions Na+, K+, and Cl- in the urine. The ratio of excreted sodium and potassium ion concentration increases, which suggests that an ideal diuretic with a lower risk of hyperkaliemia must increase sodium ion excretion to a greater extent than potassium. The ethanolic extract demonstrated significant activity up to 8 hours after the administration of the medicine, according to the laxative activity investigation. The results of this study lend support to the traditional medical use of the plant's aerial parts as diuretics and laxatives. Only with additional research can the specific mechanism of the extracts be identified.

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Studies on diuretic and laxative activity of bark extracts

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