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

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Abstract:

At doses of 200 and 400 mg/kg p.o., albino rats were used to investigate the diuretic and laxative effects of a crude ethanolic extract of Mollugo pentaphylla Linn. (Family: Aizoaceae). This was contrasted with the widely used medications furosemide (10 mg/kg, p.o.) and agar agar (300 mg/kg, p.o. At 400 mg/kg, the extract was found to have strong diuretic and laxative effects. 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. In terminal compound cymes, there are flowers that might be white, greenish, orange or pink. The globular capsules are filled with numerous dark reddish-brown seeds. The roots are unintentional and unsettling. The plant contains saponin, carotene, potassium nitrate, 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 earaches[2]. According to reports, the plant is antimicrobial[3], whooping cough[4], hepatitis[5], and anti-inflammatory in addition to being spermicidal[6], anti-inflammatory, anticancer, and hepatoproductive[7]. 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 steroids[8,9].

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 activity[10, 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 weight[11];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 indicator[12,13]of Cl-. The results are shown in Table-1.

Evaluation of laxative activity:

19 rats of either sex received the laxative activity while fasting for 12 hours prior to the experiment but with unlimited access to water, according to Bose et al., 2006 14. There were six rats in each of the four animal groups. As a control, animals in the first group were given sterile saline (25 ml/kg, p.o.); as a reference, animals in the second group were given agar-agar (300 mg/kg, p.o.); and animals in the third and fourth groups were given 200 and 400 mg/kg, respectively, of the ethanolic extract of *M. pentaphylla*. Following medicine, the animals were divided and put in plastic receptacles made specifically to collect faces. The faces were collected and weighed eight hours after the medication was given. 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:

At the maximum studied dose (400 mg/kg, p.o.) of *M. pentaphylla* ethanolic extract, sodium, potassium, and chloride ions were shown to be significantly removed from the body and urine volume was also significantly increased. The test extract is insignificant at the lower dose (200 mg/kg), nevertheless. The diuretic activity of the reference medication (10 mg/kg furosemide) was greater than that of the test extract (400 mg/kg). Table 1 displays an overview of the findings. In response to the ethanolic extract of *M. pentaphylla* (200 and 400 mg/kg, p.o.), the amount of rat feces produced rose significantly and dose-dependently (Table 2). A common medicine with a similar effect is agar-agar (300 mg/kg, p.o.).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 pressure[15–17]. 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 ionsNa^+, 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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