

Phytochemical Evaluation and Analgesic Activity of *Pentas lanceolata* Leaves

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Abstract

In the present study, different solvent extracts of "*Pentas lanceolata*" leaves (family Rubiaceae) were under taken for phytochemical investigation and subjected to analgesic activity. The preliminary and phytochemical investigation showed presence of sterols, triterpenoids, glycosides, flavonoids, alkaloids, carbohydrates, resins. The different solvent like n-Hexane, ethyl acetate, ethanolic extracts of compounds from "*Pentas lanceolata*" leaves. Analgesic activity was performed by the acetic acid induced writhing method. Due to the presence of the above compounds in n-hexane and ethanol extracts showed significant activity ($P < 0.01$) when compared with the standard (aspirin) whereas ethyl acetate extract showed moderate to weak ($P < 0.05$) activity.

Keywords: n-Hexane; Ethyl acetate; Ethanol; Aspirin; Analgesic activity

Introduction

Pentas lanceolata, commonly known as Egyptian Star cluster, is a species of flowering plant in the madder family, Rubiaceae that is native to much of Africa as well as Yemen. It is known for its wide use as a garden plant where it often accompanies butterfly gardens. These leaves are collected from Osmania university and authenticated (voucher no: 0166) by Prof. Prathibha Devi, Dept of botany, Osmania university, Hyderabad, Telangana, India.

Plant profile

Kingdom : *Plantae*

Division : *Magnoliophyta*

Class : *Magnoliopsida dicotyledons*

Subclass : *Asteridae*

Order : *Rubiales*

Genus : *Pentas*

Species : *Lanceolata*

Family : *Rubiaceae*

- It is a many-branched, somewhat sprawling plant that features 4" wide rounded clusters (corymbs) of star-shaped flowers over a long summer to frost bloom. Elliptic to lanceolata dark green leaves (to 6" long). Flowers are pink, magenta, lilac or less commonly white (Figure 1).
- It is used to anti-bacterial; anti-fungal activity had been reported and also used in beds and borders of garden, containers, and houseplant. Also may be effectively gown indoors under artificial lights [1].

Materials and Methods

Solvents used

n-Hexane, ethyl acetate, ethanol (70%) was used for soxhlation process.

Extraction

The leaves of *Pentas lanceolata* were subjected to fine powder and 5.0 Kg were subjected to continuous successive extraction with

different solvents like n-hexane, ethyl acetate and ethanol (70%) in to 15 batches of each 250 g to 280 g in soxhlet extractor. After complete extraction, the different (n-Hexane, ethyl acetate and ethanol) solvents were concentrated to water bath and finally dried under reduced pressure to the dryness in flash evaporator. After drying the respective extracts were weighed and calculated percentage yield (Tables 1 and 2).

Biological Activity

Analgesic

Pain is an unpleasant feeling often caused by intense or damaging stimuli, such as stubbing a toe, burning a finger, putting alcohol on a cut, and bumping the "funny bone". The International Association for the Study of Pain's widely used definition states: "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [2].



Figure 1: *Pentas lanceolata*.

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n-Hexane extract	Terpenoids, sterols, glycosides, saponins
Ethyl acetate extract	Carbohydrates, flavonoids, resins
Ethanol extract	Alkaloids

Table 1: Preliminary phytochemical investigation of different extracts of the *Pentas lanceolata* leaves.

Extracts	% Yield
n-Hexane	15 gms
Ethyl acetate	12 gms
Ethanol	14 gms

Table 2: The analysis of extracts of the *Pentas lanceolata* leaves.

Pain motivates the individual to withdraw from damaging situations, to protect a damaged body part while it heals, and to avoid similar experiences in the future. Most pain resolves promptly once the painful stimulus is removed and the body has healed, but sometimes pain persists despite removal of the stimulus and apparent healing of the body; and sometimes pain arises in the absence of any detectable stimulus, damage or disease. Here, the chemical induced writhing tests are used for the evaluation of the analgesic activity of peripherally acting drugs [3].

Experimental Procedure

Acetic acid induced writhing method (Peripheral analgesic activity)

Writhing test is a chemical method used to induce pain of peripheral origin by injection of irritant principles like phenylquinone, acetic acid in mice [4]. The animals react with characteristic stretching behavior, which is called writhing. In this method male albino mice weighing between 25-30 g body weights were selected for the study. The animals were divided into 5 groups of 6 animals each. First group of animal received acetic acid 0.6 % v/v. i.p. and served as control. Second group served as positive control and received aspirin 150 mg/kg body weight. The third, fourth and fifth groups of animals received 200 mg/kg body weight of extracts of the *Pentas lanceolata* leaves extracts as a suspension in 0.6% w/v sodium CMC 30 minutes prior to the administration of acetic acid injection. The writhing effect was indicated by the stretching of abdomen with simultaneous stretching of at least one hind limb. This was observed for 30 minutes and the percentage inhibition was calculated by using the formula [5-8] (Table 3).

$$\text{Percentage inhibition} = 1 \left[-\frac{RT}{RC} \times 100 \right]$$

RT = mean reaction time in treated group

RC = mean reaction time in control group

Statistical significance

The results were carried out to calculate Mean \pm SEM for determination of significant inter groups difference which was analyzed separately and one way analysis of variance, (ANOVA) [9] was carried out followed by Dunnet's 't' for individual comparison [10].

Results

The shade dried leaves of *Pentas lanceolata* was subjected to successive solvent extraction method by using n-hexane, ethyl acetate and ethanol (70%) in soxhlet extraction. All these extracts were concentrated and calculated for their percentage yield. The yields were found to be 15 g, 12 g, and 14 g respectively.

The results of phytochemical investigation of n-hexane extract showed the presence of terpenoids, sterols, glycosides Saponins. Ethyl

acetate extract shown the presence of carbohydrates, flavonoids, resins and finally ethanol extract shown the presence of alkaloids (Table 4 and Graph 1).

Acute toxicity studies

No death was observed even at the maximum administered dose 2000 mg/kg body weight [11]. However there was a dose dependent increase in the magnitudes of certain autonomic response.

Analgesic activity

Analgesic activity by using Acetic acid induced writhing method results indicated that the n-hexane, ethanol extracts of leaves of *Pentas lanceolata* at dose of 200 mg/kg showed significant activity ($p < 0.01$) in reducing the pain and ethyl acetate extract of *Pentas lanceolata* leaves at dose of 200 mg/kg exhibited a moderate to weak activity ($P < 0.05$), in reducing the pain, which was comparable to Aspirin (150 mg).

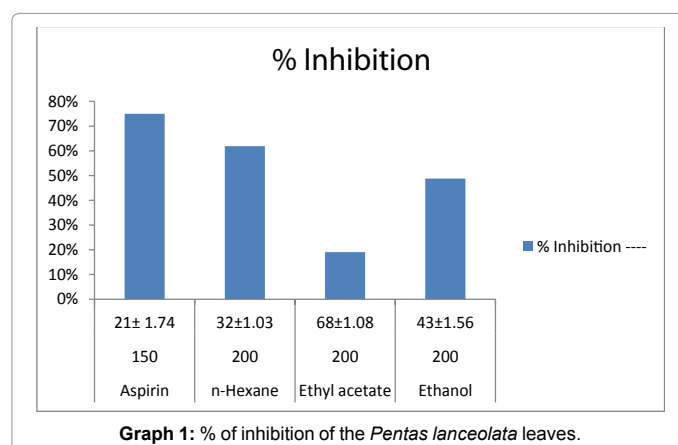
Thus the result revealed the analgesic effect of n-hexane, ethyl acetate and ethanol extract of *Pentas lanceolata* leaves seems to support the use of it as an analgesic.

Conclusion

The shade dried leaves of *Pentas lanceolata* was subjected to

GROUPS	TREATMENT
Group 1 st	Served as control receiving 0.6% w/v of sodium CMC suspension orally
Group 2 nd	Served as a positive control and received acetyl salicylic acid (aspirin) standard drug (150 mg/kg) orally, as suspension in sodium CMC (0.5 ml of 0.6% w/v Solution)
Group 3 rd	Animals were treated with (200 mg/kg b.w) of n-Hexane extract of <i>Pentas lanceolata</i> (0.5 ml of 0.6% w/v solution, orally).
Group 4 th	Animals were treated with (200 mg/kg body weight) of Ethyl acetate extract of <i>Pentas lanceolata</i> (0.5 ml of 0.6%w/v solution, orally)
Group 5 th	Animals were treated with (200 mg/kg body weight) of ethanol extract of <i>Pentas lanceolata</i> (0.5 ml of 0.6%w/v solution, orally)

Table 3: Groups and treatment.



Graph 1: % of inhibition of the *Pentas lanceolata* leaves.

Treatment	Dose (mg/kg)	Number of writhings	% Inhibition
Control	---	84 \pm 2.01	---
Aspirin	150	21 \pm 1.74	75%
n-Hexane	200	32 \pm 1.03	61.91%
Ethyl acetate	200	68 \pm 1.08	19.05%
Ethanol	200	43 \pm 1.56	48.81%

Statistical analysis was done by ANOVA followed by Dunnet's test. All the values are expressed as mean \pm SEM. * $P < 0.05$, ** $P < 0.01$. When compared to control

Table 4: Acetic acid induced writhing method.

successive solvent extraction method by using n-Hexane, ethyl acetate and ethanol (70%) in soxhlet extraction. Analgesic activity by using Acetic acid induced writhing method results indicated that the n-Hexane, ethanol extracts of leaves of *Pentas lanceolata* at dose of 200 mg/kg showed significant activity ($p < 0.01$) in reducing the pain and ethyl acetate extract of *Pentas lanceolata* leaves at dose of 200 mg/kg exhibited a marked ($P < 0.05$), in reducing the pain, which was comparable to standard drug aspirin (150 mg).

Further investigation we will find the structural conformation, structural elucidation of different extracts of *Pentas lanceolata*.

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References

1. www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=a538
2. Rang HP, Dale MM, Ritter JM, Moore PK (2003) Text book of Pharmacology, Churchill living stone, Edinburg, 5th edition, 560-572.
3. Turner RA (1965) Screening methods in Pharmacology. Demic Press, New York, 152.
4. Gawade SP (2012) Acetic acid induced painful endogenous inflection in writhing test on mice. J Pharmacol Pharmacother 3: 348.
5. Ghosh MN (2005) Evaluation of Analgesic activity. Fundamentals of experimental Pharmacology, Scientific book Agency, Calcutta, 2nd edition, 69-71.
6. Katzung BG (2004) Basic and Clinical Pharmacology, Mec Graw Hill Companies. 9th edition, 576-578.
7. Koster R, Anderson M, Deber EI (1959) Acetic acid for analgesic screening. Fed proc 18: 412-414.
8. Kulkarni SK (1993) Hand Book of Pharmacology, Vallabh Prakashan, New Delhi, 2nd edition, 49-51.
9. (1987) ANOVA. New tables for multiple comparisons with control. Biometrics 43: 439- 456.
10. Dunnet CW (1964) New tables for multiple comparisons with control. Biometrics 20: 482-495.
11. (2001) OECD /OCDE, 425 OECD Guide lines for testing of chemicals acute oral toxicity-up-and-down procedure 26:1-26.