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Original Article

Effects of Methanol Extract of *Piper chaba* Stem Bark on Acute Inflammation in Rats

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Abstract

The plant *Piper chaba* Hunter (Piperaceae), a climbing glabrous shrub grows in plenty in southern Bangladesh. Popularly known as 'Choi' it is used as spices and believed to have medicinal value in a wide variety of disease conditions including arthritis, asthma, bronchitis and piles. In the present study, effect of methanol extract of *Piper chaba* stem bark on acute inflammation has been reported. The anti-inflammatory effect was studied in rats by injecting 0.1ml of 1% carrageenan suspension into the planter surface, where oedema of the rat's hind paw was used as an index of acute inflammation. Methanol extract of *Piper chaba* stem bark given orally 1 hour before injection at doses of 125 and 250 mg/kg body weight, produced significant ($p< 0.05$) anti inflammatory effect compared to control and the percentage of inhibition of oedema formation was 33% and 35% respectively, which however was less compared to aspirin (46%) and hydrocortisone (56%). The result suggest that in case of acute inflammation, *Piper chaba* stem bark possess mild to moderate anti inflammatory effect compared to that of aspirin and hydrocortisone.

Key words: Rats, acute inflammation, *Piper chaba*, aspirin, hydrocortisone, choi.

Introduction :

Piper species are widely distributed in the tropical and subtropical regions of the world[1]. The plant *Piper chaba* Hunter *(Piperaceae)* is a climbing, glabrous shrub available in various parts of India and Malay Islands[1]. In Bangladesh it is grown in plenty in the southern part particularly in Jessore, Khulna, Satkhira and Bagerhat areas[2]. Popularly known as choi, it is used as spices in meat curry and other dishes and believed to have medicinal value in a wide variety of disease conditions including arthritis, asthma, bronchitis and piles. The crude extract was found to possess antibacterial, carminative, expectorant, analgesic, hypotensive and smooth muscle relaxant properties[2-4]. Recently, 80% aqueous acetone extract from the fruit of *Piper chaba* as well as some isolated alkamides were found to be protective against ethanol and indomethacin induced gastric lesions in rats[5]. Stem bark of *Piper chaba* produced a significant anti-inflammatory effect in rat model[6].

Considering its reported anti-inflammatory properties and availability in our country, the present study was undertaken to evaluate the anti-inflammatory effect of methanol extract of *Piper chaba* stem bark, compared to steroidal and non-steroidal anti-inflammatory agents in case of acute inflammation in rats.

Materials and Methods:

The stem bark of *Piper chaba* Hunter was cut into pieces, shade-dried and grounded to coarse powder, which was then extracted with methanol at room temperature for 3 days. The filtrate concentrated in vacuum (50°C) yielding the crude methanol extract was stored at 4°C, weighed to appropriate dosages form and diluted with normal saline prior to use. Thirty Long

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Evan Norwegian rats of either sex, weighing between 150-200g were kept under standard conditions of light and temperature, fed with animal pellets and allowed to drink water adlibitum. Animal were divided into five groups each consisting of 6 rats. Acute inflammation was produced by injecting 0.1 ml of 1%. Carrageenan suspension in normal saline in all rats. One hour before carrageenan injection, group I served as control that received normal saline, group II and group III were given methanol extract of *Piper chaba* Hunter at a dose of 125 mg and 250 mg/kg body weight orally respectively. Group IV were given aspirin at a dose of 100mg/kg body weight orally and group V were given hydrocortisone at a dose of 2mg/kg body weight subcutaneously. Progress of the local inflammatory exudative lesion was assessed by measuring the maximum linear cross-section of the joint 1 hour before and 3 hours after the carrageenan injection, the measurements were taken as accurately as possible by slide calipers. Percentage of inhibition of oedema formation was calculated by using the formula: {(C-T) ÷ C} x 100, where T and C stand for test and control.

Results:

The mean initial antero-posterior diameter of rat's paw of control group (group-I) was 7.93±0.04 mm and after 3 hours of carrageenan injection it was 13.22±0.15 mm. The mean initial antero-posterior diameter of rats paw of group-II (choi 125mg/Kg body weight) was 8.14 ±0.18 mm, whereas after 3 hours of carrageenan injection it was 11.45±0.20 mm. The mean initial antero-posterior diameter of rat's paw of group III (choi 250 mg/kg body weight) was 8.16±0.18 mm and after 3 hours of carrageenan injection it was 11.33±0.28 mm. The mean initial antero-posterior diameter of rat's paw of group IV(Aspirin 100 mg/Kg body weight) was 8.17 ±0.17 mm and after 3 hours of carrageenan injection it was 10.85±0.16 mm. The mean initial antero-posterior diameter of rat's paw of group V (Hydrocortisone 2mg/kg body weight) was 8.12±0.19 mm and after 3 hours of carrageenan injection it was 10.46±0.17 mm. Finally increase in antero-posterior diameter (MEAN ±SEM) of rat's paw in group-I, II, III, IV and V were 4.94±0.43, 3.30±0.36, 3.18±0.24, 2.67±0.17, 2.17±0.24 mm respectively. (Table I) The percentage of inhibition of oedema formation in group II, III, IV, and V were 33%, 35%, 46% and 56% respectively. (Figure I)

Table I: Anti-inflammatory effects of *Piper chaba* extracts, aspirin and hydrocortisone on carrageenan induced oedema in rat's paw.

Group	Initial antero posterior diameter (mm) (MEAN ± SEM)	Antero posterior diameter after 3 hours of carrageenan injection (mm) (MEAN± SEM)	Increase in antero-posterior diameter (mm) (MEAN± SEM)
Group-I (Control)	7.93 ±0.04	13.22 ± 0.15	4.94 ± 0.43
Group-II (*Piper chaba* extract 125 mg/kg b.w.)	8.14 ± 0.18	11.45 ± 0.20	3.30 ± 0.36*
Group-III (*Piper chaba* extract 250 mg/kg b.w.)	8.16 ± 0.18	11.33 ± 0.28	3.18 ± 0.24*
Group- IV (Aspirin 100 mg/kg b.w.)	8.17 ± 0.17	10.85 ± 0.16	2.67 ± 0.17***
Group- V (hydro cortisone 2 mg/kg b.w.)	8.12 ± 0.19	10.46 ± 0.17	2.17 ± 0.24***

*P < 0.05 in a test of significance difference from control.
*** P< 0.001 in a test of significance difference from control.

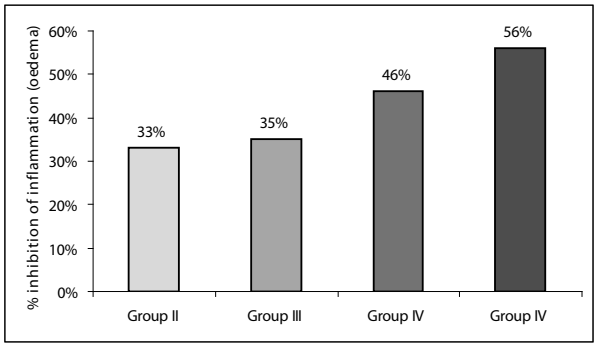

Figure I: Percentage of inhibition of carrageenan induced inflammation by different doses of methanol extract of *Piper chaba*, Aspirin and Hydrocortisone in comparison to control.

Discussion:

Administration of methanol extract of stem bark of *Piper chaba* at a dose of 125 mg/kg body weight and 250mg/kg body weight orally produced a significant ($p<0.05$) anti-inflammatory effect, where the percentage of inhibition of oedema formation was 33% and 35% respectively. Following administration of aspirin and hydrocortisone the anti-inflammatory effects were highly significant ($p<0.001$) and the percentage of inhibition of oedema formation were 46% in aspirin and 56% in hydrocortisone.

In earlier studies, mean paw volume after carrageenan administration in animals treated with test samples increased up to the third hour of study and then got a declining trend[6]. Carrageenan induced paw oedema has been reported to have more than one phase and the initial phase has been attributed to the release of histamine and serotonin (5-HT), the maintenance of oedema during the plateau phase is caused by kinin-like substances and the second accelerating phase of swelling are due to prostaglandin like substances.[7]

As the crude methanol extract exhibited significant inhibition of paw oedema, the possible mechanism of the observed anti-inflammatory activity might be its ability to inhibit the release of histamine, serotonin or kinin like substances or biosynthesis of prostaglundins.

Conclusion:

The results suggest that *Piper chaba* stem bark possess mild to moderate anti-inflammatory effect compared to aspirin and hydrocortisone in case of acute inflammation. Before establishing extract of stem bark of *Piper chaba* as a therapeutically effective anti-inflammatory agent, further studies should be carried out to determine the active principles responsible for anti-inflammatory effect and its cellular mechanism of action. Toxicological studies should also be undertaken as well before any clinical trial for suitability of using in man.

References :

1. Kirtikar KR, Basu BD. Indian Medicinal Plants. 3rd ed. International Book Distributors; 1987. p. 2130-31.

2. Ghani A. Medicinal Plants of Bangladesh. 2nd ed. Dhaka: Asiatic Society of Bangladesh; 2003.p. 267-68.

3. Yusuf M, Chowdhury JU, Begum DJ. Medicinal Plants of Bangladesh. Bangladesh Council of Scientific and Industrial Research; 1994.p.192.

4. Haque ME, Rahman A, Amin A, Shekher HU. Alkamide and lignan from the stem bark of *Pipar chaba* (Piperaccae). Dhaka University Journal of Pharmaceutical Sciences 2004; 3:1-3.

5. Morikawa T, Matsuda H, Yamaguchi I, Pongpiriyadacha Y, Yoshikawa M. New amides and gastroprotective constituents from the fruit of *Piper Chaba*. Planta Medica.2004; 70:152-59.

6. Rahman MTU, Shilpi JA, Ahmed M, Hossain CF. Preliminary pharmacological studies on *Piper chaba* stem bark. Journal of Ethnopharmacology 2005; 99:203-9.

7. Rosa MDI. Biological properties of carrageenan. Journal of Pharmacology1972; 24:89-102.