



A STUDY ON ANTI-INFLAMMATORY EFFECT OF HEMIDESMUS INDICUS

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ABSTRACT

BACKGROUND : Hemidesmus indicus is one such important herb popularly known as Indian sarasaparilla. It is said to possess anti-inflammatory effect.

AIM: The present study attempted to investigate the anti-inflammatory of the crude extract of Hemidesmus indicus.

METHODS: Anti-inflammatory effect was evaluated using Carrageenan induced paw oedema method in rats. Institutional animal ethical clearance was obtained.

RESULTS: The anti-inflammatory activity showed a significant reduction in rat paw edema induced by sub plantar injection of carrageenan. The aqueous and ethanolic extracts of Hemidesmus indicus produced approximately 52% & 56% inhibition of inflammation respectively, which was comparable with that of diclofenac sodium which produced 67% inhibition of inflammation.

KEYWORDS : Anti-inflammatory effect, Rats, Diclofenac, paw edema, Hemidesmus indicus

1. INTRODUCTION:

Pain is an unpleasant sensation localised to a part of the body. It is often described in terms of a penetrating or tissue destructive process (eg. Stabbing, burning, twisting, tearing, squeezing) and/or of a bodily or emotional reaction (e.g. terrifying, nauseating, sickening). Any pain of moderate or higher intensity is accompanied by anxiety and the urge to escape or terminate the feeling. When acute, pain is characteristically associated with behavioural arousal and a stress response consisting of increased blood pressure, heart rate, pupil diameter and plasma cortisol level [1]. Pain may be somatic, visceral, referred or neuropathic. It is a subjective symptom which is affected by a variety of psychological factors. So pain can be reduced by reassurance, by hypnosis, and by trance-like meditative states. However, it is emphasized that management of pain by prescribing narcotic and non-narcotic analgesics is of great importance. Narcotic analgesics are particularly indicated for the relief of visceral pain, post-operative pain, severe pain in trauma and the pain of advanced malignant diseases. These analgesics all act as complete or partial agonists at opioid receptors, thereby inhibiting both the spinal and central processing of pain sensation. Fears of the physiological effects of the narcotics are often coupled with concern on the part of the clinician, patients or family that the patient will become addicted or tolerant to narcotics used in pain management.

Non-narcotic analgesics are thought to act peripherally. But there may be central components to their action. They inhibit cyclo-oxygenase and in turn inhibit the formation of prostaglandin synthesis. The inhibition of prostaglandin synthesis is thought to remove the effect of prostaglandins in lowering the threshold and makes them less sensitive to painful stimuli. Non-narcotic/Non-steroidal anti-inflammatory drugs (NSAIDs) are efficacious in providing symptomatic relief but all available agents have been associated with toxicities. These agents are highly useful for the treatment of acute, self-limited inflammatory conditions. However, their ability to modify disease progression in chronic inflammatory settings is not well documented and remain an area of continuing controversy. To overcome these problems, the most important advancement in anti-inflammatory drugs has been the identification of selective inhibitors of cyclo-oxygenase-2 (COX-2) inflammation induced form of the enzyme. Even though these drugs have a high degree of safety, the post-marketing surveillance and further studies should shed light on whether or not the safety of these drugs is sustained during chronic long-term therapy. So research is going on to find out drugs with potent analgesic and anti-inflammatory action with less side effects. In this process, plants are being increasingly screened for possible anti-inflammatory activities. Hemidesmus indicus is one such important herb popularly known as Indian sarasaparilla, which is easily available in our country. Studies have reported that Hemidesmus indicus has a high degree of effectiveness against syphilis, leucorrhoea, skin disorders, gout, dyspepsia etc [2]. It has also been found to have efficacy against rheumatic pain and boils [3], and the root decoction has been found to relieve inflammation and ulcers of the alimentary tract. Present study

was undertaken to evaluate the anti-inflammatory effect of Hemidesmus indicus on various experimental models following systemic administration.

2. AIM:

To evaluate the anti-inflammatory activity of aqueous ethanolic extract of Hemidesmus indicus.

3. METHODS & MATERIALS :

- A) Drugs and Chemicals
 - a. Extract of Hemidesmus indicus
 - b. Polysorbate (Tween) 80
 - c. Carrageenin
 - d. Diclofenac sodium
- B) Animals

Albino rats.
- C) Appliances/Equipments
 - a. Plethysmograph
 - b. Oral feeding tube
 - c. Tuberculin syringe

The root of Hemidesmus indicus was collected locally from Alagarkovil hills, Madurai district, Tamilnadu. The roots were thoroughly washed, dried in shadow and powdered.

Extract of Hemidesmus indicus

1) Ethanolic Extract

250 G of the powdered roots of Hemidesmus indicus was extracted with 95% alcohol for 24 hours using Soxhlet apparatus. The solvent was evaporated under reduced pressure. The residue obtained (8.5G) was brown in colour with pleasant odour.

2) Aqueous Extract

250 G of the powdered roots of Hemidesmus indicus was refluxed for 24 hours in a round-bottomed flask with distilled water and filtered. The filtrate was evaporated to dryness. The residue obtained (10G) was kept in a desiccator for 48 hours. It was dark brown coloured with pleasant characteristic odour [4]. 500mg extract was dissolved in 50ml of the solvent. The solution was prepared to provide 10mg per ml.

Polysorbate (Tween) 80 [5]

It is a non-ionic surface active agent. It is lemon to amber coloured, oily liquid and bitter in taste. Specific gravity is about 1.07 to 1.09 and PH is 6 to 8. These agents are inert and used as a solubilizing agent for water-insoluble substances for administering test compounds.

Carrageenin [6]

It is structurally a polysaccharide of the red sea weed. The name "Carrageenin" is derived from the Irish coastal town of Carrageen".

The main source of carrageenin are chondrus crispus and gigartina mamilliosa Among the many types of Carrageenin known, Lota Carrageenin is the most highly sulphated. Dilute aqueous solutions are viscous and the viscosity increases with the concentration of carrageenan Carrageenin is now an established phlogistic agent/ edemogen for inducing edema in the rat paw and it is the preparation employed in this study, for subplantar injection. In our study 1% carageenin was used.

Diclofenac Sodium

The Solution of diclofenac sodium was prepared to provide 1mg/ml.

Experimental Animals

Albino rats

Young sexually mature adult albino rats of wistar strain of either sex weighing about 175-200 grams were selected and used for the stud

The animals were inbred colony maintained under standard laboratory conditions in Madurai Medical College, Central Animal House and fed on Gold mohar animal feed daily, supplemented with the vegetables like carrot, cabbage and water.

Appliance/Equipments

Plethysmograph

Winter et al (1963) used mercury for immersion of the paw edema. It is a simple apparatus containing mercury. The mercury displacement due to dipping of the paw can be directly read from scale attached to the mercury column[7].

STUDY DESIGN

The study was approved by Institutional animal ethical committee

Carrageenin induced rat- hind paw edema[8]:

Method of Winter et al (1962) was followed to produce paw edema in adult albino rats by phlogistic agent carrageenan.

Adult albino rats of either sex with a body weight between175 - 250grams were used. They were divided into four groups of six animals each.

One group was used as control and the other three groups were treated with standard drug, aqueous and ethanolic extract of Hemidesmus indicus respectively.

The animals were starved over night. To ensure uniform hydration the rats received 2ml of water by stomach feeding tube (control group) the test drugs suspended in the same volume was administered. The drug treated groups received diclofenac sodium 10mg/kg and the aqueous and ethanolic extracts of Hemidesmus indicus in dose of 100mg/kg orally 30 minutes prior to injection of 0.05ml of 1% carrageenan.

After 30 minutes of drug administration a subplantarinjection of 0.05ml of 1% carrageenin was administered into the plantar side of the left hind paw of each rat in the respective groups. The paw was marked with ink at the level of the lateral malleolus and immersed in mercury upto the mark. The paw volume was measured Plethysmographical (volume displacement) immediately after injection again after 1 hour and 4 hours.

The difference between the zero hour pawedema and at the end of 1 hour and 4 hour were noted. The mean increase in paw volume was noted. The mean paw volume indicates the degree of inflammation in each group. The percentage of inflammation and the percentage of inhibition were calculated by using the following formula.

Percentage of anti inflammatory effect = $\frac{V_c - V_t}{V_c} \times 100$
 V_c =Mean paw edema volume in control group
 V_t =Mean paw edema volume in treated groups.

Percentage of Inhibition of Inflammation (Harris and Spencer 1962)

- 0 -30%-No anti-inflammatory effect
- 30 -50%-Mild anti-inflammatory effect
- 50 -70%-Moderate anti-inflammatory effect
- >70%-High anti-inflammatory effect

C) Statistical Analysis

All data were subjected to statistical analysis, using the student's t-test for significant difference between control and experimental animals.

4.RESULTS :

EFFECT OF AQUEOUS EXTRACT OF HEMIDESMUS INDICUS ON CARRAGEENIN- INDUCED RAT PAW OEDEMA

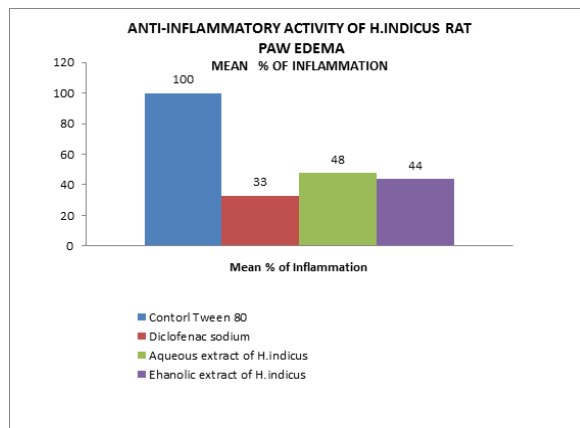
Administration of aqueous extract of Hemidesmus indicus orally in the dose of 100 mg/kg weight showed a significant reduction in rat paw oedema The mean paw volume of albino rats was found to be 1.5±0.08. The mean percentage of inhibition of inflammation was 52% and 'P' value was found to be <0.01 which was statistically significant.

Table No 1: Anti – Inflammatory Activity of Hemidesmos Indicus Rat Paw Oedema

Group	Drug	Mean Paw volume in ml±.SD	Mean % of Inflammation	Mean % of Inhibition of Inflammation
1.	Control Tween 80	2.10±0.15	100	0
2.	Diclofenac Sodium	1.11±0.14**	33	67
3.	Aqueous extract of H.indicus	1.5±0.08**	48	52
4.	Ethanolic extract of H.indicus	1.21±0.06**	44	56

Values are mean±S.D n=6 **p < 0.01

Figure 1: Anti – Inflammatory Activity of Hemidesmos Indicus Rat Paw Oedema



EFFECT OF ETHANOLIC EXTRACT OF H.INDICUS ON CARAGEEMOM OMDICED RAT PAW OEDEMA

Administration of ethanolic extract of H.indicus orally in the dose of 100mg/kg body weight whoed a significant reduction in rat paw oedema The mean paw volume of albino rats was found to be 1.2±0.06. The mean percentage of inhibition of inflammation was 56% and 'P' value was found to be < 0.01 which was also statistically significant. Tween 80 was used as a vehicle and the effects of both the ethanolic and aqueous extracts of H.indicus were compared with diclofenac sodium as a standard, which showed a mean paw volume of 1.11±0.14 and the meanPercentage inhibition of inflammation was 67% and the 'P' value was found to be <0.01 which is statistically significant.

5. DISCUSSION & CONCLUSION :

Inflammation represent a series of homeostatic events that have evolved to aid in our survival in the face of pathogens and tissue injury .viewed in this context better anti –inflammatory therapy runs the risk of blocking such events and thereby doing more harm than good .beyond the global issue of survival blockade of physiologically important mediators [such as prostaglandin ,leukotriene ,cell adhesion molecule or cytokine mediated events] will be associated with some degree of cellular and organ system toxicity .thus it may be difficult or impossible to avoid toxicity with anti-inflammatory drugs targeted against such mechanisms Due to disadvantage with the use of NSAIDs recently more light is being thrown on the use of herbal remedies in the treatment of acute and chronic inflammatory disorders which are associated with lesser systemic toxicity .one such plant namely hemidesmus indicus has been evaluated in this study for its anti-inflammatory and analgesic properties.The findings of the present study pertaining to the effect of aqueous and ethanolic extract of Hemidesmus indicus exhibits anti-inflammatory activity. The anti-

inflammatory activity is evidenced by a significant reduction in rat paw edema induced by subplantar injection of carrageenan. The aqueous and ethanolic extracts have produced approximately 52% and 56% inhibition of inflammation respectively. This effect is comparable with that of diclofenac sodium, a derivative of phenylacetic acid, a non specific cox inhibitor which produced 67% inhibition of inflammation in this model. Though less efficacious, aqueous and ethanolic extracts of *Hemidesmus indicus* are devoid of serious side effects such as gastritis, which is commonly seen with NSAIDs. In fact *Hemidesmus indicus* has antiulcer activity. The notion that blockade of COX responsible for many of the side effects of currently available NSAIDs has spurred efforts to develop COX-2 specific agents. The safety of selective COX-2 inhibitors during chronic long term therapy is yet to be established. So non selective NSAIDs plus omeprazole or misoprostol may be appropriate in those patients at high risk for gastrointestinal toxicity. The combination of drugs like diclofenac with misoprostol may pose problems like high acquisition cost and some patients experience abdominal pain and diarrhoea from the misoprostal component. The anti-inflammatory response along with the antiulcer activity of *Hemidesmus indicus* will be a great boon in the treatment of inflammatory disorders. It may have the advantage of both efficacy and cost effectiveness over the non selective COX inhibitors. Further studies can be carried out to isolate the active principle responsible for the anti-inflammatory and analgesic effects of *Hemidesmus indicus*.

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