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ASSESSMENT OF THE ANTI-INFLAMMATORY EFFECT OF A FOLKLORE MEDICINAL PLANT – TILIACORA ACUMINATA MIERS

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ABSTRACT

The plant *Tiliacora acuminata* is a Menispermaceae member found all over India. The plant is well known for its folklore uses as an analgesic and anti-inflammatory drug. Diclofenac sodium was used as the standard drug and the test drug used was the *kashaya* (decoction) of the whole plant. Both the test drug and the standard drug in the corresponding doses were administered orally to the respective groups for 5 consecutive days. 24 hours after the 5th dose oedema was induced in the left hind paw of all the animals using 20µl of 1%carageenan in normal saline. The paw thickness measurement was taken using vernier calipers before induction, just after injection of carageenan, then every hour upto the 6th hour and then the 24th hour**.** The acute anti-inflammatory study done in carageenan induced paw oedema model showed significant results in the high dose treated group comparable with that of the standard drug Diclofenac sodium.

Keywords: *Tiliacora acuminata,* Anti-inflammatory, paw oedema, acute inflammation

INTRODUCTION

The plant *Tiliacora acuminata* Miers is a creeper of the family Menispermaceae. This plant is commonly known as *Vallikanjiram* in Malayalam though it is not in any way related to *kanjiram* (Strychnos nux-vomica of Loganiaceae family) except for some resemblance in its foliage.[1] This plant has not been described in any of the classical *āyurvedic* texts. *Ācarya* P.V Sharma gives the botanical identity for a drug *Krşņavetra* as *Tiliacora acuminata* Miers. This name indicates that the plant has a dark color and is like *vetra* i.e, bamboocane. It is seen that the branches of *Tiliacora acuminata* is dark in color and the branches are highly flexible. The long and flexible branches are used for thatching and basket work. The stem is used as rough cordage in South Vietnam.[2]*Krşņavetra* has references in *Cakraduttam Kuştha cikitsa* and *Vangasēna Samhita Vişa pratishedam*[3] This plant is said to be used by some tribal communities as an antidote for snake venom[4]. In Bangladesh some folk practitioners are using this drug for wound healing[5]. In Kerala many traditional practitioners are using this drug for treatment of conditions like

vātakaṇṭakam which is a very painful condition.

Pharmacological study

Collection and processing of drug

The plant *Tiliacora acuminata* Miers was collected from Puthuparambu, Kottakal. The whole plant collected was washed 3-4 times in water and shade dried. The shade dried plant was crushed and then made into powder. 20g of this powder was taken and soaked in 60 ml of double distilled water. Then the decoction was prepared by standard *Ayurvedic* procedures. i.e 8 times water (160ml) was added and was reduced to one fourth by boiling. This decoction was filtered and centrifuged. The supernatant was collected and further evaporated in a water bath till the extract was dry. The yield was 6.2g. This was reconstituted in 35ml of autoclaved double distilled water and stored in freezing temperature. This prepared drug was used for the whole experiment.

Materials

Reagents and instruments

- Diclofenac sodium
- Ranbaxy
- 1% carageenan
- 0.1g carageenan was dissolved in 10ml normal saline.
- Vernier calipers

Animals

Male Balb/c mice (4-8 weeks old, 20-30g body weight) were obtained from the animal breeding section of Amala Cancer Research Centre, Thrissur. The animals were maintained in well ventilated polypropelene cages under standardized environmental conditions (22 -28^0 C, 60 – 70% relative humidity, 12 hr dark / light cycle) and fed with standard mouse feed (Lipton India) and water *ad libitum*. All the animal experiments were carried out at Amala Cancer Research Centre by prior permission of Institutional Animal Ethics Committee (IAEC) (No.149/1999/CPCSEA).

Anti-inflammatory study[6]

30 male balb/c mice aged 4-6 weeks weighing 20-25g were selected and grouped as follows with 6 animals in each group

Control: which received no treatment?

Standard: which received Diclofenac sodium in the dose of 10mg/kg body weight

Group1: This received the test drug in a dose of 125mg/kg body weight

Group 2: This received the test drug in a dose of 250mg/kg body weight

Group 3: This received the test drug in a dose of 500mg/kg body weight

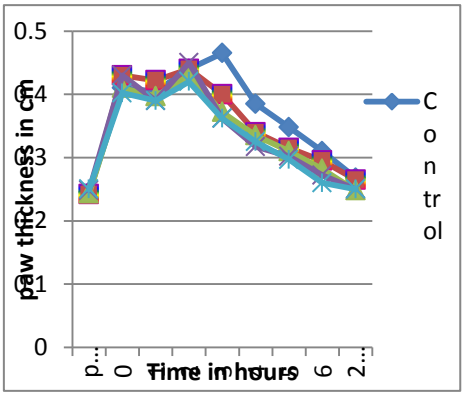
Diclofenac sodium and the test drug in the corresponding doses were administered orally to the respective groups for 5 days. 24 hours after the 5th dose oedema was induced in the left hind paw of all the animals using 20µl of 1%carageenan in normal saline. The paw thickness measurement was taken using vernier calipers before induction, just after injection of carageenan, then every hour upto the 6th hour and then the 24th hour**.**

Statistical analysis: The statistical analysis of the data was done by using Instat Graphpad software

Results:Anti-inflammatory study: The anti-inflammatory effect of *Tiliacora acuminata* Miers decoction was assessed by carageenan induced paw oedema method by measuring the paw thickness using vernier calipers.The drug was assessed for its acute anti-inflammatory effect in carageenan induced acute paw oedema model in Balb/c mice. The standard drug used was Diclofenac sodium and the test drug was administered in 3 different doses- half of therapeutic

dose (125mg/kg body weight), therapeutic dose (250mg/kg body weight) and double therapeutic dose (500mg/kg body weight). The assessment was done by measuring the paw thickness every hour up to the 6th hour and in the 24th hour using vernier calipers. The paw thickness measured up to the 3rd hour did not have any significant difference between the groups. All the groups showed highly significant reduction in paw oedema when compared to the control group ($p<0.001$). The groups which received the test drug in the therapeutic dose and in double the therapeutic dose showed almost same effect as the standard drug. The half dose group showed significant reduction in paw oedema when compared with control but it was not as effective as the therapeutic dose, double dose and standard drug. In the 4th hour also all the groups showed highly significant reduction in paw oedema when compared to the control group. All the groups which received test drug showed anti-inflammatory effect comparable with the standard drug. In the 5th hour of assessment, also all the groups showed highly significant reduction in paw oedema when compared to the control group. The double dose group and the therapeutic dose group showed anti-inflammatory properties almost as same as the standard drug. The half dose group showed a lesser anti-inflammatory effect than the other groups. In the 6th hour, the half dose group did not show any significant reduction in paw oedema when compared with the control group. All the other groups showed significant reduction in paw oedema when compared to the control group. In the 6th hour only the double dose group showed anti-inflammatory activity comparable to the standard drug. In the 24th hour of assessment, the half dose group did not show any significant reduction in paw oedema. All other groups showed significant reduction in paw oedema when compared to the control group. Among those the group which received the therapeutic dose and double dose showed highly significant effect ($p<0.001$), the anti-inflammatory effects of the therapeutic dose group and the double dose group were comparable to the effect of the standard drug. Thus the statistical analysis showed that the drug in all the 3 doses had significant effect in reducing the paw thickness from the third hour of injection onwards. The double dose group and the therapeutic dose treated groups showed significant, sustained results up to the 24th hour of assessment. These two groups showed anti-inflammatory effects which were comparable with that of the standard drug.

Results and discussion: Regarding the plant *Tiliacora acuminata* Miers, the plant is a new one to the *Āyurvedic* pharmacopoeia. So the *Āyurvedic* pharmacological properties are not mentioned anywhere. The *rasa pancaka* of this drug can only be assessed to a certain extend of surety. The *rasa* of the drug when assessed by the *nipāta* method was found as *tikta* by the volunteers without any difference in opinion. So being *tikta* we can assume that the drug may have *laghu, rukşa gunas* and hence may cause *pitta śamana*



property in the body. The drug was found to have a very good anti-inflammatory property which may be attributed to this. From assessing the type of reaction with distilled water, it was found to be exothermic, so it may be inferred to be an *uşna Vīrya* drug. Thus it may also have a *kapha vāta śamana* property. It may be considered as having *katu vipaka*. Considering the above mentioned findings, we can infer that the drug being *tikta rasa, ushna Vīrya* and *katu vipaka* may possess a *pācana* property. In *s'opha samprapti* all the 3 *doşas* have their own roles to play. *Pitta* causes *pāka, kapha* causes the *puya* and *vāta* causes *ruja* in *s'opha*. So this drug alleviates the *paka* in *s'opha* by doing *pitta s'amana*, alleviates the swelling by reducing *kapha* thus causing the reduction in paw thickness.

Tiliacora acuminata Miers[7], a plant belonging to Menispermaceae, is known to be the biggest source of diphenylbisbenzylisoquinoline (DBBI) which are well known for their pharmacological activities such as antitumor (Kupchan etal 1973), antimicrobial (Wu, W.-N. etal 1976) and hypotensive effects (Joshi etal 1974, Wu, W.-N. etal 1976).It[8]has been shown that prostaglandins, histamine, serotonin, and bradykinin are mediators of different phases of carrageenan-induced oedema. Di Rosa[9] et al., Capasso [10et] al., and Salvemini[11] et al. have also reported the involvement of histamine, 5-hydroxytrptamine, bradykinin, prostaglandin, and nitric oxide in carrageenan-induced paw oedema. The alkaloids, flavanoids and tannins present in the drug may be contributory to the anti-inflammatory effects.

Another [12] study indicated that the extracts ethanol (70%), hexane, ethyl acetate and methanol extracts of *Tiliacora acuminata* showed good antioxidant activity. Among the all the extracts ethyl acetate extract showed better activity. Although the anti-oxidant activities found invitro experiment were only indicative of the potential health benefit, these results remain important as the first step in screening anti-oxidant activity of *Tiliacora acuminata*. Antioxidant activity can be considered with potential health benefits in many diseases like Parkinsonism, autoimmune disorders and also in diseases where inflammation is considered as the basic pathology. So this is also indicative of its anti-inflammatory effect.

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