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PHARMACOLOGICAL EVALUATION OF DIFFERENT EXTRACTS OF *BOSWELLIA SERRATA* ON XYLENE INDUCED MICE EAR EDEMA

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ABSTRACT
Inflammation is the local response of living mammalian tissues to injury due to any agent. It is the body defence reaction in order to eliminate or limit the spread of injurious agent, followed by removal of the necrosed cells and tissues. Prolonged uses of both steroidal and non-steroidal anti-inflammatory drugs are well known to be associated with peptic ulcer formation, hence search for new anti-inflammatory agents that retain therapeutic efficacy and yet are devoid of these adverse effects is justified. The present study was aimed to investigate the anti-inflammatory activity of commercial and hexane extracts of Boswellia serrata in Swiss albino mice. In acute model, xylene was used to induce inflammation in mice ear. The both extracts has significantly ($p \leq 0.05$) decrease in ear edema as compared to the untreated vehicle control group.

Key words: *Xylene, Swiss Albino Mice, Boswellia serrata, Diclofenac Sodium.*

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INTRODUCTION

Inflammation if fundamentally a protective response, the ultimate goal of which is to rid the organism of both the initial cause of cell injury (e.g., Microbes, toxins) and the consequences of such injury(e.g., necrotic cells and tissues).Although clinical features of inflammation were described in an Egyptian papyrus (dated around 3000BC), Celsus, a Roman writer of the first century AD, first listed the four cardial signs of inflammation: rubor (redness), tumor (swelling), Calor (heat), and dolor (pain). A fifth clinical sign, loss of function (functioleasea) was later added by Virchow.[1]

The enzyme, Phospholipase A_2, is known to be responsible for the formation of mediators of inflammation such as prostaglandins and leukotrienes which by attracting polymorphonuclear leucocytes to the site of

inflammation would lead to tissue damage probably by the release of free radicals. PhospholipaseA_2 Converts phospholipids in the cell membrane in to arachidonic acid, which is highly reactive and is rapidly metabolized by cyclooxygenase (prostaglandin synthase) to prostaglandins, which are major components that induce pain and inflammation.[2,3]

Inflammation is terminated when the offending agent is eliminated and the secreted mediators are broken down or dissipated. In addition, there are active anti-inflammatory mechanisms that serve to control the response and prevent it from causing excessive damage to the host.

Many anti-inflammatory drugs (both NSAID's and corticosteroids) have been developed but the safety profile studies have shown that none of them is clearly safe.[4] They show wide ranges of adverse effects due to adverse reaction of synthetic and chemical medicines being observed round the globe, herbal medicines have made a comeback to improve our basic health needs. The use of herbal and other naturally based medicine has a minimum or no side effects. However the utilization of whole plants, plant crude preparation, isolation of active constituents that has biological activity are used as folk medicines for various disease shows the way for new alternative treatment. [5]

Salai guggal, an oleo-gum-resin from *Boswellia serrata, (*Familly-Burseraceae) is also known as Frankincense in English and Olibanum in Arabian. This tree, abundantly growing in dry hilly tracts of India, yields oleo-gum-resin which has been used for variety of therapeutic purposes, such as 1)cancer,[6]2)inflammation,[7] 3)arthritis,[8] 4)asthma, [9]5)psoriasis,[10]6) colitis,[11] 7) crohn's diseases,[12]and 8)hyperlipidemia[13]. This present study emphasis to Pharmacological evaluation of anti-inflammatory activity of Commercial and Hexane extracts of *Boswellia serrata* in different doses (63, 126 and 252 mg/kg) respectively.

MATERIAL AND METHODS:

ANIMALS:

Male Swiss Albino Mice were obtained from the colonies maintains at Central Animal Facility, Natural Remedies Pvt. LTD, Bangalore, and housed three animals per cage with paddy husk as bedding. Animals were housed at temperature of 25±2^{o}C and relative humidity of 30-60%. A 12:12 h light and dark cycle was followed. The animals were allocated to different treatment groups and each animal in a group was recognized by mark of picric acid on the fur. Animals had free access to pellet feed and purified water *adlibitum.* Institutional Animal Ethic Committee (IAEC) Registration No-32/SASTRA/IAEC/RPP has been approved to carry out the animal experimental work.

STANDARD DRUGS/CHEMICALS:

Diclofenac Sodium (Voveran, Novartis Pharmaceutical Ltd.) and Xylene, Chemlabs, Bangalore, was used for experiments. All other experimental chemicals and solvents used were of analytical grade.

PREPARATION OF PLANT EXTRACTS:

DOSES:

Boswellia serrata were prepared in 1% Tween-20 and1% DMSO (Dimethyl Sulphoxide) as a suspension and administered to the respective doses.

ACUTE ORAL TOXICITY STUDY:

As per the OECD 423 guidelines, the herbal extracts at different doses up to 2000 mg/kg was administered and the animal were observed for behavioral changes, the animals were observed for a further 14 days for any signs for delayed toxicity. The Commercial and Hexane extracts of *Boswellia Serrata* has good margin of safety and did not shown the lethal effects on the animals up to the doses of 2000 mg/kg.

STATISTICAL ANALYSIS:

The data expressed as MEAN ± SEM for each treatment group. The data obtained for each response measure were subjected to one way analysis of variance (ANOVA) followed by Dunnet´s "t"- test.

XYLENE INDUCED MICE EAR EDEMA MODEL:

ANIMALS:

Animal : Swiss Albino Mice
Sex : Male
Weight : 23-27 gm
Animals per Group : 6
Number of groups : 8

EXPERIMENTAL DESIGN FOR XYLENE INDUCED MICE EAR EDEMA MODEL:

Group-I: Vehicle control received 1%Tween 20 + 1%DMSO (dose: 10 ml/kg).
Group-II: Animals treated with Diclofenac sodium (dose: 50 mg/kg).
Group-III: Animals treated with *B. serrata* – commercial ext (dose: 63 mg/kg).
Group-IV: Animals treated with *B. serrata* – commercial ext (dose: 126 mg/kg).
Group-V: Animals treated with *B. serrata* – commercial ext (dose: 252 mg/kg).
Group-VI: Animals treated with *B. serrata* – Hexane ext (dose: 63 mg/kg).
Group-VII: Animals treated with *B. serrata* – Hexane ext (dose: 126 mg/kg).
Group-VIII: Animals treated with *B. serrata* – Hexane ext (dose: 252 mg/kg).

EXPERIMENTAL PROCEDURE[14]:

The effect of extract on acute edema was assessed by using xylene induced ear edema in mice. Sixty minutes after oral administration of extracts, Diclofenac sodium, 50µl of xylene was applied to the anterior and posterior surfaces of the right ear under light ether anesthesia. The left ear was considered as control. Four-hour later xylene application mice were sacrificed by cervical dislocation and both ears were removed. Ear lobes were punched out in circular disc using metal punch (6 mm diameter) and weighed. The difference in the weight of discs from right treated and left untreated was calculated and was used as measure of edema. The level of percentage inhibition was calculated using the formula,

$$\text{Percentage inhibition (\%)} = \frac{\text{Control- Treated}}{\text{Control}} \text{X } 100$$

TABLE 1: EFFECT OF DIFFERENT EXTRACTS OF *B. SERRATA* ON XYLENE INDUCED MICE EAR EDEMA

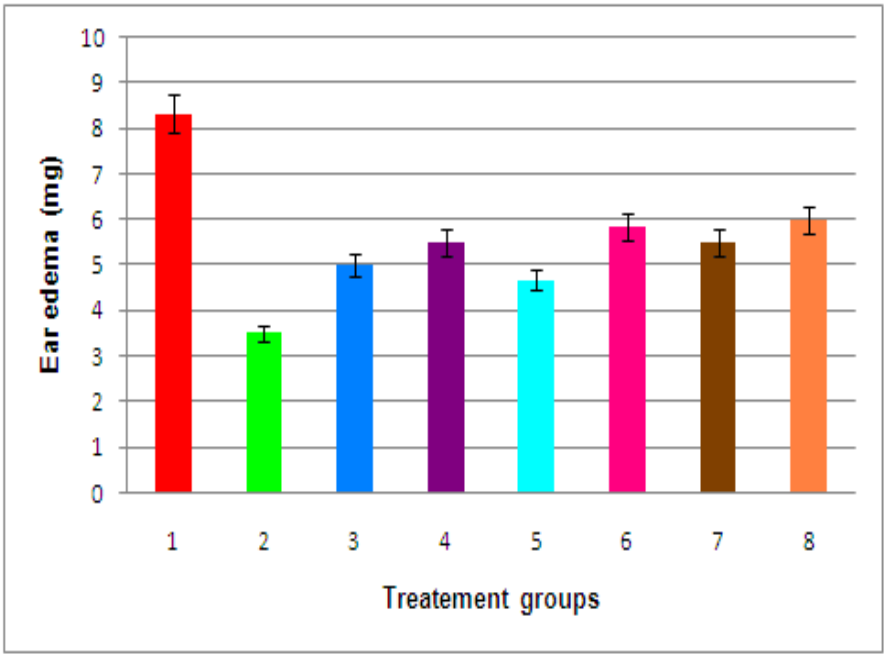
Treatment groups	Ear edema (mg)	Percentage inhibition (%)
I Vehicle control (10 ml/kg)	8.33 ± 0.61	-
II Diclofenac sodium (50 mg/kg)	3.50 ± 0.22*	57.98
III *B.serrata* Commercial extract (63 mg/kg)	5.00 ± 0.58*	39.98
IV *B.serrata* Commercial extract (126 mg/kg)	5.50 ±0.22*	33.97
V *B.serrata* Commercial extract (252 mg/kg)	4.67 ± 0.21*	43.94

VI B. serrata Hexane extract (63 mg/kg)	5.83 ± 0.48*	30.01
VII B. serrata Hexane extract (126 mg/kg)	5.50 ± 0.56*	33.97
VIII B. serrata Hexane extract (252 mg/kg)	6.00 ± 0.52*	27.97

Values are expressed as mean ± SEM; n=6

* p≤0.05 Vehicle control Vs Diclofenac sodium/commercial and hexane extracts of *B. serrata*

FIG: 1 EFFECT OF DIFFERENT EXTRACTS OF *B.SERRATA* ON XYLENE INDUCED MICE EAR EDEMA



Group I Vehicle Control (10 ml/kg)
Group II Diclofenac Sodium (50 mg/kg)
Group III *B.Serrata* Commercial ext (63 mg/kg)
Group IV *B.Serrata* Commercial ext (126 mg/kg)
Group V *B.Serrata* Commercial ext (252 mg/kg)
Group VI *B.Serrata* Hexane ext (63 mg/kg)
Group VII *B.Serrata* Hexane ext (126 mg/kg)
Group VIII *B.Serrata* Hexane ext (252mg/kg)

RESULT AND DISCUSSIONS

Xylene induced mice ear edema method has certain advantages for natural product testing and has good predictive values for the screening of anti-inflammatory agents.

Xylene causes instant irritation of the mice ear which leads to fluid accumulations and edema characteristic of an acute inflammatory response, suppression of this response is a likely indication of anti-phlogistic effects[15].

Oral administration of extracts in different doses, 60 min before topical application of xylene, inhibited the development of ear edema. The inhibitory effect of extracts was significant at

nearly all doses as shown in the table1. The inhibition produced by *Boswellia serrata* Commercial extract at 63 mg/kg (39.98%) which was lesser than that produced by 252 mg/kg (43.94%), but greater than 126 mg/kg (33.97%).

Boswellia serrata – Hexane extract of dose level of 126 mg/kg inhibited inflammation (33.97%) which was potent inhibition as compared to 63 mg/kg (30.01%) and 252 mg/kg (27.97%). Diclofenac sodium inhibited the inflammation (57.98%) at 50 mg/kg.

The dose levels selected for Xylene induced mice ear edema model, *Boswellia serrata* - Commercial extract 63 mg/kg, 126 mg/kg, and 252 mg/kg, from which 252 mg/kg was potent. *Boswellia serrata*- Hexane extract 63 mg/kg, 126 mg/kg, and 252 mg/kg, from which 126 mg/kg was potent.

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