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Anti-inflammatory effect of methanolic extract leaves of *Anogeissus accuminata*

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ABSTRACT

The aim of this study is to establish the anti-inflammatory activity of the Methanolic extract of *Anogeissus accuminata* leaves with its fractions and to delineate the possible mechanism of action of methanolic extract of *Anogeissus accuminata*. The anti-inflammatory activities of methanolic extract of *Anogeissus accuminata* was evaluated in a Dextran induced model of acute inflammation and the paw edema volume was measured. Methanolic extract of *Anogeissus accuminata* (300mg/kg, body wt, p.o) significantly reduced Dextran induced paw edema in rats. Methanolic extract of *Anogeissus accuminata* possesses significant anti-inflammatory activity.

Key words: *Anogeissus accuminata*, anti-inflammatory.

INTRODUCTION

The importance of medicinal plants in traditional health care practices, providing clues to new areas of drug research and biodiversity conservation is now well recognized. Inflammation is a complex biological response of vascular tissues to harmful stimuli such as pathogens, damaged cells and irritants. It is the protective attempt by the organism to remove the injurious stimuli as well as initiate healing process for the tissue and considered to be the major cause of rheumatoid arthritis. Drugs currently used for management of pain and inflammatory conditions present toxic side effects on chronic administration. Therefore, attempts are being taken to study promising plants which may lead to develop newer or safer drugs¹.

Anogeissus accuminata is a moderate size tree with small leaves, which falls earlier on the dry season². Its local names include Button tree, Pasichettu, Peddmanu, Buchakram. Leaves of the plant are used in traditional and tribal medicine of Andhra Pradesh to treat painful inflammatory conditions and commonly used in India by the tribal people for the treatment of liver disorders, diarrhoeal diseases and cancer disorders³. A perusal of the literature revealed that although *Anogeissus acuminata* is widely used in traditional medicines as an anti-inflammatory agent, these properties have not been scientifically evaluated. Therefore, the present study is an attempt to investigate the anti-inflammatory properties of the methanolic extract of *Anogeissus acuminata* leaves in experimental animals.

MATERIALS AND METHODS

Plant material extraction:

The leaves of *Anogeissus accuminata* (solanaceae) was collected in march 2010 from S.V.university, Tirupathi, Andhra pradesh, India. The plant material was taxonomically identified by the botanist Dr. K. Madhavachetty and the voucher specimen was retained in our laboratory for future reference. The leaves were dried, powder material (500g) of the leaves of *Anogeissus accuminata* was extracted with 2000ml of methanol in a Soxhlet apparatus. The methanol extract was distilled, evaporated and dried in vacuum. The resulted extract yield was 7.45% and the appearance of the extract was dried gum resin in nature. The chemical constituents of the extract were identified by qualitative analysis followed by their conformation through the literature.

Experimental animals:

Wistar rats (110-340g, fasted) of either sex were used and grouped and housed in polyacrylic cages (six animals per cage) and maintained under standard laboratory conditions (temp 24-28°C, relative humidity 60-70% and 12hr dark light cycle). They were fed commercial rat feed and boiled water was given adlibitum. All animal experiments were carried out according to NIH guidelines after getting the approval of the Institute's Animal Ethics Committee (Reg.No.1447/PO/a/11/CPCSEA).

Dextran-induced rat paw edema:

Edema was induced in rats according to the method of winter et al (1962)⁴. 0.1ml of 1% Dextran (sigma chemical company) was injected into the right hind paw, under the plantar aponeurosis. Group I animals were administered with only Dextran. In a separate group of animals (group II), Indomethacin (5mg/kg) was administered orally. The plant extract in 300mg/kg dose was administered orally to the animals of group 3, 30min before Dextran injection. The hind paw volume was measured plethysmographically just before and three hours after Dextran administration. The difference in left and right paw volumes indicated the degree of inflammation. The anti inflammatory activity of the plant extract was estimated as the degree of edema inhibition.

RESULTS

Anti-inflammatory activity:

Table: 1 reveals the methanolic extract of *Anogeissus accuminata* at 300mg/kg dose significantly inhibited the Dextran induced paw edema in rats. At 300 mg/kg it showed 75% inhibition after 3hr of Dextran injection. Indomethacin (5mg/kg) produced 83.33% inhibition of edema formation.

Table I. Effect of the Methanolic extract of *Anogeissus accuminata* on rats left hind paw edema induced by Dextran

S.No.	Group	Dose	Paw Volume (ml)			
			1 st hr	2 nd hr	3 rd hr	4 th hr
1	Control (Normal saline)	0.3ml	0.25±0.001	0.42±0.001	0.52±0.002	0.33±0.001
2	MEAA	300mg/kg	0.16±0.001 (38.25%)	0.28±0.001 (33.73%)	0.32±0.001 (39.08%)	0.18±0.001 (45.35%)
3	Indomethacin	5mg/kg	0.13±0.001 (50.20%)	0.24±0.001 (42.93%)	0.28±0.002 (45.79%)	0.15±0.001 (54.47%)

n=6 animals in each group, values are Mean ± SEM; *p*<0.001 when compared to control by Dunnett's test.

DISCUSSION

Although several agents are known to treat chronic inflammatory diseases, prolonged use of these agents should be avoided due to serious or adverse side effects. Consequently, there is a need to develop new anti-inflammatory agents with minimum side effects. Plants are used for treating various diseases like rheumatism, fever, infection, edema etc., Analgesic drugs available in the market today also exert a wide range of side effects. The study of plant species traditionally used as pain killers should still be seen as a logical and fruitful research strategy, in search of analgesic drugs. Inflammation is a complex process and various mediators like prostaglandins, leucotriens, platelet activating factor etc., have been reported to be involved in the development of inflammatory diseases.

The results of present study revealed that the time course of edema development in Dextran induced paw edema models in rats is generally represented by a biphasic curve⁵. The first phase occurs within an hour of injection and is partly due to the trauma of injection due to the serotonin component⁶.

Prostaglandins play a major role in development of the second phase of reaction which is measured around 3hr time⁷The presence of prostaglandins in the inflammatory exudates from the injected foot can be demonstrated.

Dextran induced paw edema model is known to be sensitive to cyclooxygenase inhibitors and has been used to evaluate the effect of non-steroidal anti-inflammatory agents which primarily inhibit the enzyme cyclooxygenase involved in prostaglandin synthesis. Based on these reports, it can be inferred that the inhibitory effect of *Anogeissus accuminata* Dextran induced inflammation in rats could be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis⁸. Phytochemical reports on *Anogeissus accuminata* have shown the presence of alkaloids and tannins which are considered to produce significant anti-inflammatory effects.

Further studies are warranted on these lines to pinpoint the chemicals and their exact mechanism of action.

CONCLUSION

It can be concluded from present study that *Anogeissus accuminata* leaf extract can be used for the development of a herbal drug for anti-inflammatory conditions and warrants further studies to decipher its exact mechanism of action.

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