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Research Article

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Anti-inflammatory activity of *acacia catechu* bark extract-*in vitro* study

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ABSTRACT

Rheumatoid arthritis (RA) is a chronic inflammatory disease characterized by joint swelling, joint tenderness, and destruction of synovial joints, leading to severe disability and premature mortality. Acacia catechu Willd. Commonly known as karungali in Tamil and Khadira in Sanskrit .Chemical constituents are well known for their potential health benefits and have been reported to possess valuable biological activities such as antibacterial and antifungal, antioxidant, antiurolithiatic, anticonvulsant and anxiolytic, and hepato protective properties. The aim of this article is to investigate the Anti inflammatory activity of Acacia catechu Bark ethanolic extract.

Keywords: *Acacia catechu* Bark, Anti-Inflammatory, Biological, Rheumatoid arthritis, inflammation.

INTRODUCTION

Inflammation is the body's immediate response to damage tissues and cells by pathogens, certain stimuli such as chemicals or even by physical injury.[1,2] Acute inflammation is a short term response that usually results in healings. For example ; leukocytes infiltrate the damaged region , removing the stimulus and thus repairing the tissues.[3] On the other hand, chronic inflammation is a prolonged, and unregulated response that involves acute inflammation , tissue destruction and also attempts at tissue repair. [4-6]Such persistent inflammation is associated with many chronic human diseases , including allergy , rheumatoid arthritis , and also autoimmune diseases. In specific , rheumatoid arthritis is an autoimmune disease that can cause chronic inflammation of the joints and other areas of the body. Moreover, inflammatory mediators are released from tissues during injury or any inflammatory reactions.[7] They are capable of producing edema when injected locally. Stimulation of smooth muscles contraction *in vitro* and even in the alternating blood pressure when injected systemically. Histamine, major basic protein, complement, and arachidonic acid metabolites are examples of inflammatory mediators. Furthermore, NSAID's are prescribed for anti inflammatory actions. Because all NSAIDs can produce side effects, patients, especially if they are elderly, the drug should be selected carefully for the corresponding treatment.

Acacia catechu belongs to the family *leguminosae*. The common names includes cutch, black catechu, black cutch, wattle bark, black cattle . [8-10]*Acacia* bark is an herbal plant used mainly for digestive disorders and to treat diarrhea. it is a natural astringent rich in tannic acid .11- Recent studies reported that *Acacia catechu* bark extract may aid to block the bodies pain trigger mechanism. it possess significant pharmacological , nutritive value. Acacia bark is hardened woody with a rusty appearance, brown color it contain tannins and Gallic acid. It is also employed in tanning industry. [15-18] *Acacia* bark is commonly used in maintaining dental and oral hygiene. The fresh twigs is used for the protection of gums and teeth.[19-22] It is also considered useful as an external application for mouth ulcers , it reduces gingival inflammation. Used in case of leprosy in rural areas.

EXPERIMENTAL SECTION

Plant material

Acacia catechu Bark is obtained as an gift sample from Green Chem Herbal Extracts & Formulations, Bangalore.

Chemicals
Diclofenac sodium is obtained from sigma Aldrich (USA), All the chemicals used were of analytical grade.

EVALUATION OF INVITRO ANTI-ARTHRITIC ACTIVITY
Inhibition of Protein Denaturation method[23] ,[24]
Concentration of test substance: 1000 to 200µg/ml
Standard: Diclofenac sodium
Chemicals Required : Bovine serum albumin, 1N HCl, Phosphate buffer (pH 6.3)
Instrument : Incubator, Spectrophotometer - 660nm

The following 4 solutions is used
Test solution (0.5ml) consists of 0.45ml of bovine serum albumin (5%w/v aqueous solution) and 0.05ml of test solution.
1. **Test control** solution (0.5ml) consists of 0.45ml of bovine serum albumin (5%w/v aqueous solution) and 0.05ml of distilled water.
2. **Product control** (0.5ml) consists of 0.45ml of distilled water and 0.05ml of test solution
3. **Standard solution** (0.5ml) consists of 0.45ml of bovine serum albumin (5%w/v aqueous solution) and 0.05ml 0f Diclofenac sodium (200µg/ml).

All of the above solutions were adjusted to pH 6.3 using a small amount of 1N Hcl. The samples were incubated at 37°C for 20minutes and heated at 57°C for 3 minutes. After cooling, add 2.5ml of phosphate buffer to the above solutions. The absorbance of the solutions was measured using UV-Visible spectrophotometer at 416nm. The percentage inhibition of protein denaturation was calculated using the formula.
The percentage inhibition of Protein denaturation will be calculated as follows.

$$\text{Percent Inhibition} = 100 - \frac{\text{OD of test solution} - \text{OD of product control}}{\text{OD of test control}} \times 100$$

The control represents 100% protein denaturation. The result is compared with Diclofenac sodium treated sample.

RESULTS AND DISCUSSION

Acacia catechu Bark exhibits significant anti inflammatory activity. The ethanolic solvent form of Acacia Bark shows an inhibitory activity when tested at 200-1000 µg/ml by inhibiting denaturation of protein and its effect was compared with standard drug diclofenac sodium. The results are depicted in table 1 and represented in Fig 1. Auto antigen production in rheumatoid arthritis is due to denaturation of protein. From the results of the present study it can be stated that ethanolic bark extract of *Acacia catechu* is capable of controlling the production of auto antigen and inhibiting the protein denaturation in rheumatoid arthritis.

Fig 1 : *invitro* Anti- Inflammatory activity of *Acacia catechu Bark* Extract

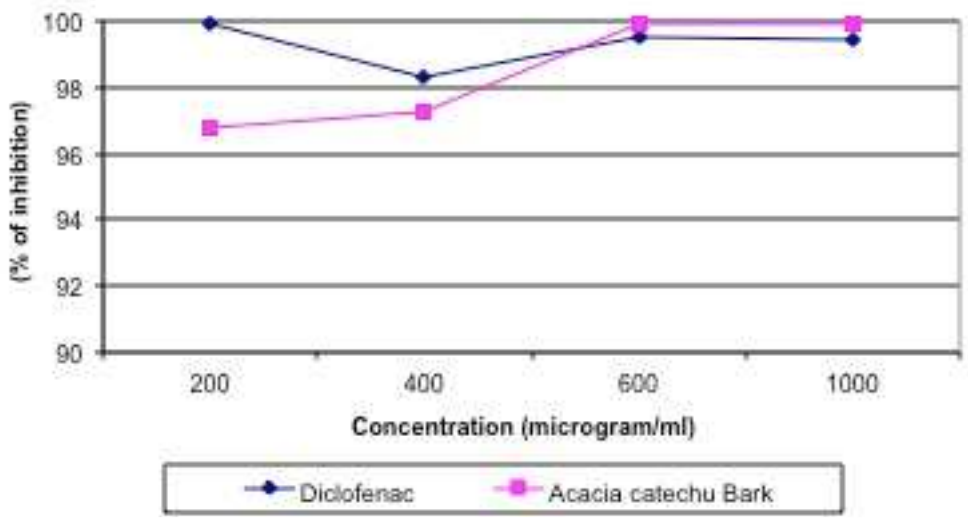

Table 1: *invitro* Anti- Inflammatory activity of *Acacia catechu Bark* Extract by inhibition of protein denaturation method

S.NO	Concentration µg/ml	Diclofenac % of Inhibition	*Acacia catechu* Bark extract % of Inhibition
1	200	99.88	99.92
2	400	98.27	99.91
3	800	99.52	99.88
4	1000	99.45	99.96

CONCLUSION

The *invitro* study by the inhibition of protein denaturation method emphasizes the anti-inflammatory/ anti arthritic efficacy of herbal extract similar to that of standard diclofenac sodium. The anti arthritic activity is due to the presence of flavonoids, phenols, polyphenols, and steroids. Further studies are mandatory, to identify the active constituent(s), that is responsible for the anti inflammatory efficacy.

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