Anti-inflammatory Activity of Root of *Dalbergia sissoo* (Rox.b) in Carrageenan-Induced Paw Edema in Rats

Sagar Manoj Kumar[1]*, Upadhyaya Kumud[2]

[1]College of Pharmacy, GRD (PG) IMT, 214, Rajpur Road Dehradun.
[1]Present address: College of Pharmacy, GRD(PG)IMT, 214, Rajpur Road Dehradun.
[2]Department of pharmacy, Kumaun University Bhimtal, Nanital (U.K.)
* Corresponding author. Tel.: +91-9458411789. E-mail address: manojsagar@live.com.

ABSTRACT

Dalbergia sissoo Roxb commonly known as Indian rosewood found throughout India, Bangladesh, Pakistan and Nepal up to 900 m. The root of *Dalbergia sissoo* Roxb was collected and then dried. The phytochemical analysis of hexane, chloroform and methanol extract revels presence of different phytochemical constituent's. The methanolic extract showed the presence of Alkaloids, Carbohydrates, saponins, flavonoids, glycosides (Cardiac glycosides, anthraquinone glycoside and saponin glycosides) and steroids.
The methanolic extract of *Dalbergia sissoo* Roxb was investigated for anti-inflammatory activity in experimental animal models. Treatment with 70% methanolic extracts of *Dalbergia sissoo* demonstrate a diminished inflammation in rat hind paw when challenged with carrageenan induced paw edema. The methanolic extract of *Dalbergia sissoo* root at 1000 mg/kg showed the most potent anti-inflammatory activity compared to the other groups (100 and 500 mg/kg) throughout the observation period. *Dalbergia sissoo* Roxb was devoid of ulcerogenic effect on the gastric mucosa of rats in acute and chronic tests. It was concluded that the *Dalbergia sissoo* root extract possessed significant anti-inflammatory activity without any side effect on gastric mucosa.

Keywords: *Dalbergia sissoo*; phytochemical screening; Anti-inflammatory; methanolic extract
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Author for Correspondence: manojsagar@live.com

INTRODUCTION

Dalbergia sissoo Roxb (Fabaceae) is a medium to large sized gregarious and deciduous having thick rough grayish brown bark. Commonly known as Indian Rose wood found throughout India. It is used as timber or fire wood and for the treatment of a variety of ailments by different ethnic groups.[1–6] *Dalbergia sissoo* Roxb has been used as indigenes system of medicine are reported to be useful in the treatment of arthritis, gonorrhoea and rheumatic pains. *Dalbergia* genus has provided a large number of compounds, which include flavonoids and neoflavonoids have been reported from *Dalbergia sissoo*.[7–9] Although several drugs are used to treat inflammatory disorders but their prolonged uses may cause serve adverse effect. Consequently there is a need to develop new anti-inflammatory agents with minimum side effects. Several plants are being used in traditional medicine for treating there disorder which are inflammatory in nature.[10]

MATERIALS AND METHOD

Plant Material

The fresh roots of the plant (*Dalbergia sissoo*) were shade dried at room temperature (25^0–35^0 C) for 20–25 days. The dried roots were powdered in a grinder and weighed before used for calculating the yield. The plants were authenticated by comparison with the herbarium and voucher specimen was lodged in the departmental herbarium of Botanical Research survey of India Dehradun. The voucher specimen has *ID-BSD* 112718.

Preparation of Extracts

The dried powdered roots (300gm.) were subjected to extraction with different solvent as per the decreasing order of polarity, Hexane, Chloroform and methanol with the help of soxhlet apparatus. The plant material

was separated by filtration and different polarity extracts were concentrated (by Rotavapour, Büchi, Switzerland) and lyophilized to preserve it. The percentage yield was calculated. The yields of different extracts were 21.6, 17.3 and 35.5%. Preliminary phytochemical screening was carried out on the extract using the standard screening method.[11] Dilutions of the methanolic extract were made in 2% gum acacia for the pharmacological studies.

Phytochemical Screening

The individual fractions were subjected to the identification of different compounds.[11, 12] The molish's test and fehling's test were carried out for carbohydrate. Mayer's test and Wanger's Test for alkaloids, Aq. Sodium hydroxide test, concentrated sulphuric acid test and shinoda's test were carried out for flavonoids. Foam test for saponins, Salkowiski test and Libermann burchard test for phytosterol, Biuret test, Ninhydrin test and Million's test were carried for proteins and amino acid.

Animals

For anti-inflammatory activity Wistar rats (200–300 g) were kept in the Animal House at the College of pharmacy, GRD (PG) IMT, Dehradun (U.K.) was used. The animals were housed in groups of 6–10 under environmentally controlled conditions with free access to water and standard food. Food was withheld overnight prior to experiments while water was still provided. The handling and use of animals were in accordance to the Guidelines of Institute Animal Ethics Committee were followed while using live animals. All the animals were acclimatized to the laboratory environment for 5 days before the experiment. Six animals per group were used in each experiment. The animals were fasted overnight just prior to the experiment but allowed free access to drinking water.

Anti-inflammatory Activity

In present study anti- inflammatory activity was determined in wistar rats of either sex according to the previously described method.[14] Acute inflammation was produced by subplantar injection of 0.1 ml of 1% suspension of carrageenan with 2% gam acacia in normal saline, in the right hind paw of the rats, one hour after oral administration of the drugs. The paw volume was measured plethysmometrically (Ugo Basile) at '0' and '3' hours after the carrageenan injection. Indomethacin 100 mg/kg, p.o. suspended in 2% gum acacia was used as the standard drug. The inhibitory activity was calculated according to the following formula

$$\text{Percentage inhibition} = \frac{(C_t - C_0)_{control} - (C_t - C_0)_{treated}}{(C_t - C_0)_{control}} \times 100$$

Where C_t = paw circumference at time t, C_0 = paw circumference before carrageenan injection

Statistical analysis

Results are expressed as mean ± S.E.M. statistical evaluations were made using ANOVA followed by t-test (GraphPad InStat software) and P values less than 0.001 were considered significant. Data are represented as mean ± S.E.M.

RESULT

The extraction with different solvent as per the decreasing order of polarity, Hexane, Chloroform and methanol with the help of soxhlet apparatus, the yields of extracts were 21.6, 17.3 and 35.5% (Table 1). Phytochemical screening showed that the alcoholic extract of *Dalbergia sissoo* contains proteins, amino acids, carbohydrates, tannins and flavonoids (Table 2). The effects of methanolic extracts of *Dalbergia sissoo*, on paw edema induced by carrageenan are shown in Table 3. Methanolic extract of *Dalbergia sissoo* possessed anti-inflammatory activity at the 1000 mg/kg dose. A dose of 1000 mg/kg elicited a greater percent inhibition of inflammation after 4 hr. than other groups. These results showed that test drug at the dose level of 1000 mg/kg have the most potent anti-inflammatory activity.

DISCUSSION

Treatment with methanolic extract of *Dalbergia sissoo* produced a diminished inflammation in rat hind paw when challenged with carrageenan. Non-steroidal anti-inflammatory drugs act by inhibiting cyclooxygenase and the production of prostaglandins. Indomethacin offers relief from inflammation by suppressing the production of prostaglandins and bradykinin. The presence of flavonoids has been reported in Dalbergia species,

Table 1: Percentage yield of extracts (Successive extraction) from *Dalbergia sissoo Rox.b* roots

Part of Plant	% Yield		
	Hexane	Chloroform	Methanol
Roots	21.6	17.3	35.5