**[Analgesic and anti inflammatory activity of the methanolic extract of the frontal leaves of Tectona grandis.](https://ispub.com/IJPHARM/8/1/5396)**

*N nayeem, Karvekar*

**Keywords**

analgesic, anti inflammatory., tectona grandis

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**Abstract**

The methanolic extract of the frontal leaves of Tectona grandis was evaluated for its analgesic activity by the Eddy’s hot plate method and the anti inflammatory activity were evaluated using the carrageenan induced paw edema. The results revealed that the analgesic activity was dose dependent. Low dose (250mg/kg body weight) of the frontal leaves extract at 15, 30, 60 and 120 mts.The anti inflammatory activity of the methanolic extract of the frontal leaves of Tectona grandis were evaluated using the carrageenan induced paw edema. The results have shown that the frontal leaf extract when administered at a dose of 250 mg/kg body weight had significant activity after 15 mts which was slightly better than the standard. The findings of this study indicate that the methanolic extract of the leaves of Tectona grandis have significant analgesic and anti inflammatory activity which was attributed to the presence of the phytoconstituents of the plant.

**Introduction**

Tectona grandis belonging to the family Verbinaceae is commonly called as teak. The various parts of the plants are reported to posses various activities. Some of the activities include its action as a cooling agent, laxative and sedative, bronchitis, as diuretic and in the treatment of urinary discharge, in the treatment of the common cold and headache, hair problems and in scabies 1,2.The various phytoconstituents isolated from Tectona grandis are Juglone which has been reported to posses anti-microbial activity3, Betulin aldehyde is reported to posses anti tumor activity4, Lapchol shows anti ulcerogenic activity5. We had earlier demonstrated that the hydroalcoholic extract of Tectona grandis leaves posseses significant wound healing activity in different wound models6. Analgesic and anti inflammatory activities play a major role in the healing of wounds. The initial phase of wound healing is the inflammatory phase, followed by the phase of proliferation and maturation phase. The present work was carried to evaluate the analgesic and anti inflammatory activity of the methanolic extract of the frontal leaves ofTectona grandis as this could have been one of the contributing factors for its pro healing affect.

**Materials And Methods**

**Plant material**

The frontal leaves of Tectona grandis were collected from the rural areas of Bangalore in the month of October 2006. The plant was identified and authenticated by the Regional Research Institute, Bangalore where the specimen voucher (RRCBI Acc no 12474) has been deposited for future reference. The material was shade dried, pulverized and preserved in air tight containers until further use.

**Preparation of the extracts**

The methanolic extract of dried powder (1 kg) of the leaves was prepared by using Soxhlet apparatus. The extract was then concentrated and dried to give dark brown mass. This extract was used for further investigation.

**Phytochemical screening**

The extract was then subjected to preliminary phytochemical analysis using standard procedures and majority of the constituents were found to be polar in nature. The phytochemical screening was carried out using reagents like Mg and HCl for Flavonoids, ferric chloride for tannins ,Liberman’-Buchard’s for steroids, Molish’s and Benedict’s for carbohydrates and the ability to foam for saponins7.

**Selection of animals**

The Institutional Animal Ethical Committee (No Krp/IAEC-27/2006) approved the experimental protocol and the guidelines for the animal care were strictly adhered to during the experimentation as recommended by committee for the purpose of control and supervision of experiments on animals (CPCSEA), Govt of India.Sprague-Dawley (SD) rats of either sex weighing 250-275 gm were used. The animals were maintained under standard conditions and were fed with commercial diet and water ad libitum during the experiment.

**Acute toxicity studies**

The acute oral toxicity study was performed according to OPPTS (office of the prevention, pesticides and toxic substance) guidelines.

Colony bred male rats of Wister strain (200-250g) were maintained under standard conditions. The rats were acclimatized for 5 days and fasted over night.

**Experimental**

**Analgesic activity of the frontal leaves of**

Analgesic activity of the frontal leaves was evaluated using the Eddy’s hot plate method.

Rats of either sex weighing 250-275 gm were used. The animals were maintained under standard conditions and were fed with commercial diet and water ad libitum during the experiment. The animals were divided into 4 groups of six animals each. Group 1 served as the control, group 2 was administered with standard indomethacin, group 3 and 4 were treated with 250mg/kg body weight (lower dose) and 500mg/kg body weight (higher dose) of the frontal leaves extract. The extracts were administered orally. The Eddy’s hot plate was maintained between 55-56 0C.The animals were placed on the hot plate and the time taken for licking was recorded using a stop watch. The reaction was observed at 0, 15, 30, 60 and 120 mts9.

**Anti inflammatory activity of the frontal leaves of**

Anti inflammatory activity was evaluated using carrageenan induced paw edema method.

The animals were divided into four groups. Group 1 served as a control, group 2 was given ibuprofen, group 3 was given 250 mg/kg leaf extract which served as a lower dose and group 4 was administered 500 mg/kg.All the rats were injected with 0.1ml of carrageenan in normal saline into the sub planter region of the right hind paw. The volume of the paw was measured at 0, 15, 30, 60 and 120 mts using plethysmograph9.

**Statistical analysis**

Results were tabulated and the data was expressed as mean ± SEM. The difference between experimental groups were determined using one way analysis of variance (ANOVA) followed by Dunnet test. P<0.05 was considered significant.

**Results**

Acute toxicity studies of the methanolic extract did not reveal any toxicity in any of the animals up to the dose of 2000mg/kg body weight. Test dose of 2 g/kg was given to the animals orally and was found to be safe. . Hence 1/4th hand 1/8 th of this dose i.e. 500 mg/kg and 250mg/kg body weight were used in the study as higher and lower doses respectively.

**Phytochemical screening:**

The results of the phytochemical analysis has revealed the presence of Flavonoids, tannins, anthraquinones, saponins, carbohydrates, and proteins

**Analgesic activity:**

Analgesic activity of the frontal was evaluated using the Eddy’s hot plate method. The extracts showed analgesic activity in a dose dependent manner. The frontal leaves at a dose of 250mg/kg exhibit significant activity within 15 minutes which lasted up to 120 minutes while the higher dose of the same extract showed significant activity after 30 minutes which gradually decreased after 60 mts .

**Figure 1**

Table 1: Analgesic activity of the methanolic extract of frontal leaves of



All values are mean ± SEM, n=5-6, \*P<0.05 indicates significant and \*\*P<0.001 is extremely significant when compared with control.

**Anti inflammatory:**

The extract also exhibited significant anti inflammatory activity. The frontal leaf extracts at a lower dose of 250mg/kg and a higher dose of 500mg/kg and the standard showed significant activity when compared to the control at 15 minutes up to 30 minutes which gradually decreased in case of the extract of the higher dose. At 120 minutes the activity of the frontal leaves at the lower dose was comparable to the standard while the higher dose of the extract did not show any activity at 120 mts.

**Figure 2**

Table 2: Anti inflammatory activity of the methanolic extract of frontal leaves of



All values are mean ± SEM, n=5-6, \*P<0.05 indicates significant and \*\*P<0.001 is extremely significant when compared with control.

**Discussion**

The methanolic extract of the leaves of Tectona grandis has shown significant analgesic and anti inflammatory activity when compared to the control. It has been suggested that prostaglandins and bradykinins play a major role in the carrageenan induced edema and analgesia10. So it may be predicted that the methanolic extract may be acting by inhibiting the synthesis of these substances as histamine, bradykinin and PG (prostaglandin) are the chemical mediators for carrageenan induced hind paw edema11.

The phytochemical analysis has revealed the presence of Flavonoids, steroids, glycosides, anthroquinones, saponins, tannins, carbohydrates and proteins in the extract. Flavonoids have been reported to target prostaglandins, which are involved in the late phase of acute inflammation and pain 12 .The polyphenolic compounds like phenolic acids, Flavonoids and tannins have been reported to posses other biological activities such as wound healing, analgesic, anti inflammatory and antioxidant13 .It may be presumed that the analgesic and anti inflammatory activity could be due to the individual or combined synergic effects of the phytoconstituents present in the extract.

**Conclusion**

Based on the results of our study it can be concluded that the methanolic extract of the plant posses significant analgesic and anti inflammatory activity .Further studies have to be carried out to identify the constituents and the exact and detail mechanism of action that is responsible for this activity.

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#### Author Information

**Naira nayeem, M. Pharma**
Department of pharmaceutical chemistry, Krupanidhi College of Pharmacy

**Karvekar, MD PhD**
Department of pharmaceutical chemistry, Krupanidhi College of Pharmacy

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