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# Evaluation of Analgesic Activity of Essential Oil of *Rosmarinus officinalis* And Its Comparison with That of Aspirin: An Experimental Study.

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**ABSTRACT**

Many pharmaceutical agents are there for pain relief but at the same time a good portion of population is also there not preferring allopathic medications and has inclination towards herbal products over synthetic ones. Herbal products are increasingly being used to treat various pathological conditions in the present days. Rosemary essential oil has already being used as a preservative in food industry due to its antioxidant and antimicrobial activities and it was shown to possess other health benefits. This experimental study was planned to evaluate & compare the analgesic effects of Rosemary essential oil (REO). The aim of this study was to evaluate the analgesic activity of essential oil of Rosmarinus officinalis and its comparison with that of Aspirin. Wistar rats and hot plate method was used for this study. Control group of 6 animals were given normal saline , Standard group of 6 animals were given aspirin (200 mg/kg body weight) while test group of 6 animals were given increasing doses of Rosemary essential oil (100, 200, 300 & 400 mg/kg body wt). The analgesic activity of REO in terms of Response Time were noted and depicted in tabular form. Results were analyzed by using Tukey Test and results were found to be statistically significant at 30min, 60min, 90min & 120min at 100mg/kg body wt, 200mg/kg body wt, 300mg/kg body wt & 400mg/kg body wt doses of REO respectively ; no significance was found at 0min.

**Keywords:** Rosemary essential oil, aspirin, normal saline, Hot plate, analgesiometer.

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## INTRODUCTION

Herbs from natural origin have been used by man since time immortal for a variety of purposes including the treatment of pain. Opium has been in use to treat pain from prehistoric era. With the development of ultramodern techniques, isolation and utilizations of phytochemicals has turned out the domain of disease. For the management of pain, a constant research based on natural pharmacophore and its interaction with targets, has led to search of many potential therapeutic agents.[1]

Rosmarinus officinalis (Family Lamiaceae), popularly called rosemary, is a common household plant and grown in many parts of the world. It is an aromatic evergreen shrub and its leaves are similar to hemlock needles. The leaves are used as a flavoring agent in foods. It is native to the Mediterranean countries and Asia, but is reasonably hardy in cool climates. It can withstand droughts.[2]

Various parts of the rosemary plants are in use for the medicinal purpose since the stone age.They have antispasmodic, analgesic, antirheumatic, carminative, cholagogue, diuretic, expectorant, and antiepileptic effects.

Rosemary contains a number of phytochemicals, including rosmarinic acid, camphor, caffeic acid, ursolic acid, betulinic acid, and the antioxidants carnosic acid and carnosol.[3]

It also has anti-oxidant and antimirobial effects, and hence may protect against various forms of cancers[4] and infections. Its ethanolic preparation is highly lipid soluble and hence can be absorbed through the skin.

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. [6] In medical diagnosis, pain is regarded as a symptom of any unpleasant underlying condition.

Pain motivates the individual to withdraw from damaging situations, to protect a damaged body part while it heals, and to avoid similar experiences in the future.[7] Most pain resolves once the noxious stimulus is removed and the body has healed, but it may persist despite removal of the stimulus and apparent healing of the body.

Pharmaceutical drugs may not be your only path to pain relief. Natural pain treatments— like herbal medicine, in which parts of a plant are used medicinally to treat health problems — is an increasingly popular way to manage pain as well.

Though research on herbal remedies is still in its early phases, many herbs are thought to reduce pain and inflammation. However, it should be used with caution.[8]

This study was planned to evaluate the analgesic effects of Rosemary essential oil (REO) specially for the population not willing to take allopathic painkillers.

## RESEARCH DESIGN

The present study was conducted in the Department of Pharmacology, Jawaharlal Nehru Medical College, Sawangi(Meghe), Wardha, Maharashtra. The research protocol was approved by the Institutional Animal Ethical Committee. This was an animal study. Animal experiments were performed in 18 healthy wistar rats of either sex weighing 100-150gms responsive to pain stimuli. Pregnant, wounded (paw) and non-responsive to pain rats were excluded. Each cage was uniquely coded with a colour-coded cage card indicating group and number of animal. Duration of study was 3 months.

## MATERIALS

Test Materials used were Pure *Rosemarinus Officinalis* essential oil (REO) and Tablet Aspirin. Instrument used was Hot-Plate Analgesiometer.

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## METHODOLOGY

Animals were screened & selected by using hot plate method with a cut off time 30secs.

After selecting the animals, all 18 animals were acclimatized in the environment (25 ± 3°C), with light/dark control each 12 hours (7 a.m. to 7 p.m.) and were placed in cages up to 6 rats & were provided with proper meal & water ad libitum. They were kept without any food 12 hours before the experiments, but water ad libitum.

The essential oil of Rosemary was purchased online from amazon.in & tab Aspirin was bought from local medical shop.

Then the animals were divided into 3 groups (n=6).

Groups A (Control) was given normal saline (NS) 0.5 ml orally. Group B was given standard drug aspirin at dose of 200 mg / kg [9]. Group C was given test drug, rosemary oil in increasing dose of 100mg/kg, 200mg/kg, 300mg/kg, 400mg/kg on 1st, 2nd, 3rd and 4th day. [5]

Eddy's hot plate analgesiometer apparatus was maintained at 55 ± 0.50 degree celcius. Animals were individually exposed and the reaction time they have spent to lick the footpad or any paw or jumping were recorded. The cut off time used were 30 seconds to avoid thermal injury. The observations were taken at 0, 30, 60, 90 and 120 minutes after drug treatments.

## OBSERVATIONS AND RESULTS

Response time for each drug and dose were depicted in tables and the analgesic activity of REO was compared with that of standard & control group and statistically analyzed by one way ANOVA. Multiple Comparison was done by Tukey Test. Software used in the analysis were SPSS 17.0 version & EPI-INFO 6.0 version.

### Observation & Results

**Fig.1. Bar-Chart showing Mean value of response time on Hot Plate.**

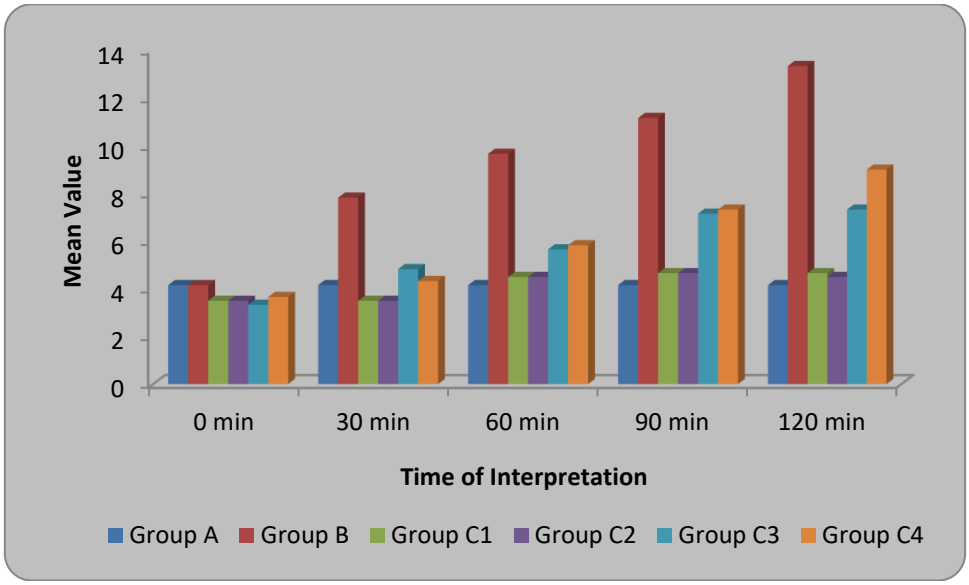

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**Table 1: Mean & standard deviation(SD) of response time in groups**

| GROUP | | 0 min | 30min | 60min | 90min | 120 min |
|---|---|---|---|---|---|---|
| A=Control (NS) | Mean<br>SD | 4.16<br>0.98 | 4.16<br>0.98 | 4.16<br>0.98 | 4.16<br>0.98 | 4.16<br>0.98 |
| B =Aspirin | Mean<br>SD | 4.16<br>0.98 | 7.83<br>1.32 | 9.66<br>1.50 | 11.16<br>1.60 | 13.33<br>1.50 |
| C1 = REO 100mg/kg (Day 1) | Mean<br>SD | 3.5<br>1.22 | 3.5<br>1.22 | 4.5<br>1.22 | 4.66<br>1.03 | 4.66<br>1.03 |
| C 2 =200mg/kg (Day 2) | Mean<br>SD | 3.5<br>1.22 | 3.5<br>1.22 | 4.5<br>1.22 | 4.66<br>1.03 | 4.5<br>1.04 |
| C 3= 300mg/kg (Day 3) | Mean<br>SD | 3.33<br>1.21 | 4.83<br>1.16 | 5.66<br>0.81 | 7.16<br>1.94 | 7.33<br>1.86 |
| C 4= 400mg/kg (Day 4) | Mean<br>SD | 3.66<br>1.5 | 4.33<br>1.03 | 5.83<br>1.16 | 7.33<br>0.81 | 9<br>0.89 |
| P value | | 0.53, NS | 0.0001,S | 0.0001,S | 0.0001,S | 0.0001,S |
| Significant pairs | | | A & B<br>B & C1<br>B & C2<br>B & C3<br>B & C4 | A & B<br>B & C1<br>B & C2<br>B & C3<br>B & C4 | A & B<br>B & C1, C2,<br>C3, C4<br>C1 & C2, C3<br>C2 & C3, C4 | A & B, C3, C4<br>B & C2, C3, C4<br>C 1& C3,C4<br>C2 & C3, C4 |

This table shows that compared to aspirin, the analgesic effect of REO is less but compared to control, it has significant analgesic effect. That means it is a less potent herbal analgesic.

We see the groups here are noted as their mean & standard deviation value.

P value is found non significant at 0 min. But at 30mins & 60mins Group B is found significant as compared to Group A, C1, C2, C3, C4. At 90mins, Group B is found significant as compared to Group A, C1, C2, C3, C4.

C3 & C4 is significant as compared to C1.
C3 & C4 is significant as compared to C2.

At 120mins Group B is found significant as compared to Group A, C1, C2, C3, C4.

C3 & C4 is significant as compared to C1.
C3 & C4 is significant as compared to C2.

The results obtained show REO has analgesic activity which increases with increase in concentration upto 400mg/kg body wt.

## DISCUSSION

Essential oils are complex mixtures of volatile, liquid, lipophilic and odoriferous substances. The composition of an essential oil is genetically determinate which is specific for a tissue or a characteristic of its development stage. In this study, we evaluated the analgesic efficacy of the essential oil obtained from *R. officinalis*.

Rosemary oil contain a-pinene, borneol, b-pinene, camphor, bornyl acetate, camphene, 1,8-cineole and limonene. Out of these Rosemarinic acid is a potential anxiolytic agent. This component acts as a GABA

transaminase inhibitor, more specifically on 4-aminobutyrate transaminase. Rosmarinic acid also inhibits the expression of indoleamine 2,3-dioxygenase inhibiting cyclooxygenase.

A. Raskovic assumed that 1,8-cineole, camphor, and α-pinene increase the latency time of animal response to heat-induced pain between 20th and 50th minute of the test significantly when compared to saline-treated group.[11]

The results obtained in our study shows that Essential oil of Rosemarinus officinalis has analgesic activity which increases with increase in concentration upto 400mg/kg body wt. though not comparable to Aspirin.

The result indicate the effectiveness and relative safety of REO for the treatment of conditions associated.

The group treated with REO has shown a significant inhibition both in the first and second phase compared to the control group ($P < 0.01$). The effect was less than the group treated with Aspirin, confirming the peripheral effect of REO and suggesting an inhibition of prostaglandin synthesis.

Lucimara Romana Dipe de Faria (2011) carried out similar experiment & the result suggested that REO has an anti-inflammatory activity as well as peripheral analgesic activity, and has shown to be harmless to the gastric mucosa.

Gonzalez-Trujano et al. (2007) carried out rat studies using several experimental models of pain. He found that intraperitoneal injection of rosemary extract significantly reduced writhing of rats compared to controls, suggesting reduction of spasmodic pain.

*Rosmarinus officinalis* is a medicinal species currently lacking a confirmed or well studied scientific pharmacological description. In a study conducted by Koster et al., 1959, *Rosmarinus officinalis* significantly decreased the acetic acid-induced abdominal contractions in mice. It has been described that the writhing test is an experimental model used in the screening of analgesic drugs, but it is also found to be useful to evaluate visceral pain by Cervero and Laird, 1999. These results support the practice in which a decoction of *Rosmarinus officinalis* is given to cure spasmolytic pain in folk medicine.

## CONCLUSION

Although the analgesic effect of REO is not comparable to that of aspirin even at higher concentration like 400mg/kg. But as the mean reaction time in groups receiving essential oil of Rosemarinus officinalis differ significantly from that of without drug (control), hence can be concluded that essential oil of Rosemarinus officinalis can be used in the management of mild pain.

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