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Sebastiania Chamaelea (L.) Mull. Arg. - An Experimental Study for Analgesic Efficacy

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ABSTRACT:

The recognition of pain as a pathologic phenomenon in and of itself is still up for discussion. Despite the evidence that pain is an illness, the pathologic nature of this condition has not yet been fully acknowledged. In order to fulfil the growing need for pain management, this study sought to improve the native flora. *Sebastiania chamaelea* (L.) Mull.Arg, is one among those indigenous flora of Kerala that was in folklore management of ailments decades back. In the study, the analgesic efficacy of whole-plant powder was evaluated in Wistar albino rats using the Eddy's Hot plate method at three distinct doses (effective dose, half the effective dose, and double the effective dose). The outcome variable under investigation was the duration of jumping or licking paws. The drug's analgesic activity is evidenced by the lengthening of the response time. One-way ANOVA was performed on the collected data along with a Tukey post-hoc test. According to the findings, the double dosage group of rats had significant analgesic effect when compared to other dose groups and the control group at a P value < 0.005. and the double-dose group had the longest time for reaction at the 60th minute ($p<0.0001$). The powder form of the drug showed considerable analgesic action at its double the effective dose when evaluated using the thermal model of Wistar albino rats, also known as the Eddy's hot plate method.

Key words: Analgesic activity, *Sebastiania chamaelea* (L.) Mull.Arg, Edy's hot plate, Double dose

INTRODUCTION

The most prevalent symptom that drives a person to seek medical attention is pain. Pain is a typical sign of many ailments. Pain been described by Sir Charles Sherrington as "the bodily adjunct of an imperaprotective reflex." In contrary to other feelings, pain serves as a warning sign that something is wrong.[1] The Latin word "POENA" (Old French: PEINE), which means "punishment," is the root of the English word "pain."[2] Each patient experiences and expresses pain differently, according to the International association for the research of pain, which defined pain as "an unpleasant sensory and emotional experience associated with actual or probable tissue damage or expressed in terms of such damage."[3] The stimulus that can bring out the tissue damage can be physical, chemical or

other factors including the bacterial toxins.[4]

In Ayurveda, *acharyas* employed a variety of phrases to describe pain in relation to its underlying causes. One of them, the word "*vedana*," which means pain is derived from "*vid dhatu*." It denotes information, observation, emotion, feeling, agony, etc. Fundamentally, there are two categories of perception: *dukha* (sorrowful feelings) and *sukha* (happy feelings). According to *Charaka*, pleasant sensations are referred to as "*Sukham*" and unpleasant sensations as "Dukham."[5] Although scholars have discussed a variety of medications with *vedanahara* (analgesic) activity, the availability of the legitimate raw drug raises concerns because it can significantly impact the outcome of treatment. Finding the indigenous flora's pharmacological action is therefore necessary. One of the indigenous drugs in the state of Kerala is the plant "*Kodiyaavanakku*," which is botanically designated as *Sebastiania chamaelea* (L.) Mull.Arg. The reference regarding the drug was obtained from *Yogamrutam*[6] and Hortus Malabaricus of Van Rheede[7]. Additionally to Ayurveda the Siddha system of medicine and folkloric practices sometimes employ *Sebastiania chamaelea* (L.) Mull.Arg.[4] In the past, the drug was used to treat diarrhoea[7] as well as to regain strength. The use of Kodiyaavanakku in *Swasa (*dyspnea*)*,[6] *Antravridhi (*displacement of intestine from it's place*)*,[8] and *Vayukshobha (*aggravated vata in the GIT) Chikitsa[9] is described in the ancient Malayalam textbook *Yogamrutham*. The unique medicinal porridge known as *Karkidaka kanji*, which is traditionally popular in the South Indian state of Kerala during the monsoon season, includes significant amounts of *kodiyaavanakku*. This particular Ayurvedic diet is beneficial for people of all ages because it strengthens the body's defenses and serves as a detoxifier.[10]

There are 15 phenolic acids in *Sebastiania chamaelea* (L.) Mull. Arg., including caffeic acid, melilotic acid, aesculetin, p-hydroxy benzoic acid, coumarin, cinnamic acid, salicylic acid, and scopoletin, and 5 flavonoids, including myrecetin and quercetin, kaempferol, luteolin and apigenin.[11] The acute toxicity study of the drug have shown the safety of drug for internal administration.[12] Previous research work on the analgesic activity of the drug was done using the Kashaya preparation of the *Sebastiania chamaelea* (L.) Mull.Arg.[13] in addition the antibacterial[11], antioxidant[14], anti plasmodial[15] activities are also proven. The purpose of the current study is to identify the dosage of the powdered drug that will exhibit statistically significant analgesic activity.

MATERIALS AND METHODS

Materials

Collection and preparation of the test drug

The entire *Sebastiania chamaelea* plant (L). Mull.Arg., also known as Kodiyaavanakku in Malayalam, was harvested in November from the lawns of the Government Ayurveda College in Tripunithura. The plant's ability to bear fruit was regarded as a sign of maturity. Physical contaminants were removed with water before being dried in the shade. The drug was properly dried before being ground into a fine powder and sieved through a sieve with a mesh size of 120. The study utilized this drug's powder form. Moreover, the powder was used together with distilled water (1 ml of distilled water for 1 gram of drug powder). This is given orally to the animals using feeding cannulas in accordance with their body weight.

Animals

From the College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, Wistar albino rats of either sex were bought. During seven days, animals were acclimated in lab environments while having access to a regular feed and water. In the course of the experiment, food was withheld. The Institutional Animal Ethics Committee authorized the study proposal in accordance with the standards established by the Committee for the Purpose of Control and Supervision on Experiments on Animals, India.

Dose of the test drug

About the dosage of the powdered *Sebastiania chamaelea*, there were no classical references accessible (L). Mull.Arg. Using the Paget's and Barnes tables, the dose was derived by extrapolating the therapeutic dose for humans to an animal dose based on surface area. As a result, the 12 g of powder meant for humans was converted to 216 mg/200 g for rats. This was regarded as the drug's calculated effective dose. Also, the medication was administered in the following doses: 1/2 X and 2X, where X stands for the estimated effective dosage of the test medication..

Grouping of animals

Four sets of six rats each, each with three males and three females, were made. A standard food and water were given to Group A, the control group. The calculated effective dose, half the calculated dose, and double the calculated dose of the test medication were administered to Groups B, C, and D, respectively.

Method

Analgesic activity

For better observation, the animals were labelled and

maintained in separate cages. On Eddy's hot plate, the chosen animals were placed. A stopwatch was used to time the animals' basic reaction times by monitoring their jumps or paw licks in response to being put on the hot plate. The appropriate doses were then given to each group in sequence. At 15, 30, 60, and 120 minutes after the administration of the medicines, the reaction time is observed.

Statistical analysis

The data obtained was statistically analyzed using one-way ANOVA with Tukey's post hoc analysis. Graphs were plotted based on findings for better understanding.

RESULTS

The mean jump or paw licking response at 0^{th} minute in Group A (Control), was 3.800 sec which decreased to 2.675 sec by 15^{th} sec. Then the mean response time tends to decrease till the 120^{th} sec. And the time duration for the response was 2.447 sec, 1.948 sec, 1.838 sec, and 2.808 sec respectively at 30^{th} min, 45^{th} min, 60^{th} min, and 120^{th} min. (table 1)

The mean jump or paw licking response time before treatment in Group B (Half dose) was 4.288 sec which subsequently decreased after the medicine administration. And the mean response time was 3.442 sec, 3.173 sec, 2.720 sec, 2.660 sec, and 2.520 sec respectively at 15^{th} min, 30^{th} min, 45^{th} min, 60^{th} min, and 120^{th} min.

In Group C (Effective Dose) the mean jump or paw licking response time before treatment was 3.678 sec which decreased to 3.588 sec by the 15^{th} min after medicine administration. Later the response time increased to 3.945 sec at 30^{th} min, 4.103 sec at 45^{th} min, and 4.377 sec at 60^{th} min. Later it decreased to 4.038 sec at 120^{th} min.

The mean jump or paw licking response time before treatment in Group D (Double dose) was 4.260 sec which decreased to3.180 sec at 15^{th} min after medicine administration. By 30^{th} min it increased to 3.623 sec. Further the response time increased at 45^{th} min and 60^{th} min to 5.397 sec and 6.305 sec respectively. Later the response time tends to decrease at 120^{th} min to 4.645 sec. Table 1: Mean Value Of Time Duration For Jump Or Paw Licking Response - In Group A (Control), Group B (Half Dose), Group C (Effective Dose) And Group D (Double Dose)

The time duration for jump or paw licking response at 15^{th} min, 30^{th} min, 45^{th} min and 60^{th} min of Group A has significantly reduced when compared to the time duration for basal (0^{th} min) response statistically. All other comparisons within the group A were statistically not significant.

The decrease in the time duration for jump or paw licking response at the 45^{th} min, 60^{th} min and 120^{th} min of Group B was statistically significant ($P<0.001$) when compared to the time duration for basal (0th min) jump or paw licking response. All other comparisons within the group were statistically not significant ($P>0.05$)

In group C all the differences shown in the response time were statistically not significant when compared within the group values.

In group D, the increase in the response time at the 60^{th} min was highly significant statistically with respect to the response time at basal (0^{th} min). All other comparisons with respect to the response at 0^{th} min was statistically insignificant. The response time at the 120^{th} min has significantly increased when compared to the response time at 15^{th} min. Also when compared to the 60^{th} min, the response at 120^{th} min has decreased significantly. And the difference in time of response at the 120^{th} minute is not statistically significant when compared to the time of response at other intervals. At 60th min, there is highly significant increase in the response time when compared to that of 15th min and 30th min. Increase in time for response at the 45th min is significantly high when compared to the time for response at 15th min and 30th min. All other comparisons within the group were not statistically significant.

Comparison of response time between Group A and Group B

Comparison of the time duration for jump or paw licking response of Group A with Group B at 15^{th}, 30^{th}, 45^{th}, 60^{th} and 120^{th} minutes shows that there is no statistically significant difference between Group A (Control) and Group B (half dose).

Comparison of response time between Group A and Group C

When compared there is no significant difference between both groups in the response time at 0^{th} min and 15^{th} min.

But the time for response increased significantly for Group C at 30^{th} min, 45^{th} min, 60^{th} min and 120^{th} min when compared to Group A. And the significance was high at 45^{th} min and 60^{th} min.

This shows that the Group C (effective dose) have significant analgesic activity at 30^{th} min, 45^{th} min, 60^{th} min and 120^{th} min when compared to Group A (control group).

Comparison of response time between Group A and Group D

When compared there is no significant difference between both groups in the time duration for response at 0th min and 15th min. But the time duration for response increased significantly for Group D at 30th min, 45th min, 60th min and 120th min when compared to Group A. And the significance was high at 45th min, 60th min and 120th min.

This shows that the Group D (Double dose) have significant analgesic activity at 30th min, 45th min, 60th min, and 120th min when compared to Group A (control group).

Comparison of response time between Group B and Group C

When compared there is no significant difference between both groups in the response time at 0th min, 15th min, and 30th min.

But the response time increased significantly for Group C at 45th min, 60th min and 120th min when compared to Group B. And the significance is high at 120th min. This shows that the Group C (Effective dose) shows significant analgesic activity at 45th min, 60th min and 120th min when compared to Group B (Half dose).

Comparison of response time between Group B and Group D

When compared there is no significant difference between both groups in the response time at 0th min, 15th min and 30th min. But the increased response time observed in Group D is highly significant at 45th min, 60th min and 120th min when compared to Group B.

This shows that the Group D (Double dose) shows significant analgesic activity at 45th min, 60th min and 120th min when compared to Group B (Half dose).

Comparison of response time between Group C and Group D

When compared there is no significant difference between both groups in the time duration for response at 0th min, 15th min, 30th min and 120th min. But the time duration for jump or paw licking response increased significantly for Group D at 45th min and 60th min when compared to Group C. And the significance is high at 60th min. This shows that the Group D (Double dose) shows significant analgesic activity at 45th min and 60th min when compared to Group C (Effective dose).

DISCUSSION

Eddy's Hot plate method was used to study the analgesic activity of the *choorna* of whole plant *Sebastiania chamaelea* (L.) Mull.Arg. in three different doses (half dose, effective dose and double dose) in Wistar albino rats. The data obtained from the present study were subjected to statistical analysis using One way ANOVA with Tukey's post hoc test which showed that the analgesic activity of the drug with the three dose groups was statistically significant ($p<0.05$), when compared to the control group. Maximum analgesic activity was shown by double the effective dose group at the 60th second with $p < 0.0001$.

From the results the drug *Sebastiania chamaelea* (L.) Mull. Arg. possess analgesic activity when given orally at a double the effective dose and can bring out its maximum effect within an hour. As the effect was found to be reduced by the 2nd hour the drug can be suspected to have short term analgesic effect. Previous study that have been done using the *kashaya* formulation also proved the analgesic effect of the drug.[13] Also the drug is one among the main ingredients of special porridge preparation, so called *Karkidaka kanji*, of certain localities in Kerala during the monsoon season. This preparation is intended to provide strength and rejuvenation during the monsoon season. In ancient Malayalam textbook, *Yogamrutham* the drug is indicated in *Vayukshobha* which literally means the aggravation of vata in the GIT. Also the other indications of the drug are *swasa* and *antravridhi*. *Swasa* is *amasaya samudbhavam* (arising in stomach)*[16]* and *antravridhi* means the displacement of intestine from its place. These all shows the drug have specific action in the gastro intestinal tract and the analgesic activity of the drug can be utilized in *vedana* (pain) associated with *vata* vitiation.

CONCLUSION

The findings from this research indicate that internally administered *Sebastiania chamaelea* (L.) Mull. Arg. (powder of the whole plant) exhibit dose-dependent analgesic action. The presence of phytoconstituents like phenolic acids such as caffeic acid, melilotic acid, aesculetin, p-hydroxy benzoic acid, coumarin, cinnamic acid, salicylic acid and scopoletin, flavonoids like myrecetin, quercetin, kaempferol, luteolin and apigenin.and steroids could be the possible reason of this activity.

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TABLE 1: MEAN VALUE OF TIME DURATION FOR JUMP OR PAW LICKING RESPONSE - IN GROUP A (CONTROL), GROUP B (HALF DOSE), GROUP C (EFFECTIVE DOSE) AND GROUP D (DOUBLE DOSE)

Group	**Time duration for jump or paw licking response before treatment (in sec)**	**After Treatment**				
		15^{th} min (in sec)	**30^{th} min (in sec)**	**45^{th} min (in sec)**	**60^{th} min (in sec)**	**120^{th} min (in sec)**
Group A	3.800	2.675	2.447	1.948	1.838	2.808
Group B	4.288	3.442	3.173	2.720	2.660	2.520
Group C	3.678	3.588	3.945	4.103	4.377	4.038
Group D	4.260	3.180	3.623	5.397	6.305	4.645

*min- minutes; sec - seconds