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EVALUATION OF VEDANASTHAPANA (ANALGESIC) EFFECT OF MOCARASA: SHALMALI NIRYASA (*SALMALIA MALABARICA* – GUM DC)

Shreedevi Huddar [1], Elleri Anup Kumar [2]*, C Devaraj [3]

[1] Professor and HOD, PG Department of Dravyaguna, Shree Shivayogeeshwar Rural Ayurvedic Medical College Hospital and PG Research Centre, Inchal, Karnataka, India

[2] Assistant Professor, PG Department of Dravyaguna, Shree Shivayogeeshwar Rural Ayurvedic Medical College Hospital and PG Research Centre, Inchal, Karnataka, India

[3] Associate Professor, Department of Dravyaguna, Maria Ayurveda Medical College, Attoor, Kanyakumari Dist, Tamil Nadu, India

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***Corresponding author**
E-mail: akcasinoroyale@gmail.com

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ABSTRACT

Pain, said to be one of nature's earliest signs of morbidity and is also one of the most typical presentations seen in medical practice, brings disturbance in the equilibrium state of a person. In order to manage such conditions, several drugs are available in the present era. Among them, some are expensive, and some have side effects such as dyspepsia and gastrointestinal bleeding, burning sensations, etc. For relieving pain, Acharya Charaka mentioned Vedanasthapana Daseimani Gana (Group of 10 Drugs), of which Mocarasa (*Salmalia malabarica* Dc.) is one among them. This study is taken up to evaluate the Vedanasthapana (Analgesic) karma of Mocarasa on albino mice using Eddy's hot plate method. The Eddy's Hot plate method is followed with three groups of Albino mice (6 mice in each group) as control group, standard drug group and trial drug group. Distilled water is fed to the control group, Mocarasa kwatha (decoction) for the trial drug group and Diclofenac sodium for the standard drug group. Statistically, the analgesic effect in the trial drug started gradually at 60 min and continued up to 120 min. Meanwhile, the standard group showed immediate onset of action at 15 min duration and progressively increased up to 120 min. The trial drug and the standard drug showed insignificant differences, which reveals that both have similar analgesic activity.

Keywords: Mocarasa, Vedanasthapana, Analgesic, Qwatha.

INTRODUCTION

According to Shabda Kalpa Druma, the word vedana (pain) is derived from the root Vit, and Lyut (sensation) is a kind of disease[1]. Therefore, nidana (causative factor) for dukkha / vedana (disease/pain) is the same as the disease, i.e. Asathmendriyartha samyoga, Dhi, Dhruti, Vibhramsa, i.e., prajnaparadha (intellectual error) and parinama[2] (time). Jnanendriyas (five sense organs) receive their arthas (sense objects) when they contact their relative sense objects. If asathmya artha (improper perception of sense objects) is perceived by Indriyas, the normal process is vitiated, and the impulse reaches manas through sparshanendriya (skin), and vedana is felt[3].

The mind and body, together with the sense organs, lead to the manifestation of happiness and misery. Pain is a common complaint that makes the patient meet the physician. The property of a drug that subdues the same (vedana) in a particular part of the body and which restores the normal state is known as Vedanasthapana[4].

Pain is said to be one of nature's earliest signs of morbidity and is also one of the most common presentations seen in medical practice, which brings disequilibrium in the dosas.

Pain is originally derived from the Latin word "Poena", meaning punishment. The International Association for the Study of pain defines "pain as an unpleasant sensory and emotional experience arising from the actual or potential tissue damage or described in terms of such damage"[5].

The word analgesic originates from the Greek word **An-** without and **Algia –** pain**.** Analgesic drugs act in various ways on the peripheral and central nervous systems. The drug given to reduce pain without resulting in loss of consciousness is known as analgesic[6]. There are a good number of analgesic drugs available in the present era. Among them, some are expensive, and some have side effects such as dyspepsia and gastrointestinal bleeding, burning sensations, etc., found in drugs like aspirin. In the present context, despite various existing analgesics, there is still a necessity for better, cost-effective, safer and effective drugs. Recently, there has been a significant rise in demand for research on herbal-based analgesics. In the present context, Vedanasthapana or Angamarda prasamana dravyas (a group of drugs acting against myalgia) mentioned in Ayurvedic classics may satisfy this need.

The drug Mocarasa (*Salmalia malabarica* DC) is widely proven and practised as Sangrahaneeya in clinical conditions like Atisara and Pradara[7] consisting of pharmacodynamic properties like kashaya rasa, laghu (low molecular weight drug), seeta veerya (cold potency), snigdha (unctuous), picchila (slimy) gunas (chemical and physical property of drugs). [8]. But its analgesic effect mentioned as a Vedanasthapana dravya[9] is yet to be addressed.

With this perspective, the work is carried out to assess the Vedanasthapana (Analgesic) effect of Mocarasa (Niryasa of *Salmalia malabarica* DC) based on the Eddy's Hot Plate Method.

MATERIALS AND METHODS

Collection of the drug: A botanically identified authentic sample of *Salmalia malabarica* DC gum is collected from its natural habitat, i.e. near Kulasekaram of Kanyakumari District, Tamil Nadu, India.

Drug preparation: The total procedure is carried out in the department of Bhaishajya Kalpana, Shri Shivayogeeshwar Rural Ayurvedic Medical College Hospital and PG Research Centre, Inchal, Karnataka, India. The collected Mocarasa is cleaned and dried in the shade. The air-dried Mocarasa is made into a coarse powder using khalva yantra and stored in an airtight container.

Place of work: The pharmacognostic study of Mocarasa is carried out in the Central Research Laboratory of Shri Shivayogeeshwar Rural Ayurvedic Medical College Hospital and PG Research Centre, Inchal, Karnataka, India.
Phytochemical and physicochemical screening and Qualitative analysis were conducted at K.L.E Pharmacy College, Belgaum, Karnataka, India.
The activity study *in vivo* was done at Aditya Bangalore Institute for Pharmacy Education and Research, Bangalore, Karnataka, India.

Source of animals: The required number of healthy Albino mice of either sex was provided by the Animal House of Pharmacy College.

Housing and feeding animals: Animals are maintained at 25 ^{0}C, with 12 hours of day and dark cycles. A standard laboratory diet was given with an unlimited supply of drinking water.

Preparation of animals: The animals are randomly selected, marked to permit individual identification and kept in their cages for one week before dosing for acclimatization to the lab environment.

Preparation of Trial drug: The Mocarasa kwatha is prepared according to the standard principles of Sharangdhara Samhita. One part of the coarse powder of Mocarasa was taken, and sixteen parts of water was added, boiled and reduced to 1/8th part under low flame and filtered[10].

Animal selection criteria: 18 healthy albino mice were selected and grouped into three groups of 6 animals each.

Inclusion criteria: Healthy Albino mice weighing 20-25 grams of either sex.

Exclusion criteria: Diseased mice, already used for other experiments and pregnant mice.

Examination of the animal before the experiment: All mice were subjected to a general check-up for weight by using a spring balance. Heart rate was counted as the number of beats /minutes by feeling the heart rate with the thumb. Each mouse in the experiment was identified by the number labelled on the forehead by a permanent marker. The cages were labelled with the name of the group and drug.

Before the animal experiment was done, the animal ethical committee of the institution went through the purpose of the study, and the clearance certificate was issued.

Institutional Animal Ethical Clearance Committee Registration Number: 1611/PO/a12/CPCSEA.

Study Design: 18 mice were divided into 3 groups of 6 each, namely, the control group, trial drug group, and standard group for the study.

Dose fixing: It is done based on the "Paget Barner table", in which the adult dose was multiplied by mice factor (0.0026)[11]. Hence, the dose of mice = 0.0026xHuman dose. The trial drug, Mocarasa kwatha and the standard drug, Diclofenac sodium, were administered orally. Mice dose conversion formula = 0.0026 x Human dose. Mocarasa kwatha 0.0026x48 ml = 0.12 ml/kg body weight. ii. Diclofenac sodium dosage is 12.5 mg/kg body weight administered orally.

Procedure

a) Analgesiometer: The Analgesiometer is the instrument for studying the analgesic effect of trial drugs by observing the paw licking or jump responses due to heat, which is used as a source of pain. The instrument is fitted with a Hot plate maintained at a constant temperature. The Hot plate is to be maintained at 55 ^{0}C. It is provided with an acrylic box with a lifting lid fitted over the hot plate for placing the mice on the hot plate.
b) 18 healthy Albino mice of either sex were selected randomly, and three groups having 6 albino mice were kept in separate cages. They were numbered for their individual identification. The Basal Reaction Time of each animal was noted using a stopwatch after placing the mice on the Hot plate on which the temperature was maintained at (55 ^{0}C). The mice were removed from the Hot plate immediately by removing the lid when the paw licking or jump response was observed.
c) These observations were made for each mouse, and the mean values were taken. This reading is considered to be Basal Reaction Time. The trial drugs were given orally and the reaction time was noted at regular intervals at 15, 30, 60, and 120 min in each group.

Statistical analysis: The data collected were statistically analysed using the Paired and Unpaired students' "t" test at $P<0.05$.

Table 1: **Study design with intervention**

SN	Number of Animals	Route of administration	Name of the groups	Form of Administration	Dose
1	6	Oral	Control	Distilled water	1 ml
2	6	Oral	Standard	Diclofenac sodium suspension	12.5 mg/ Kg body wt
3	6	Oral	Trial drug	Mocarasa kwatha	0.12 ml/ Kg body wt

Table 2: Basal Reaction Time of Control Group

SN	Basal Reaction Time in sec.			
	1	2	3	Mean
1	2.8	2.7	2.6	2.7
2	3.0	3.1	2.9	3.0
3	2.4	2.6	2.5	2.5
4	2.0	2.1	1.9	2.0
5	1.9	1.7	1.8	1.8
6	2.2	2.1	2.0	2.1

Table 3: Basal Reaction Time of Standard drug Group

SN	Basal Reaction Time in sec.			
	1	2	3	Mean
1	2.6	2.5	2.4	2.5
2	1.9	2.1	2.0	2.0
3	2.4	2.3	2.5	2.4
4	2.0	2..0	2.0	2.0
5	1.8	1.9	2.1	1.9
6	2.4	2.2	2.3	2.3

Table 4: Basal Reaction of Trial Drug Group

SN	Basal Reaction Time in sec.			
	1	2	3	Mean
1	3.0	3.1	2.9	3.0
2	1.9	1.8	1.7	1.8
3	2.0	1.9	2.1	2.0
4	2.7	2.8	2.9	2.8
5	2.2	2.3	2.4	2.3
6	2.1	1.9	2.0	2.0

Table 5: Pain threshold observed at different intervals in the Control Group

SN	Pain threshold in sec.			
	15 min	30 min	60 min	120 min
1	2.8	2.6	2.5	2.4
2	3.0	2.8	2.6	2.5
3	2.6	2.8	2.8	2.3
4	1.8	2.0	2.2	2.0
5	2.0	2.2	2.0	2.5
6	2.0	2.1	1.8	2.0

Table 6: Pain threshold observed at different intervals in Standard Drug Group

SN	Pain threshold in sec.			
	15 min	30 min	60 min	120 min
1	2.8	3.0	3.55	5.32
2	2.2	2.8	5.23	6.21
3	2.4	2.6	4.76	5.21
4	2.6	3.0	3.64	4.70
5	2.4	2.5	4.78	5.13
6	2.5	2.9	6.87	5.82

Table 7: Pain threshold observed at different intervals in Trial drug Group

SN	Pain threshold in sec.			
	15 min	30 min	60 min	120 min
1	2.5	3.1	6.75	6.79
2	1.3	3.0	6.03	7.28
3	2.3	1.8	2.97	3.14
4	2.8	2.7	3.27	3.16
5	2.0	3.0	4.68	5.14
6	1.9	2.9	3.01	3.20

Table 8: BT-AT values of the Control group in different intervals

SN	BT- AT of Control Group			
	15 min	30 min	60 min	120 min
1	-0.1	0.1	0.2	0.3
2	0	0.2	0.4	0.5
3	-0.1	-0.3	-0.3	0.2
4	0.2	0	-0.2	0
5	-0.2	-0.4	-0.2	-0.7
6	0.1	0	0.3	0.1

Table 9: BT-AT values of the standard drug group in different intervals

SN	BT-AT of Standard Drug Group			
	15 min	30 min	60 min	120 min
1	-0.3	-0.5	-1.05	-2.82
2	-0.2	-0.8	-3.23	-4.21
3	0	-0.2	-2.36	-2.81
4	-0.6	-1	-1.64	-2.7
5	-0.5	-0.6	-2.88	-3.23
6	-0.2	-0.6	-4.57	-3.52

Table 10: BT- AT values of trial drug group in different intervals

SN	BT-AT of Trial Drug Group			
	15 min	30 min	60 min	120 min
1	0.5	-0.1	-3.75	-3.79
2	0.5	-1.2	-4.23	-5.48
3	-0.3	0.2	-0.97	-1.14
4	0	0.1	-0.47	-0.36
5	0.3	-0.7	-2.38	-2.84
6	0.1	-0.9	-1.01	-1.2

Table 11: Paw lick or jump response at 15 min

Group	S.D	S.E.	t value	P value	Remarks
Control	0.15	0.06	0.28	P>0.1	Insignificant
Standard	0.22	0.09	3.35	P<0.05	Significant
Trial drug	0.32	0.13	1.44	P>0.1	Insignificant

Under the Hot plate method at 15 min, the control group shows the t value as 0.28 (P> 0.1), the standard drug shows the t value as 3.35 (P<0.05), and the trial drug shows the t value as 1.44 (P<0.10)

The above statistics show that the standard drug is just significant at 15 min, and the trialdrug group and control group are not significant at 15 min.

Table 12: Paw lick or jump response at 30 min

Group	S.D	S.E.	t value	P value	Remarks
Control	0.23	0.10	0.10	P>0.1	Insignificant
Standard	0.27	0.11	5.56	P<0.01	Moderately Significant
Trial drug	0.58	0.24	1.83	P>0.1	Insignificant

Under the Hot plate method at 30 min, the control group shows the t value as 0.10 (P>0.1), the standard drug shows the t value as 5.56 (P<0.01), and the trial drug shows the t valueas 1.83 (P>0.1)

The above statistics show that the standard drug is moderately significant at 30 min, and the control group and the trial drug are Insignificant at 30 min.

Table 13: Paw lick or jump response at 60 min

Group	S.D	S.E.	t value	P value	Remarks
Control	0.30	0.12	0.27	P>0.1	Insignificant
Standard	1.24	0.51	5.16	P<0.01	Moderately Significant
Trial drug	1.58	0.64	3.31	P<0.05	Significant

Under the Hot plate method at 60 min, the control group shows a t value of 0.27(P>0.1), the standard drug shows a t value of 5.16 (P<0.01), and the trial drug shows a t value of 3.31 (P<0.05)

The above statistics show that the control group is insignificant at 60 min, the standard drug is moderately significant at 60 min, and the trial drug is just significant at 60 min.

Table 14: Paw lick or jump response at 120 min

Group	S.D	S.E.	t value	P value	Remarks
Control	0.41	0.17	0.39	P>0.1	Insignificant
Standard	0.58	0.23	13.63	P<0.001	Highly significant
Trial drug	1.58	0.64	3.12	P<0.05	Significant

Under the Hot plate method at 120 min, the control group shows a t value of 0.39 (P>0.1), the standard drug shows a t value of 13.63 (P<0.001), and the trial drug shows a t value of 3.12 (P<0.05)

The above statistics show that the standard drug is moderately significant at 120 min, the control group is Insignificant at 120 min, and the trial drug is just significant at 120 min.

Table 15: Comparison between the Control group, Standard Drug Groupand Trial Drug group at 120 min

Groups	Difference between Mean ± SE	t value	P value	Summary
Control vs Standard	3.51 ±0.26	13.58	< 0.0001	Highly Significant
Control vs Trial	2.77 ±0.80	3.47	< 0.0060	Significant
Standard vs Trial	0.75± 0.82	0.90	< 0.3870	Insignificant

The above table shows that after comparing the groups statistically, the standard and trial drugs have the same action, showing similar results at 120 mins.

The observations show a highly significant difference between control and standard, a considerable difference between control and trial, and an insignificant difference between standard and trial.

RESULTS AND DISCUSSION

The aqueous extracts of Mocarasa were subjected to preliminary phytochemical screening, showing the presence of tannins, carbohydrates, alkaloids, proteins, cardiac glycosides and sterols.

Evaluation of Vedana sthapana activity of Mocarasa kwatha in albino mice.

Three groups of Albino mice (6 mice in each group) are selected in the study with the Control group, Standard drug group and Trial drug group.

The experiment conducted on all the groups showed an excellent basal reaction time at different intervals through Eddy's hot plate method. The pain threshold values of the control, standard, and trial drug groups have been analysed through the schedule by following 15 min as the first reading, followed by 30 min, 60 min, and 120 min, respectively.

The basal reaction time of the mice is the criterion for analysing the analgesic effect of the drugs, and it was carefully conducted using the stopwatch reading method. Table 11 shows that at the time schedule of 15 min, the control group is insignificant at the level of P>0.1, the standard drug is significant at the level of P<0.05, while the trial drug Mocarasa kwatha has showed insignificance at the level of P>0.1.

Table 12 shows that at the time schedule of 30 min, the control group is insignificant at the level of P>0.1, the standard drug is moderately significant at the level of P<0.01, while the trial drug Mocarasa kwatha has showed insignificant at the level of P>0.1 By the above statistical analysis it is evident that on the onset of analgesic action of the standard drug is rapid while the same action in the trial drug group found to be delayed.

Table 13 reveals that the values found after 60 min in the control group were insignificant at the level of P>0.1; the significance of the standard drug group is P<0.01, while the trial drug group has shown its significance comparatively lesser than the standard group at the level of P<0.05. The above statistical analysis indicates that the analgesic action of the standard drug is more potent than the trial drug group after 60 min. It has been noted that the onset of analgesic action in the trial group has improved.

Table 14 has the final reading showing the analgesic effect of the two groups at the time scheduled after 120 min. The control group is still insignificant, and the standard drug group shows highly significance at P<0.001. The action of the trial drug shows the analgesic effect has remained a significance P<0.05.

Table 15 shows the statistical comparison between groups, i.e., control vs standard and control vs trial vs standard drug, at 120 min. Statistically, while comparing the groups, after 120 min, the control vs standard shows a highly significant difference, the control vs trial group shows a moderately significant difference, and the standard drug vs trial drug group shows an insignificant difference. It indicates that the standard drug and trial drug both have similar actions.

According to Dravyaguna shastra the action of the drug depends on the pharmacodynamic properties such as rasa (taste), guna (physical and chemical property), veerya (drug potency), vipaka (drug effect) and prabhava (specific unpredictable drug action), same fact is mentioned by Acharya Sushruta as the action of the drug is either by veerya or by rasa or by vipaka etc. properties[12]. In Ayurveda, it is mentioned that **"Vatadrute Nasthi Ruja"** [13] indicates that the Vata is the main causative factor or the manifestation of ruja in the human body. Mocarasa possesses guru (heavy/high molecular weight drug molecule), snigdha (unctuous), and picchila (slimy) gunas. With these properties, Mocarasa can subside vedana (pain) of purely Vataja and associated with Kapha dosha[14].

All the above views indicate that Mocarasa is a good Vedanasthapana or analgesic drug.

Mocharasa is the gum of the plant Shalmali (*Salmalia malabarica* DC.), which belongs to the Bombacaeceae family.

CONCLUSION

Mocarasa (*Salmalia malabarica* DC gum) is attributed with pharmacodynamic properties like kashaya rasa (astringent in taste), guru-snigdha-picchila gunas, sheeta veerya, katu vipaka (post-digestive effect) and Kapha-Vata hara in classical literature. The preliminary phytochemical evaluation of Mocarasa dry powder reveals the presence of carbohydrates, alkaloids, steroids, tannins and proteins. Mocarasa alone in kwatha (decoction) form

was effective as an analgesic on Albino mice through Eddy's hot plate method. The trial drug is found to be free from any sort of side effects during animal experimentation. Statistically, the trial and standard drugs show insignificant differences, with $P<0.05$ and $P<0.001$respectively. The present study proves that the Mocarasa exhibits its significant Vedanasthapana karma (Analgesic action), as mentioned in classical literature as one of the analgesics.

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