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EVALUATION OF ANALGESIC ACTIVITY OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII* WIGHT FRUITS IN SWISS ALBINO MICE

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Keywords:

Capparis moonii Wight, Analgesic, Eddy's hot plate method, Acetic acid-induced writhing test

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ABSTRACT: Medicinal plants abound with many phytochemicals that are effective in representing lots of pharmacological activities. The current study aimed at investigating the phytochemical and pharmacological activity of Ethanolic extract of *Capparis moonii* Wight. The analgesic activity was examined by Eddy's hot plate method and the acetic acid-induced writhing method. In Eddy's Hot plate method, after oral administration of EECM at doses of (50, 100, and 150 mg/kg body weight), at the end of the experiment *i.e.*, at 120 min, the percent MPA was 137.70 ± 2.511, 166.99 ± 2.511 and 211.83±10.648% respectively; whereas the reference drug Pentazocine displayed 288.54±10.379% MPA at the dose of 10 mg/kg as compared to the control, and the results were statistically significant ($p < 0.01$). In the acetic acid-induced writhing test, after oral administration of EECM at doses of (50, 100, and 150 mg/kg body weight), the percent inhibition was 27.08±1.098, 47.62±4.113, and 71.75 ± 3.127%, respectively. In contrast, the reference drug Ibuprofen displayed 77.70±1.180% inhibition at the dose of 100 mg/kg as compared to the control and the results were statistically significant ($p < 0.01$). The analgesic effect of the plant in both models suggests that they have been acting through a central and peripheral mechanism.

INTRODUCTION: Pain is an unpleasant sensation but a protective mechanism of our body. The term pain is taken from the Latin word peona, which means punishment [1]. International Association for the Study of Pain (IASP) defined pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [2]. As pain is always a psychological state (perception instead of a sensation).

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IASP in 2019 suggested changing the definition as an aversive sensory and emotional experience typically caused by or resembling that caused by, actual or potential tissue injury [3]. Pain perception is a normal physiologic response transduction perception mediated and transmission modulation by a healthy nervous system.

The pain-sensing neurons "nociceptors" as C-fibers and A-delta are thin fibre-like afferent neurons located in visceral tissues, skin and muscle, and joints responsible for noxious, chemical, mechanical, or thermal stimuli [4]. Based on the duration of pain, it can be 'Acute pain (caused by soft tissue damage, infection or inflammation and will be short of duration) or Chronic pain'(which lasts for 6 months or larger than that period, *e.g.*, cancer pain, neuropathic pain and arthritic pain).

Pain is one of the main disabling accompaniments of various medical conditions. Thus, having pain control is one of the essential therapeutic priorities. Pain management is currently done using either opioids (narcotics) or nonopioids (Non-narcotics). These drugs are classified under the category of "Analgesics". Analgesics are defined as the substances that decrease pain sensation by increasing the pain threshold to external stimuli without altering consciousness [5]. The difference between these two types of analgesic medications is shown in **Table 1.**

TABLE 1: DIFFERENCE BETWEEN NARCOTIC AND NON-NARCOTIC ANALGESICS

Narcotic Analgesics	Non-Narcotic Analgesics
Act centrally	Act peripherally
Cause addiction	Do not cause addiction
Produce CNS depression	Do not produce CNS depression
Do not produce gastric irritation	Produce gastric irritation
Show no anti-inflammatory effect	Show anti-inflammatory effect
e.g. Morphine, Tramadol, Pethidine *etc*.	*e.g*. Diclofenac, Ibuprofen, Aspirin *etc*.

Analgesic drugs used at present for anti-inflammatory and analgesic effects are synthetic in nature and prolonged use of which causes severe side effects like hepatotoxicity, NSAID-induced gastrointestinal toxicity, and increased risk of falls, fractures, or delirium [6].

Research to determine other alternatives for the treatment of pain is essential. Various medicinal herbs have been used for centuries for therapeutic purposes. Plants are still an untapped resource of structurally novel molecules that can help develop novel drugs. Even with recent developments in various pain therapies, the medicinal community still requires safe, effective, and potent analgesic drugs to treat various painful conditions. The family of Capparaceae consists of several essential medicinal characteristics found to be distributed in the tropical and subtropical parts of India. Plants of this family were characterized as "Rasayana herbs" and are used widely as an adaptogen to boost non-specific antioxidant resistance and immunostimulation effects. One of the main plants from the Capparaceae family is *Capparis moonii* Wight, which is a woody climber inherent to India and Sri Lanka. It is commonly known as "Large Caper", as it is the biggest of all caper flowers [7]. Commonly it is known as "Rudanti" in Sanskrit and "Waghati" in Marathi. In India, it is most commonly found in the Konkan region and cultivates in hot semi-arid conditions. The taxonomical Hierarchy of the plant is given in **Table 2.**

TABLE 2: TAXONOMY OF CAPPARIS MOONII

Kingdom	Plantae
Class	Dicotyledons
Subclass	Polypetalae
Order	Parietales
Family	Capparaceae
Genus	*Capparis*
Species	*Moonii*

Morphologically, it is a large woody climber or shrub with a height of 3-5 m. It has recurved thorns and trailing glabrous branches with thick stems. Leaves of this shrub are 7-10 cm long, either obtuse or subacute with the callous tip, smooth above and pale beneath. Flowers are white and fragrant with 10-12 cm across, forms corymbs at the end of the branches. Abundant white stamens are 5-8 cm long and are prominent on the flower. The fruits are round, 5-10 cm in diameter across green-grey to red in colour.

FIG. 1: VARIOUS PARTS OF *CAPPARIS MOONII* (FLOWER, FRESH FRUIT, PLANT AND DRIED FRUIT)

Rudanti in Ayurveda nourishes each and every cell of the body (Rasayani). It is beneficial in undernutrition and emaciated conditions (Shoshghani). It delays the signs of aging (Jara Vinashnam) and is also advantageous in diseases

that have devastating effects on all the systems of the body (Rajyakshma Shasyate). Rudanti has also been widely used to get relief from cough and asthma by the people of India. Physical, chemical, and physiological factors may lead to gastric ulceration in humans. Reactive oxygen species (ROS) are reported in the pathophysiology of human diseases, for instance, neurodegenerative inflammation, viral infections, autoimmune GI inflammation, and gastric ulcer. It has multiple known activities such as CNS depressant activity [8], anti-bacterial activity [9], insulin-mimetic activity [10], anti-hepatotoxicity [11], immunomodulatory activity [7, 12], antioxidant activity [13,] and antiulcer activity [14]. Keeping this view in mind, we have planned to undertake complete ethnopharmacological research to identify herbal medicine for comparatively less explored natural regimens in pain management. For this purpose, a thorough literature survey was done to determine the best fit model for the evaluation of the analgesic activity of *Capparis moonii*. Hot-plate test [15] and Acetic acid-induced writhing test [16] models were decided to be utilized for screening purposes. The hot plate test is widely used in basic pain research as well as in testing the efficacy of the analgesics by observing the response to pain caused by heat.

MATERIALS AND METHODS:

Collection and Authentication of Plant: Fruits of Capparis moonii were purchased from a local supplier and authenticated by Dr. Bindu Gopalkrishnan, Assistant Professor of Botany, University of Mumbai.

The fruits were washed with tap water and dried at normal room temperature with the aid of circulating air flow using fan. Then fruits were chopped into smaller portions for drying, and then, powdered mechanically sieved using (#20) and were used for extraction.

Preparation of the Extract: Powder of Capparis moonii W. (142 g) fruits were placed in the Soxhlet extractor's extraction compartment using cotton inserts to filter the solvent (ethanol 90% v/v) returning from crude powder to the round bottom flask. The Soxhlet extractor was mounted on the ethanol-containing round bottom flask. The condenser was installed towards the other end of the Soxhlet extractor to avoid solvent loss due to vapour formation and vapour condensation.

The solvent dissolves the powder's soluble constituents and changes colour. The siphon tube drained the compartment, with the solvent flowing back into the bottom round flask. This loop was replicated until the powder was consumed, which was detected when the liquid in the siphon tube was clear. Next, in the petri plates, all the contents of the round bottom flask were drained, and the solvent was allowed to dry up. After the extracts had been evaporated to get the dried crude form, they were then placed in an appropriate container and stored in a refrigerator at 4° C till the time for their use. The alcoholic extract percentage yield was 7.88% w/w. The entire study was then done on the basis of alcoholic extract of Capparis moonii W.

Physicochemical Analysis of Powdered Dried Fruits [17]: Physicochemical parameters such as Loss on drying, total ash value, acid insoluble ash value, Water-soluble ash value, and Extractive values in different solvents were calculated.

Qualitative Phytochemical Screening [17, 18]: Preliminary chemical tests and TLC Profiling were carried out on ethanolic extract of *Capparis moonii* for determination of the presence of phytoconstituents like alkaloids, flavonoids, cardiac glycosides, saponins, steroids, terpenoids, tannins, and phenolic compounds.

Animals: 30 male Swiss Albino Mice weighing (15-30 g) were used for the study. The animals were obtained from Bharat Serums and Vaccines Limited, Thane West, Maharashtra 400604. The use of these animals and the study protocols were approved by CPCSEA recognized local ethical committee of Oriental College of Pharmacy under protocol no. OCP/IAEC/2019-20/03 titled "To evaluate Analgesic Activity of Ethanolic Extract of dried fruits of *Capparis moonii* Wight. (EECM) in Swiss Albino Mice." Mice were kept at the animal house of Oriental College of Pharmacy, Sanpada, Navi Mumbai; in polypropylene cages, at 22 ± 2 °C, with 12:12 h dark: light cycle. They were provided with commercial rat feed and water given *ad libitum*.

Acute Oral Toxicity Study: Acute oral toxicity analysis was carried out for the alcoholic extract of dried fruits of *Capparis moonii* W. as recommended in OECD Guideline 423. The animals were noted keenly for the display of any toxic signs or symptoms at different time intervals of 0, 30 min, 1, 2, 4, 6, 8, 12 h and then daily for a period of 14 days. When this was conducted, any kind of toxic signs was not noted in clinical parameters during acute toxicity study even at the highest dose of 2000mg/kg. Hence, it can be concluded that the LD_{50} of the alcoholic extract of dried fruits of *Capparis moonii* W. is greater than 2000 mg/kg. Animal groups are mentioned in **Table 3.**

TABLE 3: GROUPING OF ANIMALS FOR ACUTE ORAL TOXICITY STUDY

S. no.	Acute oral toxicity	Dose of alcoholic Extract of *Capparis moonii* W.	Rats required per group for alcoholic Extract of *Capparis moonii* W.
1	Group 1	Low dose 50mg/kg	3
2	Group 2	Intermediate dose 300mg/kg	3
3	Group 3	High dose 2000mg/kg	3
Total animal required			9

Selection of Doses: The alcoholic extract's LD50 was estimated to be 2000 mg/kg. This plant has also known to be edible making it safe and accordingly 1/10th and 1/20th dose were selected for study *i.e*. low dose 100 mg/kg and high dose 200 mg/kg for the test groups with dose conversion [19, 20].

Analgesic Study:

Eddy's Hot Plate Method [15, 21]: The animals were divided into five groups (six animals in each group) for antipyretic studies.

Group I: Normal Control; Group II: Pentazocine (10mg/kg), p.o.; Group III: EECM (50mg/kg), p.o.; Group IV: EECM (100mg/kg), p.o.; Group V: EECM (150mg/kg), p.o.

Procedure: The mice were placed on a hot plate maintained at 55 °C within the restrainer. The reaction time (in seconds) or latency period was determined as the time for the rats to react to thermal pain by licking their paws or jumping.

The reaction time was recorded before (0 min) and at 30, 60, 90, and 120 min after the administration of the treatments.

The maximum reaction time was fixed at 45 sec to prevent any injury to the tissues of the paws. If the reading exceeds 45 sec, it would be considered as maximum analgesia.

The % maximum possible analgesia (MPA) was calculated as follows:

% MPA = Reaction time of Treatment - Reaction time of Control / Reaction time of Control × 100

Acetic acid-induced Writhing Method [16]: For antipyretic studies, the animals were divided into five (six animals in each group).

Group I: Normal Control; Group II: Ibuprofen (100mg/kg), p.o.; Group III: EECM (50mg/kg), p.o.; Group IV: EECM (100mg/kg), p.o.; Group V: EECM (150mg/kg), p.o.

Procedure: After 30 minutes of drug administration, 0.1 ml of 1% acetic acid solution was given to mice intraperitoneally (*i.p.*). The mice were placed individually into glass beakers, and five minutes were allowed to elapse. The mice were then observed for a period of 30 minutes and the numbers of writhes were recorded for each animal. For scoring purposes, writhe was indicated by stretching of the abdomen with simultaneous stretching of at least one hind limb.

The following formula was used to calculate percentage inhibition:

% Inhibition = No. of writhes in control Group-No. of Writhes in Treatment Group / No. of writhes in Control Group × 100

Statistical Analysis: The data were analyzed with In-Stat Software by GraphPad (version 3.10). The results are expressed as the mean ± SEM for each group. Statistical differences were evaluated using a one-way analysis of variance (ANOVA) followed by Dunnett's t-test.

Results were considered to be statistically significant at $P \leq 0.05$.*** indicated $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0$.

RESULTS:

Physicochemical Analysis of Crude Powder: The result of this study is mentioned in **Table 4.**

TABLE 4: RESULT OF PHYSICOCHEMICAL ANALYSIS OF CRUDE POWDER OF *CAPPARIS MOONII*

S. no.	Test	Result
1	Loss on drying	13.2%
2	Total ash value	6.8%
3	Acid insoluble ash value	0.52%
4	Water soluble ash value	0.68%
5	Water soluble extractive value	26.6%
6	Ethanol soluble extractive value	26.8%
7	Chloroform soluble extractive value	4%
8	Ethyl Acetate soluble extractive value	2.2%
9	n-Hexane soluble extractive value	1%
10	Petroleum ether soluble extractive value	9.6%

Qualitative Phytochemical Screening: The result of this study is mentioned in **Table 5**.

TABLE 5: RESULT OF QUANTITATIVE PHYTOCHEMICAL ANALYSIS OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII*

S. no.	Phytochemicals	Tests performed	Inference	Alcoholic extract of the dried fruits of *Capparis moonii* W.
1	Carbohydrates	Molisch test	Violet ring at junction	+
		Benedict test	Red ppt	+
		Selwinoff test	Red colour	+
2	Flavonoids	Sodium hydroxide (NaOH) test	Yellow ppt	+
		Shinoda test	Pink to a red solution	+
3	Glycosides	Modified Borntrager's test	Pink to red colour	+
4	Tannins	Ferric chloride test	Deep black colour	+
		Dil. Iodine solution test	Transient red colour	+
5	Saponins	Foam test	No Persistent foam	-
6	Fixed oils	Sodium hydroxide solution test	Clear blue solution	+
7	Alkaloids	Dragendroff reagent test	Reddish-brown ppt	+
		Mayer's reagent test	Buff coloured ppt	+
		Hager's reagent test	Yellow ppt	+
8	Phenols	Dil. Potassium permanganate test	Decolouration of $KMnO_4$ solution	+
9	Sterols	Liebermann Burchard test	Green upper layer	+
		Salkowski test	Red lower layer	+
10	Terpenoids	Liebermann Burchard test	No red upper layer	-
11	Proteins	Biuret test	No violet/ pink colour	-

TLC Profiling: The result of this study is mentioned in **Table 6.**

TABLE 6: TLC PROFILING OF EECM

Photochemical	Solvent system	Confirmatory Test	Solvent	R_f Value
Alkaloids	EA: Chloroform: Water 5 : 3 : 1	Mayer's reagent spray	Ethanol	0.8
Flavanoids	N-Butanol: EA: Water 5 : 10 : 15	3% boric acid + 10% oxalic acid spray	Ethanol	0.5
Tannins	Chloroform: Water 6 : 4	FeCl3 spray	Ethanol	0.8
Phenols	Methanol: Water 6 : 3	FeCl3 spray	Ethanol	0.7

Acute oral Toxicity Studies: The result of this study is mentioned in **Table 7.**

TABLE 7: RESULT OF ACUTE ORAL TOXICITY EVALUATION OF ALCOHOLIC EXTRACT OF THE DRIED FRUITS OF *CAPPARIS MOONII* W.

Parameters	Toxicological observation for CME for 14 days													
Time intervals on 1st day (in minutes)	1	3	6	12	180	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th
	5	0	0	0														

Awareness	Alertness	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Mood	Restless-ness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Alertness	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
CNS Excitation	Straub tail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tremors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Convulsions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CNS Depression	Sedation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hypnosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motor coordination	Abnormal gait	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Righting reflex	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Muscle tone	Grip strength	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Abnormal tone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Autonomic	Writhing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pupil size	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Exoptha-lamus	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Salivation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Urination	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Defecation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Body temperature	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Skin color	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Respiratory rate	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

'N'- indicates normal & '0'- indicates no abnormality

Eddy's Hot Plate Method: All three test groups of the Ethanolic extract of *Capparis moonii* showed dose-dependent increase in % MPA when compared against control as well as against Pentazocine, which was used as a standard. Results of this study are mentioned in **Table 8** and **Fig. 2.**

TABLE 8: EFFECT OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII* ON % MPA ON EDDY'S HOT PLATE METHOD IN SWISS ALBINO MICE

	Control	Standard (Pentazocine)	Test 1 (50 mg/kg)	Test 2 (100 mg/kg)	Test 3 (150 mg/kg)
0 min	100±0	100±0	100±0	100±0	100±0
30 min	102.52±0.904	188.61±05.550**	106.53±1.854**	123.02±1.415**	140.32±7.856**
60 min	103.24±0.886	216.52±09.432**	132.29±2.357**	133.74±0.023**	172.65±9.710**
90 min	104.72±0.889	226.87±10.190**	141.39±2.477**	153.03±0.039**	187.69±10.466**
120 min	105.64±0.921	288.54±10.379**	137.70±2.511**	166.99±2.511**	211.83±10.648**

Values are the mean ± SEM of n=6 rats/treatment. Significance **p ≤0.01

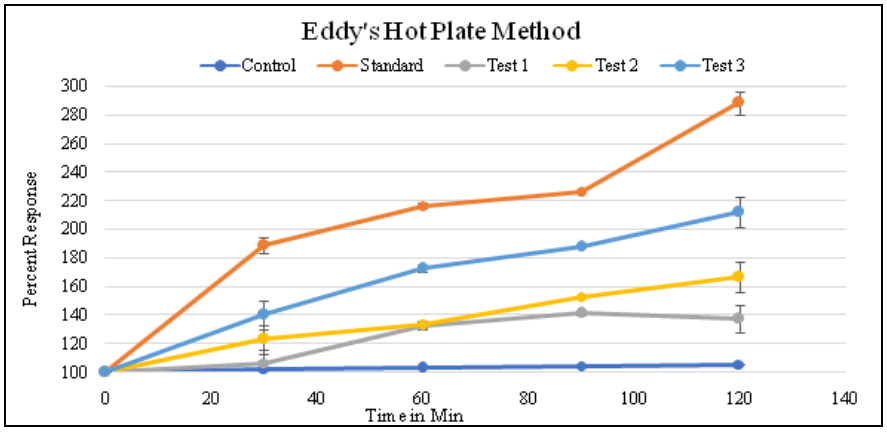

FIG. 2: EFFECT OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII* ON % MPA ON EDDY'S HOT PLATE METHOD IN SWISS ALBINO MICE

Acetic Acid-Induced Writhing Method: All three test groups of the Ethanolic extract of *Capparis moonii* showed a dose-dependent decrease in % inhibition when compared against control as well as against Pentazocine, which was used as a standard. Results of this study are mentioned in **Table 9** and **Fig. 3.**

TABLE 9: EFFECT OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII* ON % INHIBITION OF WRITHES ON ACETIC ACID-INDUCED WRITHING METHOD IN SWISS ALBINO MICE

Group	% Inhibition
Normal Control	-
Standard (Ibuprofen)	77.70 ± 1.180**
Test 1 (EECM 50mg/kg)	27.08 ± 1.098**
Test 2 (EECM 100mg/kg)	47.62 ± 4.113**
Test 3 (EECM 150mg/kg)	71.75 ± 3.127**

Values are the mean ± SEM of n=6 rats/treatment. Significance **p ≤0.01.

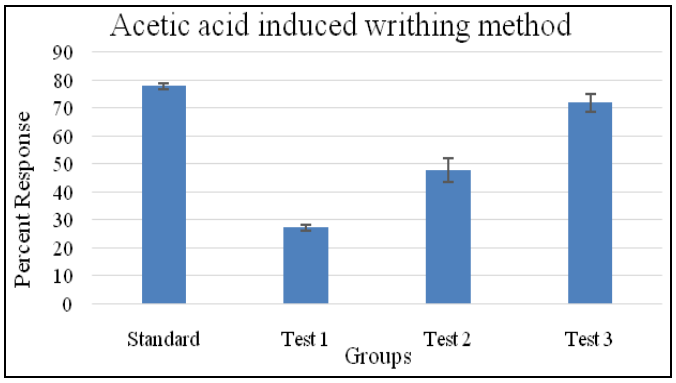

FIG. 3: EFFECT OF ETHANOLIC EXTRACT OF *CAPPARIS MOONII* ON % INHIBITION OF WRITHES ON ACETIC ACID-INDUCED WRITHING METHOD IN SWISS ALBINO MICE

DISCUSSION AND CONCLUSION: Clinical conditions such as arthritis, cancer, and vascular diseases are associated with pain and inflammation [22]. Neurologic pain is a widely used model for hot plate tests. In this method, phasic stimuli of high intensity are given [23]. Pain induced by the thermal stimulus through their action at the spinal cord level of the hot plate is specific for centrally mediated activity. Opioid agents (pentozocine) used as the standard in this study acts through binding with opioid receptors (μ, δ, and κ) present in presynaptic and postsynaptic membranes. Opioid agents (pentozocine) exert their analgesic action via supraspinal (μ1, κ3, σ2, δ1) and spinal (μ2, κ1, δ2) receptors [24]. The antinociceptive activity was observed by EECM via increasing the potential discomfort in the hot plate test. This action could be by stimulating the periaqueductal gray matter to release endogenous peptides [25]. These endogenous peptides incline the spinal cord and function as inhibitors of pain impulse transmission at the synapse in the dorsal horn [26, 27]. The possible mechanism of EECM fruits could be due to its action on the central opioid receptors or promoted release of endogenous opioid peptides [28]. The present study thus demonstrates the potential antinociceptive effect of EECM by thermal (Eddy's hot plate method) models of nociception, thus hypothesizing that EECM possesses both central and peripheral nociceptive actions. The abdominal contraction method has been used to evaluate peripherally acting analgesics by inducing acetic acid. In this method, pain is generated indirectly *via* endogenous mediators like prostaglandin, which stimulates peripheral nociceptive neurons. These neuronal fibers are sensitive to both narcotics and non-steroidal anti-inflammatory drugs [29, 30].

The acetic acid-induced writhing has been associated with an elevated level of PGE2 and PGF2α in peritoneal fluids as well as lipoxygenase products [31]. The increase in prostaglandin levels within the peritoneal cavity then enhances inflammatory pain by increasing capillary permeability. The plant extract exhibited positive results for alkaloids, and it is well-known that many alkaloids, including caffeine, cocaine, cathinone, nicotine, and yohimbine, possess central stimulant effects [32]. Therefore, the identified polyphenols and alkaloids might contribute to the observed central stimulant effect of EECM.

The significant pain reduction of the plant extracts might be due to the presence of analgesic principles acting with the prostaglandin pathways. In Eddy's Hot plate method, after oral administration of EECM at doses of (50, 100, and 150 mg/kg body weight), at the end of the experiment, *i.e.*, at 120 min, the percent MPA was 137.70±2.511, 166.99±2.511, and 211.83±10.648% respectively. In contrast, the reference drug Pentazocine displayed 288.54 ± 10.379% MPA at the dose of 10 mg/kg compared to the control, and the results were statistically significant ($p < 0.01$). In the acetic acid-induced writhing test, after oral administration of EECM at doses of (50, 100, and 150 mg/kg body weight), the percent inhibition was 27.08±1.098, 47.62±4.113, and 71.75 ± 3.127% respectively; whereas the reference drug Ibuprofen

displayed 77.70±1.180% inhibition at the dose of 100 mg/kg as compared to the control and the results were statistically significant ($p < 0.01$). The analgesic effect of the plant in both models suggests that they have been acting through a central and peripheral mechanism. It can be concluded that the observed analgesic activity in *Capparis moonii* was demonstrated by the active constituents such as beta-sitosterol, Stachyhydrin, Rutin, Gallotannins, and Chebulinic Acid from the plant extract, which acted through a peripheral region similar to the mechanism of non-steroidal anti-inflammatory agents. The phytochemical ingredients found in fruit extract of EECM, like flavonoids, which potently inhibit prostaglandins [33] tannins and alkaloids, could also contribute to the antinociceptive action of EECM [34, 35].

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