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ORIGINAL ARTICLE **OPEN ACCESS**

Evaluation of Antipyretic and Analgesic activity of Pratapamartanda Rasa- An Animal Experimental Study

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ABSTRACT

In Ayurvedic classics, the symptom of fever is considered as a separate disease called Jwara. Bhaishajya Ratnavali has mentioned Pratapamartanada Rasa, a herbo-mineral formulation for treatment of Jwara, which contains four drugs namely Shudha Vatsanabha, Shudha Hingula, Shudha Jayapala, and Shudha Tankana. To evaluate the antipyretic and analgesic activity of Pratapamartana Rasa in experimental animals. Pratapamartanda Rasa was prepared as per bhaishajya ratnavai. Antipyretic activity was carried out against yeast-induced pyrexia & Analgesic activity was evaluated using tail flick method in Wistar strain albino rats. In yeast-induced pyrexia model, both dose of test drug produced marked decrease in rectal temperature. In the tail flick method, both dose of test drug showed significant increase in tail flick response. Pratapamartanda Rasa has moderate antipyretic activity in rats, which may be due to inhibition of the synthesis and/or release of local PGE2. Further, it has mild analgesic effect through central and peripheral mechanism. The result of the present study provides further scope for development of new palatable dosage form and tested clinically for better efficacy.

KEYWORDS: *Pratapamartanda Rasa, Antipyretic, Analgesic activity.*

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INTRODUCTION

Pyrexia refers to raised body temperature. If the temperature raises by few degrees in human being, mental changes occur, like the individual becomes confused & delirious [1]. Pain has been officially defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is a disabling accompaniment of many medical conditions and pain control is one of the most important therapeutic priorities [2].

In Ayurvedic classics fever is not just a symptom but is considered as a separate disease. Many herbal and herbo-mineral formulations are mentioned in classics for treatment of Jwara which can be considered as antipyretics. One such formulation is Pratapamartanda Rasa is a herbo-mineral formulation described in Bhaishajya Ratnavali [3] [4]. It contains 4 ingredients which are Shudha Vatsanabha, Shudha Hingula, Shudha Jayapala, and Shudha Tankana. As per Rasatarangini Suddha Vatsanabha, Shudha Hingula, and Shudha Jayapala [5][6],[7] are indicated in treatment of Jwara and are also used as ingredients in many other Jwarahara formulations like Jwaramurari Rasa, Anandabhairava Rasa [8][9], etc.

All the antipyretic drugs, which reduce the elevated body temperature by inhibition of prostaglandin synthesis, are also reducing the pain sensation by same mode of action [10]. Non-steroidal anti-inflammatory drugs (NSAIDs) are most frequently used antipyretic and analgesic agent in current times but associated with many side effects [11]. Indigenous drugs possessing fever side effects should be looked for as a better alternative for the treatment of pain, inflammation, and pyrexia [12]. Thus, in the light of above and considering wide usage of Pratapamartanda Rasa it was thought useful to undertake antipyretic and analgesic activity of two dosage forms Pratapamartanda Rasa in rats to substantiate its ancient claim.

MATERIAL AND METHODS

The formulation Pratapamartanda Rasa was prepared in the pharmacy dept. of Rasashastra and Bhaishajya Kalpana BLDEA's AVS Ayurveda Mahavidyala Hospital and Research Centre Vijayapura.

Experimental Study:
For the animal experimental study IAEC approval was taken & letter with reference no 616/2023-24, Dated on 21/10/2023 and study was carried out in college animal house which is ccsea approved with registration number 533 / ccsea

Anti-Pyretic Study:

Materials: Wister Strain Albino rats, *Pratapamartanda Rasa* (test drug), Paracetamol (standard drug), Propylene glycol (control/vehicle), Baker's yeast (to induce pyrexia), Normal saline 0.9% (to prepare yeast solution) etc. formed the study materials.

Sources: Healthy adult male albino rats (Wister strain) of 90-120 days old, weighing from 150-200gms was taken for the experimental study. The animals were maintained under strict laboratory condition with controlled environment of temperature, humidity, light and dark cycles. Rats were fed with balanced pellet diet as prescribed by CFTRI, Mysore (Central Food Technological Research Institute), and water ad libitum. Maximum number 03 animals per cage were maintained. Animals under different group were caged separately. The animals were selected from animal house of B.L.DEA's A.V.Samiti Ayurveda Mahavidyalaya, Vijayapura, considering inclusive and exclusive criteria.

Method of Brewer's Yeast induced Antipyretic study: [17]

The animals were starved for 24 hrs and water ad libitum. The digital Tele thermometer cord was lubricated with borax glycerin and initial temperatures of the chosen animals were recorded. Preparation of 15% yeast solution. For 15gm of freeze-dried baker's yeast (Prestige yeast manufactured by SAF yeast Co, Ltd. Mumbai). 100ml of 0.9% normal saline was added and triturated thoroughly to make homogeneous solution. Every time fresh yeast solution was prepared and used. Pyrexia was induced by the parental administration of 2ml of yeast solution at the nape region. Temperature was recorded 18 hour after inducing pyrexia. Test drug, standard drug and control drug suspensions prepared instantly and administered orally, after 18hrs of administration of the pyrogen. After Drug administration rectal temperature was recorded consecutively every half hour for 3 hours and hourly for next 3 hours. Dosage and dosage form per 200gm Rats is shown in table no 1.

ANALGESIC STUDY:

MATERIALS: Wister Strain Albino rats, *Pratapamartanda Rasa* (test drug), Ibuprofen (standard drug), Propylene glycol (control vehicle) etc. formed the study materials.

Sources: Healthy adult male albino rats (Wister strain) of 90-120 days old, weighing from 150-200gms was taken for the experimental study. The animals were maintained under strict laboratory condition with controlled environment of temperature, humidity, light and dark cycles. Rats were fed with balanced pellet diet as prescribed by CFTRI, Mysore (Central Food Technological Research Institute), and water ad libitum. Maximum number 03 animals per cage were maintained. Animals under different group were caged separately. The animals were selected from animal house of B.L.DEA's A.V.Samiti Ayurveda Mahavidyalaya, Vijayapura, considering inclusive and exclusive criteria.

Tail immersion method of Analgesic Study: [17]

The animals were held in left hand with tail extended. Lower 5 cm portion of tail is marked. Then the marked portion is dipped in a beaker of water maintained with 55±0.5°C. Reaction time recorded with stop watch. Determination of reaction time periodically after oral administration of test drug, standard drug and control drug doses at 0, 1, 2, 3, 4, 5, 6 hrs. Dosage and dosage form per 200gm rats is shown in table no 2.

Table No 1: Showing dosage and dosage form per 200gm Rats

Sl no.	GROUP	No. of Animals	DRUG	Dosage form	Dose/200 gm Rat
1	Control group	6	Propylene glycol	Suspension	1ml
2	Test group-1	6	*Pratapamartanda Rasa*	Suspension	4.5mg in 1ml
3	Test group-2	6	*Pratapamartanda Rasa*	Suspension	9mg in 1ml
4	Standard	6	Paracetamol	Suspension	9mg in 1ml

Table No 2: Showing Dosage and dosage form per 200gm rats

Sl no.	GROUP	No. of Animals	DRUG	Dosage form	Dose/200 gm Rat
1	Control group	6	Propylene glycol	Suspension	1ml
2	Test group-1	6	*Pratapamartanda Rasa*	Suspension	4.5mg in 1ml
3	Test group-2	6	*Pratapamartanda Rasa*	Suspension	9mg in 1ml
4	Standard	6	Ibuprofen	Suspension	14.4mg in 1ml

RESULTS

The preparation of *Pratapamartanda Rasa* strictly according to classical guidelines, highlighting the importance of proper *Shodhana*, trituration, and standardization in achieving reproducible and safe final product. The organoleptic characters observed in the final products were: Color: Brick red, Odour: *Gomutra* Gandhi, Taste: *Tikta,* Touch: Fine powder.

Table No 3: Showing the results of antipyretic activity of test Groups, Control and Standard group (Mean ± SD) (n=6)

S. n		Initial temp in *F	Raised Temp hour	30 Mins	60 min	90 Min	120 min	150 min	180 min	4th hr	5th hr	6th hr
I	Control	97.15 ± 0.98	100.65 ± 0.79	100.45 ± 1.03	100.60 ± 0.57	100.52 ± 1.07	98.83 ± 0.40	98.23 ± 0.75	97.62 ± 1.54	97.78 ± 1.37	97.98 ± 1.41	98.22 ± 0.78
II	Test group I	97.60 ± 0.76	101.27 ± 1.18	101.15 ± 0.85	101.07 ± 0.71	98.62 ± 0.94	98.60 ± 0.57	98.57 ± 0.51	98.92 ± 1.17	98.78 ± 1.22	95.92 ± 1.29	96.38 ± 1.67
III	Test Group II	98.27 ± 0.59	100.78 ± 0.61	101.00 ± 0.62	101.02 ± 0.72	99.67 ± 0.76	98.85 ± 0.47	98.50 ± 0.39	98.65 ± 0.46	97.87 ± 0.50	98.90 ± 0.40	98.52 ± 0.48
Iv	Standard	99.15 ± 0.68	101.17 ± 0.67	101.05 ± 0.37	100.72 ± 0.31	99.83 ± 0.43	99.55 ± 1.20	98.57 ± 0.82	98.40 ± 0.74	96.93 ± 0.41	97.47 ± 0.90	98.15 ± 0.69

Graph I: Showing the antipyretic activities in Control, Standard, Test Group I and Test Group II (n=6)

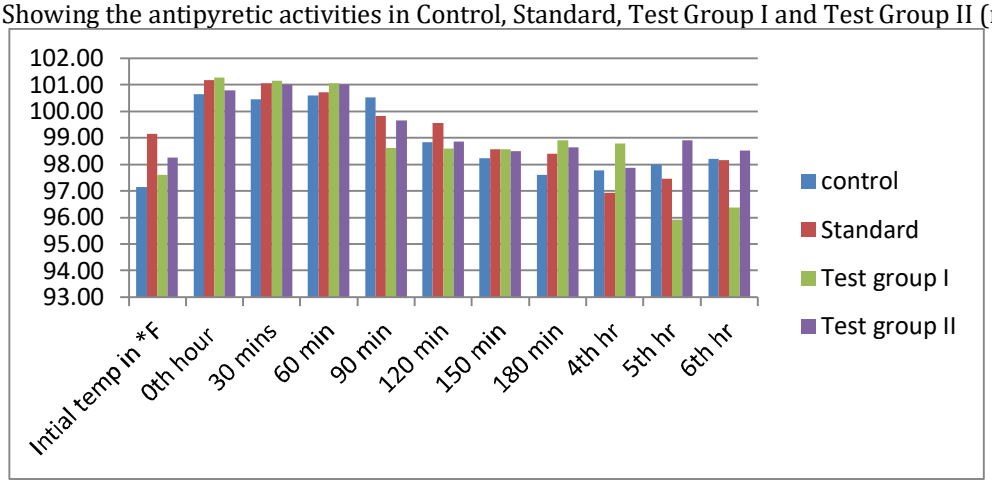
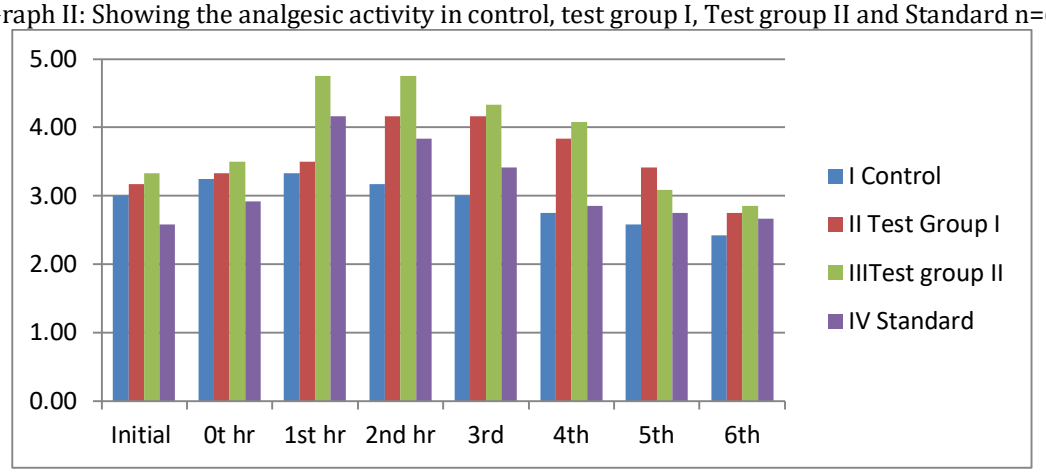


Table No 4: Showing the results of analgesic activity of test Groups, Control and Standard group (Mean ± SD) (n=6)

Groups	Initial Sec	0th hr	1st hr	2nd hr	3rd hr	4th hr	5th hr	6th hr
Control	3.00± 0.55	3.25± 0.88	3.33± 0.26	3.17± 0.41	3.00± 0.00	2.75± 0.27	2.58± 0.38	2.42± 0.20
Test Group I	3.17± 0.75	3.33± 1.03	3.50± 0.71	4.17± 0.52	4.17± 0.41	3.83± 0.41	3.42± 0.49	2.75± 0.27
Test group II	3.33± 0.52	3.50± 0.55	4.75± 0.42	4.75± 0.61	4.33± 0.41	4.08± 0.49	3.08± 0.58	2.85± 0.27
Standard	2.58± 0.38	2.92± 0.74	4.17± 1.13	3.83± 0.82	3.42± 0.66	2.85± 0.23	2.75± 0.27	2.67± 0.26

Graph II: Showing the analgesic activity in control, test group I, Test group II and Standard n=6



Antipyretic Study: All the initial and final temperatures were recorded and the maximum reduction in rectal temperature in comparison to control and standard group was calculated and analyzed by statistical analysis. Results of antipyretic activity of test Groups, Control and Standard group (Mean ± SD) (n=6) are shown in table no 3 and graph I.

Analgesic Study: All the initial and final reaction timings (in seconds) were recorded and the maximum reaction time in comparison to control and standard group was calculated and analyzed by statistical analysis. Results of analgesic activity of test Groups, Control and Standard group (Mean ± SD) (n=6) are shown in table no 4 and graph II.

DISCUSSION

Antipyretic Activity: Both the doses (low & high) of *Pratapamartanda Rasa* (Test Drug) have shown significant antipyretic activity from 1st hour to 6th hour of drug administration. Paracetamol (Standard Drug) has shown significant antipyretic activity from 1st hour to 5th hour of drug administration. In the test and standard groups Antipyretic activity was observed from 1st prime hour of drug administration. In test group Antipyretic activity was continued up to 5th hour but in standard group it was up to 6th hr. Significant & sustained Antipyretic activity was observed with both the doses of *Pratapamartanda Rasa*. In Control Group antipyretic activity was not observed throughout the study.

The formulation Pratapamartanda Rasa demonstrated a significant reduction in pyrexia in experimental models, indicating its potent antipyretic potential. From an Ayurvedic perspective, Jwara is a manifestation of Agni Vaishamya and derangement of Tridosha, primarily Pitta. The ingredients of Pratapamartanda Rasa such as Vatsanabha, Hingula, Tankana, and Jayapala possess Tikta, Katu rasa and Ushna veerya, which aid in restoring the balance of Agni and facilitate Ama pachana, thereby alleviating Jwara. The synergistic action of these ingredients promotes normalization of deranged Doshas and correction of Agni, the central factor in fever pathogenesis.

Pharmacologically, the observed antipyretic effect may be attributed to the presence of steroids, saponins, and carotenoids detected in the phytochemical analysis. Steroidal constituents are known to suppress the synthesis of prostaglandins by inhibiting cyclooxygenase pathways, thereby reducing the hypothalamic set-point for body temperature. Saponins and carotenoids exhibit potent antioxidant and anti-inflammatory activities, which mitigate cytokine-induced pyrexia. Thus, both classical and modern evidence support the role of Pratapamartanda Rasa in reducing fever through modulation of inflammatory mediators and thermoregulatory centers.

Analgesic Activity: Both the doses (low & high) of *Pratapamartanda Rasa* (Test Drug) have shown significant Analgesic activity from 0th hour to 3rd hour of drug administration. Ibuprofen (Standard Drug) has shown significant Analgesic activity from 0.5th hour to1st hour of drug administration. In test and standard group, analgesic activity started at 0.5th hr and continued up to 3rd hr in test groups and 1st hr in standard. In test group II, highly significant and peak level analgesic activity was observed at 2nd, 3rd and 4th hour. In Control Group Analgesic activity was not observed throughout the study.

The analgesic response produced by Pratapamartanda Rasa was statistically significant, suggesting its efficacy in the modulation of pain perception. In Ayurveda, Vedana arises due to Vata vitiation and obstruction in Srotas. The formulation, through its Ushna veerya, Tikshna guna, and Deepana–Pachana actions, helps in pacifying Vata and removing Avarana, thereby restoring normal sensory transmission and

alleviating pain. Vatsanabha, in particular, is recognized as a potent Vedanashamana dravya when properly processed, contributing to the formulation's analgesic property.

From a modern pharmacological viewpoint, the analgesic action may result from the presence of steroids and saponins, which interfere with the peripheral and central pain pathways. Steroidal components reduce the synthesis of inflammatory mediators such as prostaglandins and bradykinin, thereby decreasing nociceptor sensitization. Saponins possess membrane-stabilizing and anti-inflammatory effects, further supporting analgesic activity. These findings correlate with the Ayurvedic rationale of Vata-shamana and Vedanasthapana actions described for the formulation.

CONCLUSION

Pratapamartanda Rasa exhibited significant antipyretic and analgesic effects, validating its classical claims. The synergistic interplay of Rasaushadhis such as Vatsanabha, Hingula, Jayapala, and Tankana contributes to its Jwarahara and Vedanashamana activities through Agni-deepana, Ama-pachana, and Vata-pitta samana mechanisms. Analytical evaluations and phytochemical findings indicate the presence of bioactive compounds like steroids, saponins, and carotenoids, supporting its pharmacodynamic potential. The observed activities may be mediated by suppression of prostaglandin synthesis, modulation of inflammatory cytokines, and antioxidant actions.

Thus, Pratapamartanda Rasa represents a scientifically validated Rasaushadhi with a strong correlation between traditional Ayurvedic principles and modern pharmacological mechanisms.

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