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# Review on Reverse Pharmacology of Jawarhar Mahakashaya Drugs for Anti-pyretic Activity in Momoherbal and Polyherbal Form

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## ABSTRACT

Ayurvedic Jawarahara Mahakashaya (JhMh) includes Sariva, Sharkara, Patha, Manjishtha, Draksha, Pilu, Parushaka, Abhaya, Amalaka and Bibhitaka drugs as a set of ten herbal drugs, means this set of drug is effective in countering Jawar (fever) in single drug form or combined formulation. Globally the most accepted drugs which are used to cure pyrexia are NSAIDS. It is reported that most of these chemical antipyretic formulations has been associated with gastro-intestinal, renal, hepatic, CNS and dermatological side effects. Extensive literature searches both electronic online databases on concerning issues. Drugs of Jawarhar Mahakashaya in monoherbal and polyherbal form have shown significant antipyretic activity in pre-clinical set up as mentioned in Ayurvedic literatures. The main aim of this paper is to review reverse pharmacology of JhMh drugs is described in terms of Ayurveda and is supported parallelly with the facts and findings of scientific researches done in modern science. JhMh can replace the side effects of chemical drugs and stand as sustainable antipyretics if used judicious.

**Keywords:** Jawarhar Mahakashaya, Mahakashaya, Anti-pyretic, Reverse Pharmacology, Herbal Drugs, Paprola.

## INTRODUCTION

Jawarahara Mahakashaya (JhMh) includes Sariva, Sarkara, Patha, Manjishtha, Draksha, Pilu, Parushaka, Abhaya, Amalaka and Bibhitaka drugs as a set of ten herbal drugs. The term Jawarhar clearly explains that this set of drugs is effective in countering Jawar (fever) in alone or in combined form [1]. Acharya Vagbhata in Astanga Samgraha (A.S.) has replaced drug Sarkara with Guduchi in this set. Guduchi is easily available and proven anti-pyretic drug but Sharkara is controversial. Hence, JhMh of A.S. is more practical to be considered [2].

Substances used to reduce or prevent fever i.e. raised temperature of body are antipyretics. In Ayurvedic as well as Modern sciences we use various drugs which act as an anti-pyretic. A very common as well as popular group of anti-pyretics globally and abundantly being used in modern medicine are non-steroidal anti-inflammatory drugs (NSAIDS). It is reported that NSAIDS are associated with gastro-intestinal, renal, hepatic, CNS and dermatological side effects [3].

If sufficient fact and evidences could be generated, gathered and published, in one or the other ways, drugs of JhMh can replace the side effects of chemical drugs and stand as sustainable antipyretics.

Also, fever is cardinal clinical issue with the patients in the crisis of CoViD19 pandemic; so at this high situation herbal drug of JhMh could impart better and sustainable anti-pyretic action, when it could be used judicially [4].

Extensive multi-disciplinary researches on chemical anti-pyretic drugs in modern medicine are available; there exists enough evidences to justify the exact pharmacological action of chemical drugs [5]. In case of Ayurvedic anti-pyretic herbal drugs, it is seen that there exists mere description of actions in authentic Ayurvedic texts. Though, they are in use for the management of pyrexia, but lack of sufficient pre-clinical

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and clinical evidences about the pharmacological activities of herbal drugs and formulations these drugs are not fully accepted by the scientific community.

In case of Ayurvedic herbal drugs the declared action of drugs are quoted in authoritative Ayurvedic texts but its pharmacological action and its mechanism is not known. Through the process of reverse pharmacology the action and detailed mechanism of action of such quoted activities are studied [6]. For which concerned pharmacological studies in experimental setup and in clinical setup are performed. Then facts and evidences are generated for justification.

This review study is aimed to describe reverse pharmacology of JhMh drugs in terms of Ayurveda and is supported parallely with the facts and findings of scientific researches done in modern science.

**MATERIAL & METHODS**

Extensive literature searches both on electronic online databases (Google Scholar, Scopus, Springer Link, Web of Science, ScienceDirect, ResearchGate, PubMed, ChemSpider, USPTO, Google patents and Espacenet) and library visits in RGGPGAC & H were carried out to collect the literature on information published prior to September 2021.

**Observation and Result**

Herbal drug (single): Sariva

Botanical name: *Hemidesmus indicus* (L.) R. Br. Ex Schult

Family: Asclepiadaceae

Rasa-panchak and action of dosha [7].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur | Vata-pitta samak |
| | | Tikta | Kapha-pitta samak |
| 2. | Guna | Guru | Vata-samak |
| | | Snigdha | Vata-samak |
| 3. | Virya | Shita | Pitta-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | - | - |
| 6. | Action on dosha | Tridosha Samak | |

Result: Sannipataj jwar is the fever in which all three doshas are imbalanced Sariva has Tridosha samak action which means it is effective in the management of Sannipataj jwar.

In a study, brewer's yeast pyrexia (20ml/kg subcutaneously) was induced in albino rats 180-200gm (Wister strain). Initially rectal temperature was recorded and after 18 hours animals that showed an increase of 0.3 to 0.5℃ temp were selected for the experiment. Methanolic extract (test drug extract) prepared from *Hemidesmus indicus* root (collected from Madikeri, Coorg Districit, Karnataka) was administered to three groups of rats at the strength of 100, 200 and 400mg/kg orally. The control group was given 0.3ml/kg/po normal saline. Paracetamol (100mg/kg/ orally) was used as standard drug. After test drug administration rectal temperature was taken by at 1, 2, 3 and 4 hours. The pyrexia in rats were reduced significantly (P< 0.05) compared to that of control. These results indicate that extracts possess anti-pyretic properties. It was found that the extract at a dose of 100 mg/kg caused significant lowering of body temperature at 4 hour after its administration. This effect was observed maximal at doses of 200 and 400 mg/kg/po in dose dependent manner and it caused significant lowering of body temperature up to 4 hour after its administration. The antipyretic effect started as early as one hour and the effect was maintained for four hours after its administration [8].

Result: Both the standard drug (paracetamol) 100 mg/kg and test drug *H. indicus* extract significantly reduced the yeast elevated rectal temperature compared to control group.

*Herbal drug (single): Sarkara*

Botanical name: *Themeda arundinacea* (Roxb.) A. Camus

Family: Poaceae

Rasa-panchak and action on dosha [9].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur | Vata-pitta samak |
| 2. | Guna | Guru | Vata-samak |
| | | Snigdha | Vata-samak |
| 3. | Virya | Shita | Pitta-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Vata-pitta Samak |

Result: Vata-pittaj jwar is the fever in which vata and pitta doshas are imbalanced Sarkara has Vata-pitta samak action which means it is effective in the management of Vata-pittaj jwar.

There is lack of information regarding identification, collection and evidences of experimental studies on Sarkara to scientific community. A. S. has considered *Tinospora cordifolia* as the member of JhMh in place of drug Sarkara. Hence *Tinospora cordifolia* included JhMh should be considered for practical ease.

*Herbal drug: Guduchi*

Botanical name: *Tinospora cordifolia* (Thunb.) Miers

Family: Menispermaceae

Rasa-panchak and action on dosha [10].

| | | | |
|---|---|---|---|
| 1. | Rasa | Tikta | Kapha-pitta samak |
| | | Kashaya | Pitta-samak |
| 2. | Guna | Guru | Vata-samak |
| | | Snigdha | Vata-samak |
| 3. | Virya | Ushna | Kapha-vata samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Tridosha Samak |

Result: Sannipataj jwar is the fever in which all three doshas are imbalanced Sariva has Tridosha samak action which means it is effective in the management of Sannipataj jwar.

In a study, aqueous extract of moderately coarse power of stem of shade dried *Tinospora cordifolia* was prepared as such that 100gm of

*T. cordifolia* was present in 100 ml of water ( i.e. 1ml of this extract is equivalent of 1g dry powder of *T. cordifolia*). Pyrexia (of 38.71-39.9ºC in five groups with six rats in each group at 9-18hours) was produced by injecting 10ml/kg of 20% suspension of dried brewer's yeast in normal saline subcutaneously on the back of albino rats (of either sexes weighing 100-200g) 20 hrs before performing the experiment.

The rectal temperature was noted after 18 hours for the development of pyrexia (i.e. yeast injection). Group I was treated with normal saline (5ml/kg of 0.9% NaCl) p.o, Group II was given paracetamol 150mg/kg p.o, Group III 1.25gm/kg of aqueous extract of *T. cordifolia* p.o, Group IV 2.5g/kg was challenged with aqueous extract of *T. cordifolia* (p.o), Group V: 5g/kg was challenged with aqueous extract of T. cordifolia (p.o). Now, the pyrexia was noted at 30, 60, 90, 120, 180 and 240 minutes [11].

Result: Different doses of *T. cordifolia* produced a significant reduction in temperature in dose dependent manner in comparison to the standard drug.

*Herbal drug (single): Patha*

Botanical name: *Cissampelos pareira L.*

Family: Menispermaceae

Rasa-panchak and action on dosha [12].

| | | | |
|---|---|---|---|
| 1. | Rasa | Tikta | Kapha-pitta samak |
| 2. | Guna | Laghu | Kapha-samak |
| | | Tikshana | Vata-kapha-samak |
| 3. | Virya | Ushna | Kapha-vata-samak |
| 4. | Vipaka | Katu | Kapha-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Kapha-pitta-samak |

Result: Kapha-pittaj jwar is the fever in which kapha and pitta doshas are imbalanced Patha has Kapha-pitta samak action which means it is effective in the management of Kapha-pittaj jawar.

In a study, extract of the drug patha root was prepared with 99% ethyl alcohol and prepared in the powder form suitably. Wistar albino rats of 200gm+-20gm were chosen as the animal model. Pyrexia was induced by injecting suspension of 12.5% w/v dried brewer's yeast in normal saline subcutaneously in a dose of 1 ml/100 g body weight. Rats were grouped into three groups with six in each (distilled water was given to the control group). *C. pareria* powder 540mg/kg/PO were given to a group. Before test drug administration, initial rectal temperatures of all rats were recorded with digital thermometer. The respective test dosage and control were administered to the particular groups. Then, after one hour of test drug administration and vehicle to the control group, the rectal temperature was again recorded after 3, 6, and 9 hour. The difference between actual rectal temperature and initial rectal temperature was recorded for each time interval. The maximum reduction in rectal temperature in comparison to control group was also recorded [13].

Result: Powder of *C. pareria* (540mg/kg/PO) showed mild decrease in pyrexia after 6hour (12.58%) and 9hour (30.26%) in comparison to the control group.

*Herbal drug (single): Manjistha*

Botanical name: *Rubia cordifolia L.* (RC)

Family: Rubiaceae

Rasa-panchak and action on dosha [14].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur | Vata-pitta samak |
| | | Tikta | Kapha-pitta samak |
| | | Kashaya | Pitta-samak |
| 2. | Guna | Guru | Vata-samak |
| | | Rukshya | Kapha-samak |
| 3. | Virya | Ushna | Kapha-vata-samak |
| 4. | Vipaka | Katu | Kapha-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Kapha-pitta samak |

Result: Kapha-pittaj jwar is the fever in which kapha and pitta doshas are imbalanced Patha has Kapha-pitta samak action which means it is effective in the management of Kapha-pittaj jawar.

In a study, powder of dried roots of *Rubia cordifolia* was Soxhlet extracted with petroleum ether and successively treated with other chemical reagents. Male Wister rats weighing 160-180gm were used as animal model. Pyrexia in rats was induced with 15% brewer's yeast in normal saline. 18 hours after the yeast injection, rats presenting an increase in rectal temperature of more than 1℃ were chosen for the study. The animal models (n=5) in three groups were treated with vehicle normal saline (0.1ml/kg), test drug (20mg/kg/PO), ibuprofen (40mg/kg) respectively and rectal temperature was measured every 2 hours. Test compound showed temperature reduction of 39.3+-0.05℃ to 38.04+-0.14℃ after two hours of administration. Where ibuprofen reduced 39.3+-0.07'c to 37.48+-0.13'c after 2 hour of administration [15].

Result: The result shows that the manjistha holds significant potency of antipyretics.

*Herbal drug (single): Draksha*

Botanical name: *Vitis vinifera L.*

Family: Vitaceae

Rasa-panchak and action on dosha [16].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur | Vata-pitta samak |
| | | Tikta | Kapha-pitta samak |
| 2. | Guna | Guru | Vata-samak |
| | | Snigdha | Vata-samak |
| | | Mridu | Pitta-samak |
| 3. | Virya | Shita | Pitta-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Vata-pitta samak |

Result: Vata-pittaj jwar is the fever in which vata and pitta doshas are imbalanced Draksha has Vata-pitta samak action which means it is effective in the management of Vata-pittaj jawar.

In a study, hydro-alcohoic extract of dried leaf powder of the *Vitis vinifera* was prepared. Brewer's yeast was used to induce pyrexia in rats. The test extract was administered to rat in the strength of 100mg/kg, 200mg/kg and 400mg/kg [17].

Result: The statistical observation showed significant reduction of rectal temperature in standard group and in 200mg/kg and 400mg/kg doses of the extract at 23 hour ($p<0.05$) than at 19 hour.

*Herbal drug (Single): Pilu*

Botanical name: *Salvadora persica L.*

Family: Salvadoraceae

Rasa-panchak and action on dosha [18].

| | | | |
|---|---|---|---|
| 1. | Rasa | Tikta | Kapha-pitta samak |
| 2. | Guna | Laghu | Kapha-samak |
| | | Snigdha | Vata-samak |
| | | Tikshana | Vata-kapha-samak |
| 3. | Virya | Ushna | Kapha-vata-samak |
| 4. | Vipaka | Katu | Kapha-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Vata-pitta samaka |

Result: Vata-pittaj jwar is the fever in which vata and pitta doshas are imbalanced Pilu has Vata-pitta samak action which means it is effective in the management of Vata-pittaj jawar.

In a study, *S. persica* is traditionally used as anti-pyretics in folklore. It has been observed that anti-inflammatory and analgesic action is due to interference of prostaglandin. Anti-pyretic action also takes place in the same pathway. Studies have confirmed analgesic and anti-pyretic activity of pilu then anti-inflammatory action of it is supposed to occur. Phyto-chemical analysis carried out showed the presence of certain phyto-constituents which possesses anti-inflammatory and analgesic properties. Researches are needed to verify the activity. For pharmacological profiling of *S. persica*, alcoholic extract of Pilu was prepared, Wister rats (140-250g) were divided into five groups with five rats in each. The analgesic activity of the extract was compared with aspirin, 300mg/kg/PO body weight and anti inflammatory activity was compared with Indomethacine, 10mg/kg/PO body weight. Normal saline was the control drug. The test drug extract dose of 300 and 500mg/kg/PO of body weight in animal models of albino mice 20-30gm and Sprague Dawely strain rats 140-250g [19].

Result: *S. persica* showed prolonged analgesic and anti-inflammatory effect on dose dependent manner.

*Herbal drug (single): Parushka*

Botanical name: *Grewia asiatica L.*

Family: Tiliaceae

Rasa-panchak and action on dosha [20].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur | Vata-pitta samak |
| 2. | Guna | Snigdha | Vata-samak |
| 3. | Virya | Shita | Pitta-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Vata-pitta Samak |

Result: Vata-pittaj jwar is the fever in which vata and pitta doshas are imbalanced Parushka has Vata-pitta samak action which means it is effective in the management of Vata-pittaj jawar.

In a study, two types of extracts aqueous and methanolic extracts were prepared. Then the extracts were dried to form solid. Albino male mice were collected of 20-30gm as animal model. For the study five groups each with five mice were included.

In a study, pyrexia in animals was done with brewer's yeast solution. Rectal temperature of animals after 18 hours were measured and those which had an average temperature increase of 0.3-0.5℃ rise; they were selected for the study. Then the groups of animals were treated with normal saline (1ml/Kg/PO), paracetamol (150mg/Kg/PO) and plant extract (125, 250 and 500mg /Kg/PO) [21].

Result: It was found that there is dose dependent decrease in temperature with increasing from 125mg/kg- 500mg/kg. (101.74+_0.02 'F to 100.50 +_0.12 at 500mg/kg at 3hr).

*Herbal drug (Single): Haritiki*

Botanical name: *Terminalia chebula* Retz.

Family: Combretaceae

Rasa-panchak and action on dosha [22]:

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur<br>Amla<br>Katu<br>Tikt<br>Kashaya (Pradhan) | Vata-pitta-samak<br>Vata samak<br>Kapha-samak<br>Pitta-kapha-samak<br>Pitta-kapha-samak |
| 2. | Guna | Laghu | Kapha-samak |
| 3. | Virya | Ushna | Kapha-vata-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Tridosha Samak |

Result: Sannipataj jwar is the fever in which all three doshas are imbalanced Haritiki has Tridosha samak action which means it is effective in the management of Sannipataj jwar.

In a study, fruits of Haritiki were collected and subjected to hot extraction with ethanol in Soxhlet extractor for 72 hours. Wistar rats of either sex weighing 150-200gm were used as animal model for the study. Pyrexia in mouse was developed using brewer's yeast (sub-cutaneous injection of 2ml/kg of 15% W/V suspended in 0.5% w/v methyl cellulose solution). The rats were divided in six groups with six rats in each group. Normal body temperature of each rat was measured rectally before injecting yeast and 18 hour after injection. A group of animals were given normal saline 5ml/kg/PO in control group,

150mg/kg/PO paracetamol, and the test drug extract was given 100 and 200 mg/kg/PO respectively suspended in 2% w/v gum acacia solution. Then the rectal temperature was taken at every 1hour for 23 hours [23].

Result: The test drug exhibited significant antipyretic activity ($p<0.001$) at 20, 21, 22 and 23 hours of drug administration.

*Herbal drug (single): Aamlaki*

Botanical name: *Emblica officinalis* Gaertn.

Family: Euphorbiaceae

Rasa-panchak and action on dosha [24].

| | | | |
|---|---|---|---|
| 1. | Rasa | Madhur<br>Amla (Pradhan)<br>Katu<br>Tikt<br>Kashaya | Vata-pitta-samak<br>Vata samak<br>Kapha-samak<br>Pitta-kapha-samak<br>Pitta-kapha-samak |
| | | Tikta | Kapha-pitta samak |
| 2. | Guna | Guru | Vata-samak |
| | | Rukshya | kaphahar-ghna |
| 3. | Virya | Shita | Pitta-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Kapha-pitta Samak |

Result: Kapha-pittaj jwar is the fever in which kapha and pitta doshas are imbalanced. Amlaki has Kapha-pitta samak action which means it is effective in the management of Kapha-pittaj-jawar.

In a study, ethanol and aqueous extracts of Amalaki fruits were prepared. Wister rats (180-200gm were taken for the experimental study. Brewer's yeast was taken for the pyrexia induction. A single oral dose of aqueous and ethanolic (500 mg/kg, i.p.) showed significant reduction in hyperthermia in rats [25].

Result: The extracts of *Emblica officinalis* fruits possessed potent anti-pyretic activity.

*Herbal drug (single): Vibhitaki*

Botanical name: *Terminalia bellirica* (Gaertn) roxb (Bahera)

Family: Combretaceae

Rasa-panchak and action on dosha [26].

| | | | |
|---|---|---|---|
| 1. | Rasa | Kashaya | Pitta samak |
| 2. | Guna | Laghu | Kapha-ghna |
| | | Rukshya | Kapha-samak |
| 3. | Virya | Ushna | Kapha-vata-samak |
| 4. | Vipaka | Madhur | Vata-pitta-samak |
| 5. | Prabhav | | |
| 6. | Action on dosha | | Kapha-pitta Samak |

Result: Kapha-pittaj jwar is the fever in which kapha and pitta doshas are imbalanced Bivitaki has Kapha-pitta samak action which means it is effective in the management of Kapha-pittaj jawar.

In a study, the part used of Bivitak drug was collected from Apothecary Department of the Institute of PG Ayurvedic Education and Research, Kolkata in May 2006. The extract was made on Soxhlet extraction with distilled water and further after filtration it was made solid by reduced pressure over water bath in rotatory evaporator. Swiss albino mice (20-25g) and Wister rats (120-130g) were divided into seven groups with six in each group for five different tests. Pyrexia was induced in mice by injecting suspension of 12.5% w/v dried brewer's yeast in normal saline subcutaneously in a dose of 1 ml/100 g body weight. The standard (aspirin) group and the control (normal saline) group were set. Control group was given 0.5ml saline orally. The remaining five groups were administered with 100, 200, 300, 400 and 500 mg/kg body weight of the test drug orally. The initial temperature after yeast pyrexia induction was noted and then after administration of the test drug at 1, 2, 3, 4 and 24 hour the rectal temperature of the animals were recorded [27].

Result: The anti-pyretic effect of the test drug was found to be dose dependent. The response at 400 and 500 mg/kg/ PO was ($P<0.05$ even after 24hours) significant compared to that of 100mg/kg/PO aspirin.

*Polyherbal preparation of Jwarhar Mahakashaya*

The extraction of polyherbal preparation of JhMh was made on Soxhlet extraction with distilled water and further after filtration it was made solid by reduced pressure over water bath in rotatory evaporator. Swiss albino mice (20-25g) and Wister rats (120-130g) were divided into six groups with six in each group for five different strengths of test preparation. Pyrexia was induced by injecting suspension of 12.5% w/v dried brewer's yeast in normal saline subcutaneously in a dose of 1 ml/100 g body weight. The standard (aspirin) group and the control (normal saline) group were planned. Control group was given 0.5ml saline orally. The remaining five groups were administered with 100, 200, 300, 400 and 500 mg/kg body weight of the test drug orally. The initial temperature after yeast pyrexia induction was noted and then after administration of the test drugs at 1, 2, 3, 4 and 24 hour the rectal temperature of the animals were recorded [28].

Result: The anti-pyretic effect of the test drug was seen dose dependent. The response at 400 and 500 mg/kg/ PO was ($P<0.05$ even after 24hr) significant compared to that of 100mg/kg/PO Aspirin [28].

**DISCUSSION**

Sariva has Madhur (Vata-pitta-samak and Kapha vardhak action) and Tikta rasa (having Pitta-kapha-samak and Vata-vardhak action). Madhur ras is comparatively dominant than Tikta-ras principally. Hence due to dominance of Madhur-rasa Sariva results Madhur-vipak (having Kapha-vardhak action) in line. Madhur-ras has yielded Shita-virya (having Pitta-samak and Vata-kapha vardhak action) which is principally articulation. Sariva keeps Tridosha-samak action on Doshas of body which is not possible due to Mahur-tikata-rasa, Madhur-vipaka and Shita-virya of Sariva. Hence the supposed Tridosha-samak action of Sariva should be due to Prabhav of Sariva [29].

Sharkara has Madhur-rasa (having Vata-pitta-samak and Kapha-vardhak action) which yields Madhur-vipaka (having Vata-pitta-samak and Pitta-vardhak action) and Shita-virya (Kapha-vata-vardhak and Pitta-samak) which is principally articulating. Here both Madhur-rasa and Madhur-vipak can bring Vata-pitta-samak action on Doshas. But principally Vipaka dominates Rasa when both are eligible. Hence the Vata-pitta-samak action of Sarkara is due to Madhur-vipaka of the drug [30].

Guduchi has Tikta and Kashaya-rasa which brings Ushna-virya principally. Also, it possess Madhur-vipaka which does not articulate principally. Neither Rasa, Virya nor Vipaka can bring the supposed Dosha-karma of Guduchi Tridosha-samak. Hence, the Dosha-karma of Guduchi is due to Prabhava of the drug [31].

Patha has Tikta-rasa (having Pitta-kapha-samak and Vata-vardhak action) that brings Katu-vipaka (having Vata-pitta-vardhak and Kapha-samak action). Then, principally Tikta-rasa should yield Shita-virya but here Ushna-virya (having Vata-kapha-samak and Pitta-vardhak action) is yield. Patha has Kapha-pitta-samak action on Doshas but neither Tikta-rasa, Katu-vipaka and Ushna-virya of Patha is seen principally seen rendering Kapha-pitta-samak action. Hence the Kapha-pitta action of Patha is supposed to be due to Prabhav of Patha [32].

Manjistha has Madhur (the dominating Rasa), Tikta and Kashaya (having Kapha-pitta-samak and Vata-vardhak action) Rasa that yields Katu-vipaka (Kapha-pitta-samak and Vata-vardhak action) which non-articulating gives Katu-vipak and Ushna-virya. Independently Tikta and Kashaya-rasa and Katu-vipaka both can bring Kapha-pitta-samak action on Doshas but principally Vipaka dominates Rasa. Hence, Katu-vipaka here does the Kapha-pitta-samak action [33].

Draksha has Madhur and Tikta-rasa which yiels Madhur-vipaka (having Vata-pitta-samak and Pitta-vardhak action) and Shita-virya (Kapha-vata-vardhak and Pitta-samak) which is principally articulating. Here both Madhur-rasa and Madhur-vipak can bring Vata-pitta-samak action on Doshas. But principally Vipaka dominates Rasa when both are eligible. Hence the Vata-pitta-Samak action of Draksha is due to Madhur-vipaka of the drug [34].

Pilu has Madhur and Tikta-rasa. Madhur-rasa is dominant over Tikta-rasa principally. These Rasa gives Katu-vipaka (having Kapha-pitta-samak and Vata-vardhak) in line but Ushna-virya (having Vata-kapha-samak and Pitta-vardhak) out of line. Pilu has Vata-pitta-samak action on Dosha which is not articulating with Katu-vipaka and Ushna-virya. Pilu-rasa articulates with the Vata-pitta-samaka action of Pilu hence the Dosha action here is due to by Rasa [35].

Parushka has Madhur-rasa (having Vata-pitta-samak and Kapha-vardhak action) which yields Madhur-vipaka (having Vata-pitta-samak and Pitta-vardhak action) and Shita-virya (Kapha-vata-vardhak and Pitta-samak) which is principally articulating. Here both Madhur-rasa and Madhur-vipak can bring Vata-pitta-samak action on Doshas. But principally Vipaka dominates Rasa when both are eligible. Hence the Vata-pitta-samak action of Parushaka is due to Madhur-vipaka of the drug [36].

Haritiki has Pancha-rasa-yukta (Madhur, Amla, Katu, Tikta and Kashaya). Madhur-ras is comparatively dominant than Tikta-ras principally. Hence due to dominance of Madhur-rasa Haritiki results Madhur-vipak (having Kapha-vardhak action) in line. Pancha-rasa Ras has yielded Ushna-virya (having Pitta-vardhak and Vata-kapha-samak action) which is principally non-articulating. Haritiki keeps Tridosha-samak action on Doshas of body which is not possible due to Pancha-rasa, Madhur-vipaka and Ushna-virya of Haritiki. Hence the supposed Tridosha-samak action of Haritiki should be due to Prabhav of the drug [37].

Aamlaki has Pancha-rasa (Amla-pradhan) but Madhur-rasa is strong comparatively. In accordance to Madhur-rasa the Madhur-vipaka and Shita-virya here is articulating principally. Principally Madhur-vipaka and Shita-virya does not articulate in giving Kapha-pitta-samak Dosha-karma but out of Pancha-rasa Tikta and Kashaya-rasa is only responsible to bring Kapha-pitta-samak Dosha-karma [38].

Kashaya rasa of Vibhitaki does not articulate with Madhur-vipaka and Ushna-virya principally. Similarly here the Vipaka and Virya can't bring Kapha-pitta-samak Dosha karma but the Kashaya-rasa can bring the Kapha-pitta-samak Dosha-karma principally. Hence here Rasa is responsible in doing the supposed Dosha-karma [39].

Chemical analysis of JhMh indicate the presence of flavonoids and its related compounds which exhibit inhibition of arachidonic acid peroxidation, which results in reduction of prostaglandin levels thus reducing the fever. The antipyretic action of drugs of (JhMh) preparation is primarily related to the presence of flavonoids. Marked and sustained antipyretic response drugs of JhMh drugs are perhaps indicative of a prostaglandin receptor mediated response. Therefore, JhMh drugs exhibited pronounced inhibitory responses either in synthesis, release or receptor reactions in prostaglandin mediated effects [40].

***Cause and response to pyrexia***

Yeast pyrexia is generally associated with prostaglandin`s responses in later hours (4 hours) of yeast treatment, while the initial (1 to 4 hour) pyrexia response is associated with a number of factors including the presence of histamine and bradikinin. Marked and sustained antipyretic response due to test drug (JhMh drugs) is perhaps indicative of a prostaglandin receptor mediated response. Therefore, JhMh drugs exhibited pronounced inhibitory responses either in synthesis, release or receptor reactions in prostaglandin mediated effects [41].

Flavonoids and its related compounds also exhibit inhibition of arachidonic acid peroxidation, which results in reduction of prostaglandin levels thus reducing the fever. Since flavonoids exhibit several biological effects such as anti-inflammatory, anti-microbial, anti-hepato-toxic and anti-ulcer activities, it is likely that the antipyretic action of drugs of (JhMh) preparation is primarily related to the presence of flavonoids [41].

**CONCLUSION**

Extracts of monoherbal or polyherbal drugs of JhMh on chemical analysis indicate the presence of flavonoids and its related compounds which exhibit inhibition of arachidonic acid peroxidation, which results in reduction of prostaglandin levels thus reducing the fever.

The antipyretic action of drugs of JhMh preparation is primarily related to the presence of flavonoids. Marked and sustained antipyretic response drugs of JhMh drugs are perhaps indicative of a prostaglandin receptor mediated response. Therefore, JhMh drugs exhibited pronounced inhibitory responses either in synthesis, release or receptor reactions in prostaglandin mediated effects. It can potentially and probably replace the side effects of chemical drugs and stand as sustainable antipyretics when used properly in practice.

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**Conflict of Interest**

None declared.

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**REFERENCE**

1. Sharma PV, Sthana S, Shadvirechanashatashritiya Adhyaya verse 39. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.28.
2. Vaidhya, L.S. Sutra Sthana, Cha. 15 Mahakashaya-sangraha Adhyaya. Verse 36. In: Shri Vaghvata-acharaya-vicharit Ashtanga Sangraha. 3rd ed. Vaidhanath Ayurveda Bhawan Pvt. Ltd. 2000:p.539.
3. Simon, *L.* Actions and toxicity of non-steroidal anti-inflammatory drugs. Current opinion in rheumatology. 1995;7(3):159–66.
4. Mizrahi B, Shilo S, Rossman H, Kalkstein N, Marcus K, Barer Y, Keshet A, *et al*. Longitudinal symptom dynamics of COVID-19 infection. Nature communications. 2020;11(1):1-0.
5. Wongrakpanich S, Wongrakpanich A, Melhado K, and Rangaswami J. A comprehensive review of non-steroidal anti-inflammatory drug use in the elderly. Aging and disease. 2018;(1):143–50.
6. Pathak N. Reverse pharmacology of ayurvedic drugs includes mechanisms of molecular actions. Journal of ayurveda and integrative medicine. 2011;2(2):49–50.
7. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific publishers, Jodhpur, India. 2019:43-44
8. Lakshman K, Shivaprasad H, Jaiprakash B, and Mohan S. Anti-inflamatory and anti-pyretic activities of Hemidesmus indicus root extract. African journal of tradational, complementary and alternative medicines. 2006;3(1):90-94.
9. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:43-44.
10. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:43-44.
11. Suman S, Sharma A, khan RA. Evaluation of anti-inflammatory and antipyretic effect of aqueous extract of Tinospora cordifolia in rats. International journal of research and review. 2019;6:(8).
12. Purviya RP. Aushadha-gana mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:43-44.
13. Singh SG, Nishteswar K, Patel BR, Nariya M. Comparative antipyretic and analgesic activities of Cissampelos pareira Linn. and Cyclea peltata (Lam.) Hook. F. & Thomas. Ayu. 2016;37(1):62.
14. Purviya RP. Aushadha-gana mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
15. Kasture SB, Kasture VS, Chopde CT. Anti-inflammatory activity of Rubia cordifolia roots. Journal of Natural Remedies. 2001;1(2):111-5.
16. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
17. Aouey B, Samet AM, Fetoui H, Simmonds MS, Bouaziz M. Anti-oxidant, anti-inflammatory, analgesic and antipyretic activities of grapevine leaf extract (Vitis vinifera) in mice and identification of its active constituents by LC–MS/MS analyses. Biomedicine & pharmacotherapy. 2016;84:1088-98.
18. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
19. Ahmad M, Imran H, Yaqeen Z, Rehman ZU, Fatima N, Sohail T. Pharmacological profile of Salvadora persica. Pakistan journal of pharmaceutical sciences. 2011;24(3).
20. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India.p. 2019:43-44.
21. Akhtar B, Ashraf M, Javeed A, Sharif A, Akhtar MF, Saleem A, *et al*. Analgesic, antipyretic and antiinflammatory activities of Grewia asiatica fruit extracts in albino mice. Acta Pol Pharm. 2016;73:983-9.
22. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
23. Shaik Reddy V, Priyanka B, Srilakshmi A, Saisaran S, Raja C. Pharmacological evaluation of anti-pyretic activity of ethanolic fruit extract of Terminalia chebula. International Journal of Advances in Pharmaceutical Research. 2012;3(1).
24. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
25. Perianayagam JB, Sharma SK, Joseph A, Christina AJ. Evaluation of anti-pyretic and analgesic activity of Emblica officinalis Gaertn. Journal of ethnopharmacology. 2004;95(1):83-5.
26. Purviya RP. Aushadha-Gana Mimansha (1st ed.). Scientific Publishers, Jodhpur, India. 2019:p.43-44.
27. Sharma SU, Sharma US, Singh A, Sutar N, Singh PJ. Screening of Terminalia bellirica fruits extracts for its analgesic and antipyretic activities. Jordan Journal of Biological Sciences. 2010;3(3):121-4.
28. Gupta M, Shaw BP, Mukherjee A. Studies on antipyretic-analgesic and ulcerogenic activity of polyherbal preparation in rats and mice. International Journal of Pharmacology. 2008;4(2):88-94.
29. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 67-72. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.186.
30. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 45-46. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.4.
31. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 67-72. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.186.
32. Vagbhata. Sutra Sthana, Cha. 17 Dravaya-vigyania Adhyaya verse 26. In: Harishastri Paradkar Vaidya, Editors. Ashtanga Sangraha. 1st ed. Varanasi: Krishnadas Academy. 2000:p.562.
33. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 67-72. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.186.
34. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 67-72. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.186.
35. Vagbhata. Sutra Sthana, Cha. 17 Dravaya-vigyania Adhyaya verse 26. In: Harishastri Paradkar Vaidya, Editors. Ashtanga Sangraha. 1st ed. Varanasi: Krishnadas Academy. 2000:p.562.
36. Sharma, PV. Sutra Sthana, Cha. 26 Atreyabhadrakapyiya Adhyaya verse 45-46. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.4.
37. Sharma, PV. Sutra Sthana, Cha. 26 Atreyabhadrakapyiya Adhyaya verse 67-72. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.186.
38. Vagbhata. Sutra Sthana, Cha. 17 Dravaya-vigyania Adhyaya verse 26. In: Harishastri Paradkar Vaidya, Editors. Ashtanga Sangraha. 1st ed. Varanasi: Krishnadas Academy. 2000:p.562.

39. Sharma PV. Sutra Sthana, Cha.26 Atreyabhadrakapyiya Adhyaya verse 45-46. In: Charak Samhita. 1st ed. Chaukhamba Orientalia, Varanasi. 2008:p.4.
40. Gupta M, Shaw BP, Mukherjee A. Studies on antipyretic-analgesic and ulcerogenic activity of polyherbal preparation in rats and mice. International Journal of Pharmacology. 2008;4(2):88-94.
41. Gupta M, Shaw BP, Mukherjee A. Studies on antipyretic-analgesic and ulcerogenic activity of polyherbal preparation in rats and mice. International Journal of Pharmacology. 2008;4(2):88-94.

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