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Experimental study on *Swachhandbhairva Rasa* w.s.r. to its Anti-Pyretic Effect

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ABSTRACT

The ancient Ayurvedic text *Bhaisajya Ratnavali* of *Govind Das Sen* during eighteen century A.D., prescribes a specific formulation comprising five herbs named as *Swachhanda Bhairava Rasa Swachhandabhairava Rasa* is Abundant of herbal, mineral and herbomineral preparations have been found in *Ayurveda* which have been continuously used for infectious disease by Ayurvedic practitioner there are many herbomineral preparations have been found in Ayurveda. *Swachhandabhairava Rasa* contains pure mercury, pure *Gandgaka, Vatsanabh*, *Jaiyphala* and *Pippali* in equal part. Most of the ingredient are having *Tikta, Katu Rasa, Ushna Virya* and *Yogvahi* in property which is helpful to inhibit the *Jwara* by reducing the *Kleda* (wetness) and sweat out in body. So *Swachhand- Bhairaw Rasa* used in *Nava-Jwara.*

Key words: *Alchemy, Swachhand Bhairaw Rasa, Kharliya Rasaysan, herbomineral drug, Jwara Rogadhikar.*

INTRODUCTION

It is mentioned as disease as well as symptom of other diseases too. The term *Jwara* means the condition in which mind, sense organs and the body all are troubled.[4]

Here livings being not only suffer physically but also mentally. *Mithya Ahara, Vihar* (unwholesome food and physical activities) leads to aggravation of *Vatadi Doshas* which afflicts *Amashaya* and gets mixed up with *Agni*, it follows course of *Rasa* and obstructs the channels of *Rasa* and *Sweda*, suppress the activity of *Pachakagni* and expels the heat from the site of digestion spreading it all over the body thus causing "*Jwara*" with reference from *Charak Chikitsa* 03/129-131.[5]

Jwara is classified in many groups so SBR (*Swachhandbhairava Rasa*) is a very important role for the management of this disease.

Rasashastra which is commonly known as *Ayurvedic* Pharmaceutical, mainly deals with the preparation of medicinal formulation which are formed by the different procedure Like *Shodhana (purification), Marana*, *Jaran* etc. by which more effective formulation is to be formed. These *Rasa* preparations works on various diseases and cure the human being.

In *Ayurveda* texts many anti-pyretic formulations have been explained *Swachhandbhairava Rasa* is one among the specific herbo-mineral formulation (rational combination of *Rasa Dravyas* and *Kasthaausadhis*). It is a unique and efficacious

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Kharaliya Rasayana mentioned in *Bhaisajya- Ratnavali* in the context of *Jwara.*

Kharaliya (Trituration) method is a basic procedure applicable to all *Rasa Aushadhi* (Mercurial medicines) before they are subjected to any specific procedure. It is a process to convert crude drugs i.e. macro to micro level and also gives specific *Samskara* (stages of processing)

Need of Study

Swachhandbhairava Rasa is a herbo-mineral preparation which has been mentioned for the first time in *Bhaisajya- Ratnavali* indicated in management of *Nava Jwara*, as for now there has been no pharmaceutical and analytical study done on *Swachhandbhairava Rasa* so there is need of establishing its physio-chemical, pharmaceutical and analytical study. The conventional treatment of fever using non-steroidal synthetic anti-pyretic has been usually associated with many ADR and side effects. However, *Swachhandbhairava Rasa* provides treatment in a holistic approach. This combination works synergistically to produce desirable effect, lesser dose, better acceptability more bio-absorbable than conventional drugs.

Review of Literature

It is one of the potent herbo-mineral drug and the detailed description of ingredients, usage, properties, method of preparation, therapeutic effect of *Swachhandbhairava Rasa* is mentioned with chief reference in *Bhaisajya Ratnavali, Jwarachikitsa, 05/492-493.*

Aim and Objective

To conduct anti pyretic study on animal model and to assess the safety and efficacy profile of *Swachand Bhairav Rasa*. Methods of preparation of *Swachand Bhairav Rasa* as per chief reference of *Bhaishjya Ratnawali Jwar Roga Chikitsa* Chapter 5.

Materials and Methods

Materials

All drugs were obtained from authentic sources from Pandit Khushilal Ayurveda College Rasa Sastra Pharmacy and were purified as per the classical methods. Mentioned in *Rasa Garanthas.*

- *Parad* (Mercury)
- *Gandhaka* (Sulphur)
- *Vatsanabha* (*Aconitum ferox* Linn.)
- *Pippali* (*Piper longum*)
- *Jaiphala* (*Myristica fragrans*)

For Experimental study- in this antipyretic study is conducted with the help of Normal saline 0.9% (to prepare yeast solution), Tuberculin syringe, digital tale thermometer shall be used.

- Paracetamol (standard drug)
- Propylene glycol (control/vehicle)
- Wistar strain albino rat
- Yeast extract (to induce pyrexia)
- Normal saline 0.9% (to prepare yeast solution)

Method

Experimental study w.s.r to its Anti-pyretic Study.

Experimental study

Selection of animal model as Wistar strain albino rats weighing about 200-250gram used as per the guideline of OECD-423.

The animals are randomly selected and marked to permit individual identification and kept in their cages for at least 7 days prior to dosing to allow for acclimatization to the laboratory conditions.

The ambient temperature in the experimental animal room was maintained at 22±03°C, with a relative humidity of 50 to 70 %. The animals were housed in maintained standard laboratory conditions with 12 hours of light and 12 hours of dark cycles in the central Animal House Facility, *Faculty of Pharmacy, VNS Group of Institute Bhopal.* The animals were provided with a standard diet and water. The animals were fasted overnight before the experimental study but the drinking water was given 'ad libitum' in polypropylene bottles with stainless steel sipper tubes and after the

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medicine had been administered food was withheld for a further 24 hours.

Chemical for induction of pyrexia

20% Freeze-dried yeast extract purchased from Loba Chemie Pvt. Ltd.

Duration: 10 days

Inclusion criteria

- Adult healthy male / female Albino rats.
- Albino rats weighing 150-220gms.
- Albino rats aged between 90-120 days
- Rats with normal body temperature 96.5°F to 99.5°F

Exclusion criteria

- Unhealthy Albino rats.
- Weight range below 150gms and above 220gms.
- Pregnant Albino rats.
- Albino rats of age below 90 days and above 120 days.
- Rats were under another experimental study group.

Experimental design

Sample

A total of five groups were taken for antipyretic study and distributed number of six in each group. A total of 30 albino rats were taken for the experimental study.

Dose calculation

The dose was calculated by using the *table of Paget and Barnes (1964*). This dose calculation was based on the surface area ratio between humans and animals.

Animal dose = Therapeutic human dose (mg /kg) ×Human km/Animal km

Dose of rats = Human dose (mg /kg) ×37/6

Drug administration route

According to the body weight of the animals, the test drug, standard drug, and vehicle to control were administered by oral route with the help of a gastric catheter of suitable size sleeved to a syringe nozzle.

Table 1: Showing the groups of experimental study.

Group no.	Group	No. of animals	Name of drug	Rat dose (mg/kg body weight)
Group 1	Normal control	6	NS (Normal Saline)	10 ml/kg
Group 2	Negative control (yeast treated)	6	NS (Normal Saline)	10 ml/kg
Group 3	Test drug (*Swachhandabhairava Rasa*-low dose)	6	*Swachhandbhairava Rasa* LD with NS	6.41 mg/kg
Group 4	Test drug (*Swachhandabhairava Rasa*-high dose)	6	*Swachhandbhairava Rasa* HD with NS	12.82 mg/kg
Group 5	Standard drug (Parecetamol)	6	Paracetamol with NS	55 mg/kg

Statistical analysis

The obtained data has been presented as Mean ± SEM (standard error of the mean), compared using ANOVA (one-way variance) with Tukey's multiple comparison test. The value $P<0.05$ is considered as statistically significant.

After 18-20 hours of injection, Brewer's extract yeast administration caused the rats' body temperatures to rise above average. After the induction of pyrexia, all the albino rats were closely observed for their behavior and other symptoms. The following is a list of the observations made:

1) All the rats' temperature increase was noted.
2) Trembling was noted in most of the rats after one hour of the induction of yeast.
3) Fur erected.
4) Being less physically active.

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5) Weight loss observed in the test control group after the study.

All the symptoms found in Albino rats confirmed that they were suffering from hyperpyrexia.

RESULTS

Statistical and schematic analysis of the data about the experiment in respect of normal control, test control (negative control), test drug (low dose & high dose), and standard drug treated groups. Values of temperature are given as Means ± SEM (standard error of the mean) and compared using One-way Analysis of Variance (ANOVA) with Tukey's multiple comparison test to find the difference within each group and in between the groups. Values of $P<0.05$ were considered statistically significant.

Table 2: Rectal temperature before and after inducing pyrexia.

Groups	Before inducing pyrexia (temp.°F)	After inducing pyrexia (temp.°F)	After drug administration rectal temp. In °F			
			1 hr	2 hr	3hr	4 hr
Normal control	98.53±0.53	98.53 ±0.53	98.57 ±0.12	98.53±0.18	98.50±0.15	98.50±0.11
Negative-control (yeast treated)	98.52±0.10	101.70±0.18	102.2 ±0.15	102.8±0.17	103.2±0.17	103.2±017
Test-drug (*Swachhandabhairava Rasa*-Low dose)	98.92±0.40	102.9 ±0.40	101.40±0.33	100.8±0.26	100.4±0.17	98.77±0.27
Test-drug (*Swachhandabhairava Rasa*-high dose)	98.80±0.05	102.7 ±0.29	100.6 ±0.46	99.37±1.04	99.27±0.73	98.40±0.20
Standard-drug (Paracetamol)	98.50±0.08	103.0 ±0.33	100.8 ±0.30	100.2±0.17	99.50±0.45	98.83±0.20

Table 3: shows comparative before inducing Pyrexia temp. of 5 groups (n=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	0.01667	0.08513	>0.9999	NS
2.	Normal control group vs. Standard group	0.03333	0.1703	>0.9999	NS
3.	Normal control group vs. *Swachhandbhairava Rasa*-LD group	-0.3833	1.958	0.6428	NS
4.	Normal control group vs. *Swachhandbhairava Rasa*-HD Group	-0.2667	1.362	0.8689	NS
5.	Negative control group vs. standard group	0.01667	0.08513	>0.9999	NS
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD group	-0.4000	2.043	0.6060	NS
7.	Negative control group vs. *Swachhandbhairava Rasa*-HD Group	-0.2833	1.447	0.8422	NS
8.	Standard group vs. *Swachhandbhairava Rasa*-LD group	-0.4167	2.128	0.5690	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-HD Group	-0.3000	1.532	0.8132	NS
10.	*Swachhandbhairava Rasa*-LD group vs.	0.1167	0.5959	0.9930	NS

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	Swachhandbhairava Rasa-HD Group				

*Significant, ** Very significant, *** Extremely significant, NS not significant if value of q > 4.155 then p value is < 0.05

All comparative groups are showing not significant changes in initial tempera recording.

Table 4: Shows comparative after inducing of Pyrexia (After 18-20 Hrs) 5 Groups (N=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	-3.200	10.97	0.0001	***
2.	Normal control group vs. Standard group	-4.433	15.20	<0.0001	****
3.	Normal control group vs. *Swachhandbhairava Rasa*-LD group	-4.333	14.85	<0.0001	****
4.	Normal control group vs. *Swachhandbhairava Rasa*-HD Group	-4.233	14.51	<0.0001	****
5.	Negative control group vs. standard group	-1.233	4.228	0.0797	NS
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD group	-1.133	3.885	0.1153	NS
7.	Negative control group vs. *Swachhandbhairava Rasa*-HD Group	-1.033	3.542	0.1653	NS
8.	Standard group vs. *Swachhandbhairava Rasa*-LD group	0.1000	0.3428	0.9991	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-HD Group	0.2000	0.6855	0.9871	NS
10.	*Swachhandbhairava Rasa*-LD group vs. *Swachhandbhairava Rasa*-HD Group	0.1000	0.3428	0.9991	NS

*Significant, ** Very significant, *** Extremely significant, NS not significant if value of q > 4.155 then p value is < 0.05

Table showed comparative data:

Group Normal control vs Negative control, *Swachhandbhairava Rasa*LD, *Swachhandbhairava Rasa*HD and Standard were extremely significant rest all were not significant at 0 hour after induction of pyrexia.

Table 5: shows comparison of antipyretic effect on 5 groups at 1 hour (n=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	-3.633	11.39	<0.0001	****
2.	Normal control group vs. Standard group	-2.233	7.000	0.0041	**
3.	Normal Control Group Vs. *Swachhandbhairava Rasa*-Ld Group	-2.833	8.881	0.0007	***
4.	Normal Control Group Vs. *Swachhandbhairava Rasa*-Hd Group	-2.000	6.269	0.0087	**
5.	Negative control group vs. standard group	1.400	4.388	0.0669	NS
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD Group	0.8000	2.508	0.4373	NS
7.	Negative control group vs.	1.633	5.120	0.0300	*

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	Swachhandbhairava Rasa-Hd Group				
8.	Standard group vs. *Swachhandbhairava Rasa*-Ld Group	-0.6000	1.881	0.6806	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-Hd Group	0.2333	0.7314	0.9836	NS
10.	*Swachhandbhairava Rasa*-Ld Group Vs. *Swachhandbhairava Rasa*-Hd Group	0.8333	2.612	0.4009	NS

*Significant, ** Very significant, *** Extremely significant, NS not significant

Table showed comparative data:

Group Normal control vs Negative control and *Swachhandbhairava Rasa-LD* were extremely significant. Group normal control vs *Swachhandbhairava Rasa-HD* and Standard were very significant. Negative control group vs *Swachhandbhairava Rasa*-HD were significant rest all were not significant at 1 hour after induction of pyrexia.

Table 6: Shows Comparison of Antipyretic Effect On 5 Groups At 2 Hours (N=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	-4.300	8.615	0.0009	***
2.	Normal control group vs. Standard group	-1.633	3.272	0.2173	NS
3.	Normal control group vs. *Swachhandbhairava Rasa*-LD group	-2.300	4.608	0.0526	NS
4.	Normal control group vs.	-0.8333	1.670	0.7619	NS
	Swachhandbhairava Rasa-HD Group				
5.	Negative control group vs. Standard group	2.667	5.343	0.0235	*
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD group	2.000	4.007	0.1012	NS
7.	Negative control group vs. *Swachhandbhairava Rasa*-HD Group	3.467	6.946	0.0043	**
8.	Ntandard group vs. *Swachhandbhairava Rasa*-LD group	-0.6667	1.336	0.8731	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-HD Group	0.8000	1.603	0.7863	NS
10.	*Swachhandbhairava Rasa*-LD group vs. *Swachhandbhairava Rasa*-HD Group	1.467	2.939	0.2998	NS

*Significant, ** Very significant, *** Extremely significant, NS not significant

Table showed comparative data:

Group Normal control vs Negative controls were extremely significant. Negative control vs *Swachhandbhairava Rasa*-HD were very significant. Negative control vs Standard were significant rest all were not significant at 2 hours after induction of pyrexia.

Table 7: Shows comparison of antipyretic effect on 5 groups at 3 hours (n=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	-4.700	11.50	<0.0001	****

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2.	Normal control group vs. Standard group	-1.000	2.446	0.4595	NS
3.	Normal control group vs. *Swachhandbhairava Rasa*-LD group	-1.867	4.566	0.0551	NS
4.	Normal control group vs. *Swachhandbhairava Rasa*-HD Group	-0.7667	1.875	0.6827	NS
5.	Negative control group vs. Standard group	3.700	9.051	0.0006	***
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD group	2.833	6.931	0.0044	**
7.	Negative control group vs. *Swachhandbhairava Rasa*-HD Group	3.933	9.622	0.0004	***
8.	Standard group vs. *Swachhandbhairava Rasa*-LD group	-0.8667	2.120	0.5851	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-HD Group	0.2333	0.5708	0.9935	NS
10.	*Swachhandbhairava Rasa*-LD group vs. *Swachhandbhairava Rasa*-HD Group	1.100	2.691	0.3747	NS

*Significant, ** Very significant, *** Extremely significant, NS not significant

Table showed comparative data:

Group Negative vs Normal control, Standard and *Swachhandbhairava Rasa* HD groups were extremely significant. Negative control vs *Swachhandbhairava Rasa* HD were very significant rest all were not significant at 3 hours after induction of pyrexia.

Table 8: Shows comparison of antipyretic effect on 5 groups at 4 hours (n=6)

SN	Comparison Test	Mean Diff.	Q value	P value	Remark
1.	Normal control group vs. Negative control group	-4.700	17.74	<0.0001	****
2.	Normal control group vs. Standard group	-0.6667	2.516	0.4344	NS
3.	Normal control group vs. *Swachhandbhairava Rasa*-LD group	-0.6000	2.264	0.5283	NS
4.	Normal control group vs. *Swachhandbhairava Rasa*-HD Group	0.1000	0.3774	0.9987	NS
5.	Negative control group vs. standard group	4.033	15.22	<0.0001	****
6.	Negative control group vs. *Swachhandbhairava Rasa*-LD group	4.100	15.47	<0.0001	****
7.	Negative control group vs. *Swachhandbhairava Rasa*-HD Group	4.800	18.11	<0.0001	****
8.	Standard group vs. *Swachhandbhairava Rasa*-LD group	0.06667	0.2516	0.9997	NS
9.	Standard group vs. *Swachhandbhairava Rasa*-HD Group	0.7667	2.893	0.3126	NS
10.	*Swachhandbhairava Rasa*-LD group vs. *Swachhandbhairava Rasa*-HD Group	0.7000	2.642	0.3910	NS

Significant, ** Very significant, *** Extremely significant, NS not significant

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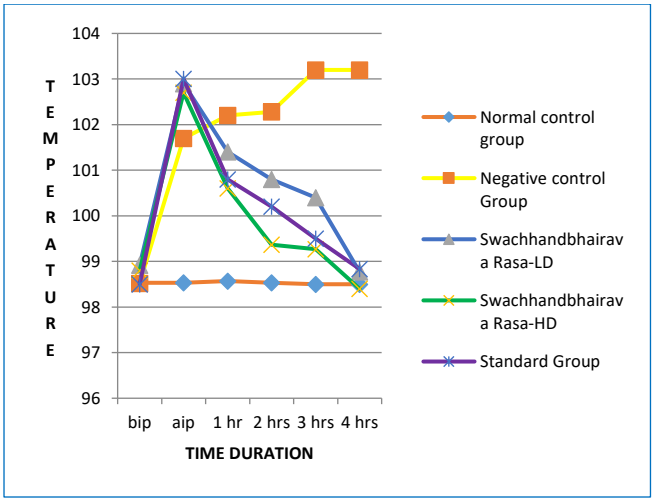
Graph 1: Showing the change in temperature at different hours in Normal control Group I, II, III, IV, & V



Graph 2: Showing the change in temperature at different hours in Normal control Group I, II, III, IV, & V

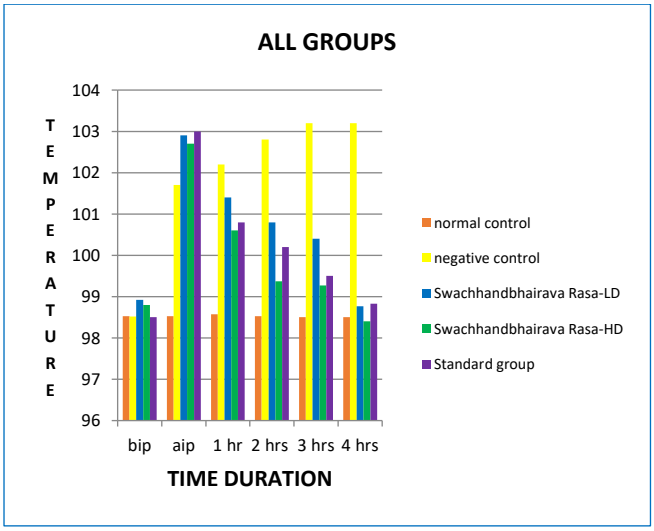


Table showed comparative data:

Group Negative vs Normal control, *Swachhandbhairava Rasa*-LD, *Swachhandbhairava Rasa*-HD and Standard groups were extremely significant rest all were not significant at 4 hours after induction of pyrexia.

Discussion

The main indication for *Swachhandbhairava Rasa* is *Sarv Jwara. Swachhandbhairava* Rasa has been shown to have strong antipyretic activity in experimental research on albino rats to evaluate the antipyretic activity. The statistical analysis was done with One way variance test (ANOVA). The antipyretic study was carried out in albino rats by using Brewer's yeast extract-induced hyperpyrexia model. 30 Albino rats were chosen and distributed 6 in total five groups. Pyrexia was induced by S.C. injection of 2ml of 20 % Brewer's yeast extract solution in normal saline.

The normal control group showed no significant change in temperature till 24 hours. After18- 20 hours of yeast extract solution administration increase in temperature was recorded in group II (Induced negative control), group III (test drug low dose), group IV (test drug high dose) and group V (standard drug) from 98.52±0.10 to 101.70±0.18, 98.92±0.40 to 102.9±0.40, 98.80±0.05 to 102.7±0.29 and from 98.50±0.08 to 103.0±0.33 respectively. The drugs were administered orally in the form of suspension prepared with the vehicle. The rectal temperature was recorded every hour for four hours.

In Group I (normal control) temperature remained significantly unchanged throughout the study. This indicates pyrexia was not observed without induction of pyrexia. In Group 2 (induced but negative control) temperature was 103.02±0.17 at the end of 4 hours and did not reach normal even after 3 days indicating that the vehicle does not possess any anti-pyretic activity. Paracetamol needs to be given to treat pyrexia of Group 2. This shows that without Antipyretic drugs pyrexia couldn't be subsided.

In Group III (MPRLD) it is observed that initially in the first 2 hours temperature started to decline extremely significantly. After a 4-hour decrease significantly and temperature reached 98.77±0.27.

In group IV (MPRHD) it is observed that initially in the first 2 hours temperature started to decline extremely significantly. After 4 hours, the decrease was very significant, and the temperature reached normal 98.40±0.20.

In group V (Standard) it is observed that after 2 hours temperature started to decline very significantly. After 4 hours, the decrease was extremely significant, and the temperature reached normal 98.83± 0.20.

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The mean of all the five groups differ significantly which is mainly due to non- non-administration of any Antipyretic medication to negative control group II whereas in the Standard group and both the test drug (*Swachhandbhairava Rasa* & *Swachhandbhairava Rasa* HD) groups the medication helped to reduce the temperature at the faster rate.

On comparing the above data it has been found that trial groups (III, IV) and standard group are more effective than the control group due to administration of the medication.

On comparing the trial Group III (*Swachhandbhairava Rasa* LD) and Group IV (*Swachhandbhairava Rasa* HD) it has been got on that Group IV with a high dose of *Swachhandbhairava Rasa* is more effective than Group III with a low dose.

On comparing the trial Group III and Group V (Standard) it has been found that Group V was more effective than Group III.

On comparing Group IV (*Swachhandbhairava Rasa* HD) and Group V (Standard) even though the group has similar antipyretic action but still on comparing individuals means it is a bit more effective than standard Group V due in the initial first 2 hours group IV rapidly decreases the temperature in compare to group v.

Fever is a complex physiologic reaction to disease involving a cytokine-mediated rise in body temperature, generation of acute-phase reactants, and activation of numerous physiologic, endocrinologic, and immunologic systems. "It is now clear that most antipyretics work by inhibiting the enzyme cyclooxygenase and reducing the levels of PGE2 within the hypothalamus or boosting antipyretic messages within the brain.

Brewer's yeast is a fungus that contains lipo-polysaccharide, a substance found in gram-negative bacteria's cell walls. As it binds to macrophages, cytokines such as interleukin-1 are released into the bloodstream, causing an antigen-antibody reaction. Through the actions of the enzymes phospholipase, prostaglandin E2 synthase, and cyclo-oxygenase, it reduces the blood-brain barrier and releases arachidonic acid. Pyrexia is caused by the synthesis and release of PGE2 into the anterior hypothalamus.

Antipyretic effect of trial drug (both doses) and standard drug was noted which is likely due to inhibition of the synthesis and/or release of local PGE2 into the preoptic area of anterior hypothalamus 17,18

The antipyretic activity of *Swachhandbhairava Rasa* may be due to its ingredients having *Agnideepana, Aampachaka, Strotoshodhaka, Malshuddikar, Jwarnashaka Swedjanak, Vedanashaka,* and *Rasayan* properties.

The earlier analytical investigation found that *Swachhandbhairava Rasa* contained a variety of organic chemicals and inorganic components like carbon, hydrogen, nitrogen, oxygen, oxygen, mercury, and sulfur. Numerous previous LD studies have demonstrated the significant anti-microbial, immuno-modulator, and febrifuge activity of each ingredient in *Swachhandbhairava Rasa.* These could have influenced the antipyretic and rejuvenating effects.

A standard drug Paracetamol may bring down the temperature to a normal level but *Swachhandbhairava Rasa* has shown antipyretic efficacy and has helped to advance health.

CONCLUSION

Swachhandabhairava Rasa has shown safe and effective Antipyretic action in both high and low doses, according to an experimental study. Pyrexia was reduced to normal temperature in the Test group without any deaths. Both the doses (low & high) of *Swachhandabhairava Rasa* drug (Test Drug) and standard drug (Paracetamol) have shown significant antipyretic activity from the first hour to the fourth hour of drug administration. Higher doses of *Swachhandabhairava Rasa* drug were found to have more pronounced and sustained antipyretic efficacy than lower doses and standard drugs. *Jwarnashaka, Srotovishodhaka, Swedjanak, Amapachaka, Agnideepaka*, and other properties of *Swachhandabhairava Rasa* Drug may have contributed to its antipyretic activity, so rats were more active in

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the test group than control and standard. The trial drug (high & low dose) was found to be free from any sort of side effects or toxic effects during the experimental study

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