WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 7, Issue 3, 872-893. Research Article ISSN 2277– 7105

EVALUATION OF THE EFFICACY OF JWARAGHNA KASHAYA ON MALARIA

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Article Received on
13 Dec. 2017,

Revised on 03 Jan. 2018,
Accepted on 23 Jan. 2018

DOI: 10.20959/wjpr20183-10865

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ABSTRACT

Aim: To evaluate the efficacy of jwaraghna kashaya Ref: A.H.CH 1/151 (patola, katuka, musta, haritaki & yashtimadhu) on malaria.

Objectives:

- To observe the antipyretic action of jwaraghna kashaya.
- To observe the clinical outcome of jwaraghna kashaya as an adjuvant medicine in malaria.

Method: Open Clinical Randomized study conducted on 60 patients, which are divided into two group i,e group A 30 patients and group B 30 patients. Each group received anti- malarial drugs. Additional to this group A also received jwaraghna kashaya. **Duration of Treatment**: 7 days. This study was carried out at Sahsniang PHC West Jaintia Hills District, Meghalaya in the Year 2015 and 2016. **Result:** The clinical trial of Jwaraghna kashaya along with antimalarial drugs in group A is observed to be more effective in reducing the clinical symptoms of malaria along with parasite clearance from the blood.

- The symptoms of Headache, Nausea/Vomiting, Taste, Myalgia, Giddiness and Fatigue shows highly significant in group A as compared to significant in group B.
- The symptoms of intermittent fever, rigor, profuse sweating and cough show equal significant result in both the groups.
- The symptom of hepatomegaly and splenomegaly showed no significant results.
- In all the symptoms except two, the P-Value is less than 0.05. Therefore; Jwaraghna kashaya is effective in the management of malaria as an adjuvant medicine.

Statistical Analysis: The present drug Jwaraghna kashaya along with the statistical analysis and interference shows remarkable improvement in clinical signs and symptoms of Malaria along with parasite clearance in group A as compared to group B. **Conclusion:** 1) Jwaraghna kashaya is having Jwaraghna (antipyretic), Rakta prasadana (blood purifier), Srotoshodaka (clears the channels), Rasayana (Rejuvenate), Deepan (increases the digestive power), Pachan, Bhedana properties.

2) Jwaraghna kashaya has provided statistically significant results in headache, nausea/vomiting, taste, myalgia, giddiness and fatigue along with parasite clearance.

3) Jwaraghna kashaya has not showed significant result in reducing hepatomegaly and splenomegaly

4) Any side effect has not been observed during and after its clinical trial.

5) In a nutshell, it can be concluded that Jwaraghna Kashaya can be used as an adjuvant medicine on Malaria

6) However this trial was carried out on a very small scale and clinical trials on a large scale are needed which may lead to opening of the new horizon.

7) The clinical study of Jwaraghna Kashaya along with anti-malarial drugs was carried out and it can be concluded that-

The evaluation of the Jwaraghna kashaya is effective as an adjuvant medicine in reducing the clinical symptoms of malaria along with reducing and clearing the parasites from the blood. Since Malaria is similar to Vishama jwara which has been studied from different Samhitas and modern books in detail. Likewise detailed study of Jwaraghna kashaya has been carried out.

KEYWORDS: Jwaraghna Kashaya, Malaria, Vishama jwara.

INTRODUCTION

Disease results from a complex interaction between man, an agent and the environment. The natural history of disease signifies the way in which a disease evolves over time from the earliest stage of its pre-pathogenesis phase to its termination as recovery, disability or death, in the absence of treatment or prevention.

Ayurveda is the system designed to distinctly explain the merits and demerits state of happiness or otherwise good or bad for life and the life itself within their parameters.[1] The purpose of Ayurveda is to procure a good health to accomplish constituted duty, acquisition of wealth, contentment of desires and salvation.[2]

It is believed in society that infectious diseases are managed only by modern medicines, though this is not completely true. According to the WHO, "herbal medicine is the most lucrative type of traditional medicine which generates billions of dollars in terms of revenue annually". The WHO states that "traditional medicine can treat various infectious and chronic conditions. Management of these diseases is not only important but their prevention and protection from recurrence is also of concern.

Ayurveda do believes in micro-organisms (krimi) and their role in disease, but emphasized more on body's response and occurrence of disease occurs only if the bala is reduced. Susruta describes the communication through contacts; Charaka describes communication of disease via other factors like air, water, etc. Combating these diseases is to be done at various levels i.e. stopping the progression, building immunity against disease using various means and treating them.

Ayurveda mentioned Jwara as the synonym of the disease or a febrile condition. "From among all disorders fever deserves to be described first, it being the foremost of all somatic diseases". Charaka mentioned Jwara afflicts body, mind and sense organs, regulates the well - being of life. Chakrapani described Jwara as "Jwarayati Santapayati" i.e. disease associated with burning manifestation is known as Jwara.[3] Jwara is the term originated by the anger of Rudra. Rudra is known as god of destruction in Hindu mythology.[4]

Vishamajwara is the varieties of Jwara, which can be identified by its peculiarity of Visamata (irregularity). Vishama jwara is characterized by Visamarambha (irregular onset) Visama Kriya (alternative feeling of hot and cold) and Visamakala (irregular duration of sufferings) of Jwara.[5] Susruta believed this to be caused by Agantuka Karana or Parahetu (external factor). This Parahetu is more cleared by commentator Dalhana as Bhutabhisanga. Bhutabhisanga can be correlated with parasitic infection as discussed in modern medicine.[6]

Though the word malaria is not mention in Ayurveda but the major cardinal symptoms of Vishama jwara have been observed to be present in other disease including Malaria, which is a protozoan disease. Malaria is transmitted by the bite of infected female Anopheles mosquito and The classic symptom of malaria is paroxysm—a cyclical occurrence of sudden coldness followed by shivering and then fever and sweating, occurring every two days (tertian fever) in *P. vivax* and *P. ovale* infections and every three days (quartan fever) in *P. malariae*. *P. falciparum* infection can cause recurrent fever every 36–48 hours, or a less

pronounced and almost continuous fever.[7] this paroxysm is also observed in the types of Vishama Jwara explained in classics i.e., in Santata jwara, it is continuous remittent of fever, in satata it is double quotidian fever occurs twice daily. Anyeddhushka jwara, it is quotidian fever occurring once daily. Tritiyaka jwara, it is tertian fever occurring every alternate day. Chaturtaka jwara, it is quartan fever occurring with 2 days interval.

Malaria has been a serious problem in North- eastern states, mainly due to the topography and climatic conditions being congenial for perennial malaria transmission and prevalence of malaria vectors. These states contribute 8.5- 11% of total Malaria cases and 13-15% of total malaria mortality in country. Among North- eastern states, Assam reports maximum malaria cases as well as P. falciparum followed by Arunachal Pradesh, Tripura and Meghalaya.[8]

Although there are promising new control and research initiatives, malaria remains today as it has been for centuries, a heavy burden on tropical communities, a threat to non-endemic countries and a danger to travelers due to its relapsing and recrudescence in nature. Additional to this, increasing resistance to chloroquine compounds and recently to artemisinin compounds have been reported. Drug resistance of the vector also plays an important role in resurgence of malaria.

It is important to stop the progression of disease at earliest possible stage. Stopping the progression of the disease in case of infectious disease is the most ideal stage of controlling the disease, moreover increasing immunity by various means against these ailments are also required. Increasing immunity ensures, that even with the exposure of the disease producing pathogens, disease is not going to be manifested.

Disease is state of altered or vitiated state of Doshas. Alteration in these body elements occurs due to various internal and external factors. External factors directly lead to manifestation of disease followed by involvement of Doshas. Thus the etiological factors of the disease may be in relation to food, routine, external factors like air, water, trauma or microbes, disease occurs only after Doshic vitiation. Thus even in microbial diseases too Doshas are important for occurrence of disease and its management. In view of this it seems that though Scholars of Ayurved knew the role of microbial agents in occurrence of disease but emphasized more on Doshas only.

Charaka Samhita in describing the Vishama Jwara, describes that depending on localization and involvement of Dhatus (Body Tissues) fever (temperature) rises after a particular interval only. Moreover it is advocated that body's immunity system is of more importance than the infective organisms. It is mentioned that Bija (seeds) socked in Bhoomi (land) flourishes only in correct time (atmosphere) and Doshas vitiates (microorganism ought to vitiate Doshas) Dhatus if Dhatus Bala (immunity) depleted and in correct time.[9]

Above description is quite clear that the body's specific and nonspecific immunity plays major role in occurrence and non-occurrence of disease. Acharya Charaka scholarly describes in Jwara (Fever – the most common presenting clinical manifestation of any type of inflammatory process in body) that inflammatory process due to pathogen occurs only when body's defense mechanism is compromised or in other words, disease occurs only in immune-compromised subjects.[10]

Ayurvedic herbs have an important role in the treatment of malaria. Even quinine and artesunate are derivatives of herbal origin. As malaria is very similar to vishama jwara and its types, Ayurveda has mentioned many formulations for treatment of vishama jwara, out of which jwaraghna kashaya mentioned by Vagbhata. The ingredients of jwaraghna kashaya are Patola, Katuki, Mustha, Haritaki and Yashtimadhu which are mainly tridosha shamaka and having other properties like jwaraghna, deepana, pachana, krimighna, kasaghna and grahi. jwaraghna kashaya is also raktashodhaka and rasayana in nature which is supposed to not only help in reducing the periodicity of fever but also helps in strengthening the immunity and reducing other symptoms of Vishama Jwara which is similar to malaria. Because of these properties Jwaraghna Kashaya was selected for the study.

Literally, the word Kashaya means that which brings about normalcy to the body by maintaining equilibrium of physiological factors by removing pathology.[11] Sushruta had highlighted the importance of kashaya prayoga in chronic fever which relieves bad taste in the mouth, thirst, loss of appetite, along with it acts as a digestive, increases the bala and antifebrile.[11]

Thus, these facts motivated me to study the disease and to evaluate the efficacy of jwaraghna kashaya on malaria.

AIM AND OBJECTIVES

AIM

To evaluate the efficacy of jwaraghna kashaya Ref: A.H.CH 1/151 (patola, katuka, musta, haritaki & yashtimadhu) on malaria.

OBJECTIVES

- To study the antipyretic action of jwaraghna kashaya
- To observe the clinical outcome of jwaraghna kashaya as an adjuvant medicine in malaria.

H_1 - Jwaraghna kashaya is effective in the management of malaria as an adjuvant medicine.

H_0 - Jwaraghna kashaya is not effective in the management of malaria as an adjuvant medicine.

MATERIALS AND METHODS

Review work done and literature from the classical texts and research websites along with modern medical science literature and allied pharmacological studies have been incorporated in the study.

Materials

Jwaraghna kashaya is a formulation mentioned in Asthanga Hrudiya chikitsa sthana Adhyaya under vishama Jwara. It is a combination of five drugs i,e. Patola, Katuki, Mustha, Haritaki and yashtimadhu[12] which has Rasayan guna and due to its rasa, veerya, vipaka has Tridoshnashak action especially Vata shamak properties, sheeta veerya and tikta rasa pradhana. Drugs are of deepana pachana which help in increasing the agnibala. It is also of krimighna and raktashodaka which helps in killing n flushing out the krimi (parasites). Hence, this drug was selected to observe its clinical outcome on malaria which is similar to vishama jwara.

Overview of jwaraghna kashaya as follow:-

Table 1: Ingridients of jwaraghna kashaya.[13]

Drugs	Latin Name	Family	Part Used	Quantity
Patola	Trichosanthes dioica	Cucurbitaceae	Patra	4 gms
Katuka	Picorrhiza kuroa	scrophulariaceae	Khanda	4 gms
Musta	Cyperus roduntus	Cyperaceae	Khanda	4 gms
Haritaki	Terminalia chebula	Combretaceae	Phala	4 gms
Yashtimadhu	Glycirrhiza glabra	Fabaceae	Khanda	4 gms

Table 2:- Rasa Panchaka of Jwaraghna Kashaya.[13]

DRUGS	RASA	VIPAKA	VIRYA	GUNA	DOSHAGHNA	KARMA
1. Patola	tikta and katu	Katu	Ushna	laghu ruksha	kapha-pittahara,	Jwaraghna Deepana
2.Katuki	Tikta	Katu	Sheeta	laghu and ruksha	kapha-pittahara,	vishama jwarahara, kasaghna, krimighna raktashodaka
3.Mustha	tikta, katu and kashaya	Katu	Sheeta	laghu and ruksha	kapha-pittahara,	jwarghna, kasaghna, krimighna nidranashahara, deepana, pachana, grahi
4.Haritaki	pancha rasa except lavana	Madhura	Ushna	laghu and ruksha	tridoshnashak,	kasaghna, stroto shodhak, rasayan, anulomana
5.Yashtimadhu	madhura	Madhura	Sheeta	guru and snigdha	tridoshahara.	chardighna, trushnahara, rasayana

METHODS OF PREPARATION[14]

For fresh decoction, Jwaraghna kashaya was prepared by taking patola, katuki, mustha, haritaki and yashthimadhu bharad churna in 1 pala i.e 40 gms of quantity and 640 ml water (i.e 16 times of bharad dravya) and was boiled and reduced upto 80 ml on slow flame. (i.e $1/8^{th}$ water)

- The daily dose of Kwath was 80 ml but the dose decided for the study was 40 ml BD
- Hence to make 40 ml of Jwaraghna Kashaya, 20 gms of patola, katuki, mustha, haritaki and yashthimadhu (i.e 4gm of each) was taken and was boiled with 320 ml of water and was reduced up to 40 ml on slow flame.

METHODOLODY

Type of study

- Open Clinical randomized study.

Place of study

- Sahsniang PHC West Jaintia Hills District, Meghalaya.
- Drugs were collected from Pune local market.
- Standardisation was done at Late Principal B.V Bhide Foundation.
- Authentification of drugs was done at Botany Department, Pune University

Sample size

60 patients were selected for study which was divided into Group A group and Group B consisting of 30 patients each.

Table -3:- Anti-malarial drugs dose and durations.

Drug acc. To type of parasite involved (NVBDCP for northeastern states)[15]	Dose	Duration
P.falciparum(+ve)		
1. ACT-AL(Artemisinin + lumefantrine)	560mg BD	3days
2. PQ	7.5mg	6 tabs On 2nd day
P.vivax (+ve)		
1. CQ	250mg	4 tabs on 1st & 2nd day 2 tabs on 3rd day
2. PQ	2.5mg	6 tabs daily for 14 days
PV & PF(+ve)		
1. ACT-AL	560mg BD	3days
2. PQ	2.5mg	6 tabs daily from 4th- 14 days

Table 4:- Dose and schedule.

	Group A	Group B
No of subject	30	30
Medicine given	Jwaraghna kashaya + anti-malarial drugs	Anti- malarial drugs
Dose	40ml kashaya and antimalarial drugs as mention in previous table	As mention in previous table
Time	Kashaya-Two times daily in pragbhata kala- apana kala and anti-malarial as mention in previous table	As mention in previous table
Route of drug administration	Orally	Orally
Duration of treatment	Kashaya-7 days and Anti- malarial as mention in previous table	As mention in previous table
Follow up	First 4 days, 7th, 14th ,* 18th (PF) or 29th (PV)	First 4 days, 7th, 14th , *18th (PF) or 29th (PV)

*18th or 32th day of follow up signify that after a gap 15 days from the day of completion of antimalarial treatment, the patients should come for follow up as per the norm of NVBDCP which is 18th day for PF positive patients as ACT-AL duration is for 3 days and 29th day for PV positive patients as the dose for primaquine is for 14 days.

SELECTION CRITERIA FOR PATIENTS

INCLUSION CRITERIA

- Age group:-18 to 60 years
- Patients diagnosed of malaria based on subjective and objective parameters.

EXCLUSION CRITERIA

- Severe and complicated malaria patients.

- Pregnant Women.
- Anaemia
- Known case of- Pneumonia

Tuberculosis.

Enteric fever

Typhoid fever

Dengue

ASSESSMENT CRITERIA

Subjective parameters

Intermittent fever, Rigor, Profuse sweating, Headache, Nausea/ Vomitting, Taste, Myalgia, Hepato-Spleenomegaly, Giddiness, Fatigue, Cough.

OBJECTIVE PARAMETERS

1) Axillary body temperature by using thermometer.

2) Investigation:-

Hb%, Thin and thick smear of MP, Parasite load and clearance for MP positive patients (before & after treatment), RDT (Rapid Diagnosis test for MP).

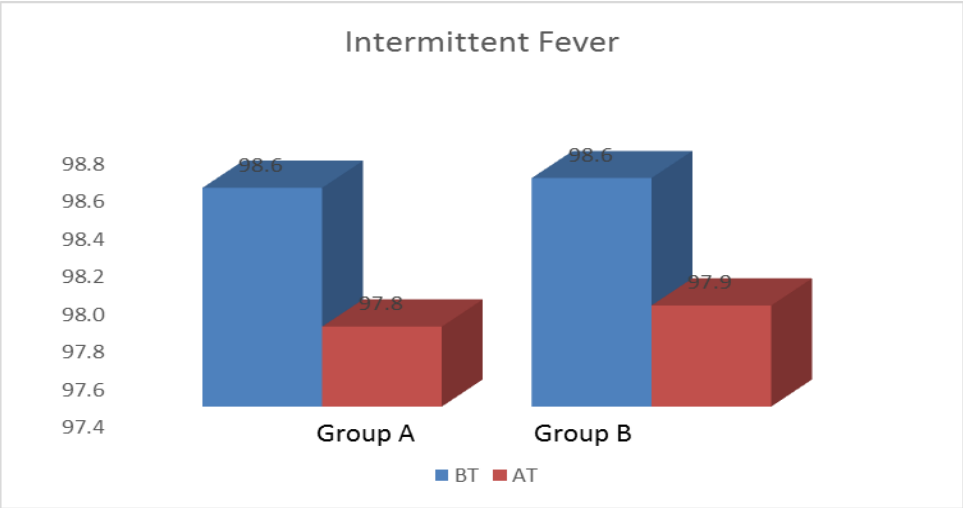
EFFICACY SCORE SYSTEM

1) INTERMITTENT FEVER-Normal=98.6°F or below, Mild=98.6°F-100°F, Moderate =100°F-102°F, Severe =102°F-104°F, Very severe =above 104°F
2) RIGOR- Absent = Grade 0, Present = Grade 1
3) PROFUSED SWEATING- Absent = Grade 0, Present = Grade 1
4) HEADACHE -Normal = Grade 0, Mild = Grade 1, Moderate= Grade 2
5) NAUSEA/ VOMITTING- Normal = Grade 0, Nausea or Regurgitation = Grade 1, Occ. vomiting=Grade 2, Vomiting 2-3 times= Grade 3
6) TASTE-Normal = Grade 0, Tastelessness= Grade 1, Bitter taste = Grade 2
7) MYALGIA-Normal= Grade 0, Mild intermittent = Grade 1, Continuous pain relief by rest = Grade 2, Not relieved by rest= Grade 3
8) HEPATOSPLENOMEGALY-Absent = Grade 0, Present = Grade 1
9) GIDDINESS- Absent = Grade 0, Present = Grade 1
10) FATIGUE-Absent = Grade 0, Present = Grade 1
11) COUGH- Absent = Grade 0, Present = Grade 1

OBSERVATIONS AND RESULT

GRADATION OF SYMPTOMS

1) INTERMITTENT FEVER



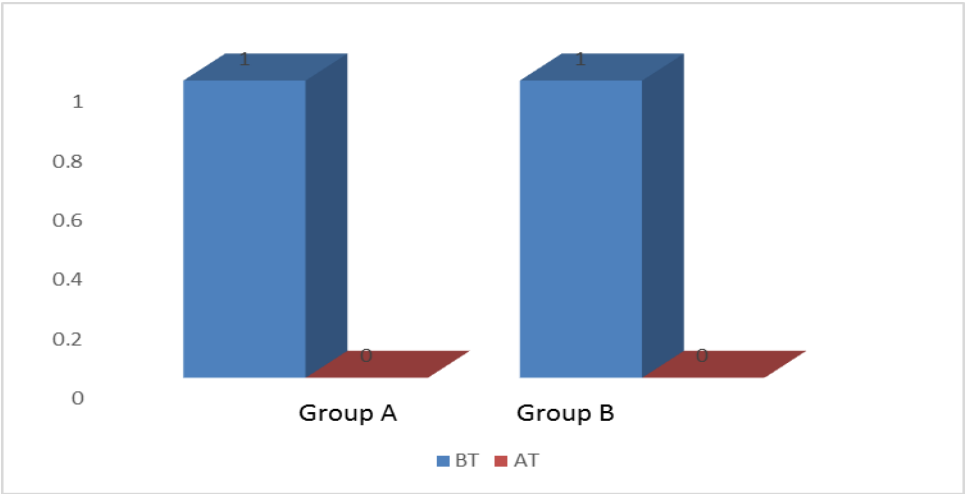
Graph no. 1 Comparative analysis of improvement on intermittent fever.

Table no. 5: Showing the comparative improvement on intermittent fever.

Intermittent Fever	Mean		t-Value	P-Value	% Effect	Result
	BT	AT				
Group A	98.6	97.8	2.917	0.008	0.7	Significant
Group B	98.6	97.9	2.132	0.043	0.7	Significant

Since observations are quantitative, we have used paired t-test. From above table we can observe that P-Values for both the groups are less than 0.05 hence we conclude that effect observed in both groups are significant.

2) RIGOR



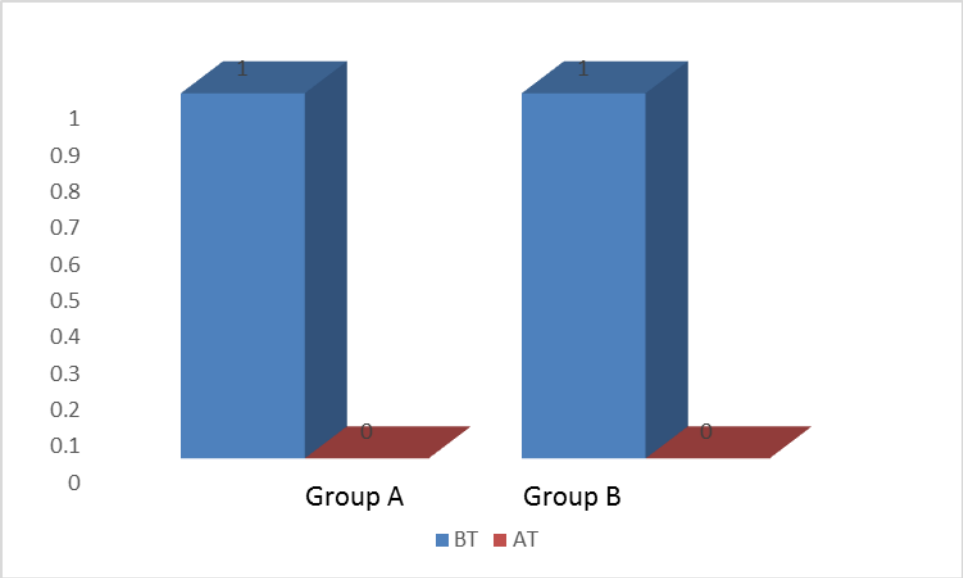
Graph No. 2: Comparative analysis of improvement on Rigor.

Table No 6: Showing the comparative improvement on Rigor.

RIGOR	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-3.873[a]	0.001	100	Highly Significant
Group B	1	0	-4.000[a]	0.004	100	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe thata P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on RIGOR.

3) PROFUSE SWEATING



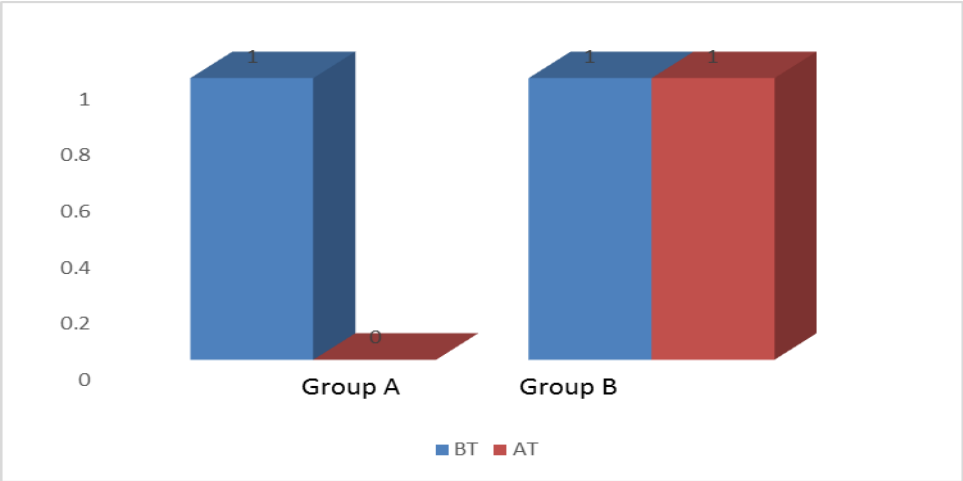
Graph no. 3: Comparative analysis of improvement on profuse sweating.

Table No 7: Showing the comparative improvement on Profuse Sweating.

PROFUSE SWEATING	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-4.899[a]	0.000	100	Highly Significant
Group B	1	0	-4.796[a]	0.004	100	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Sweating.

4) HEADACHE



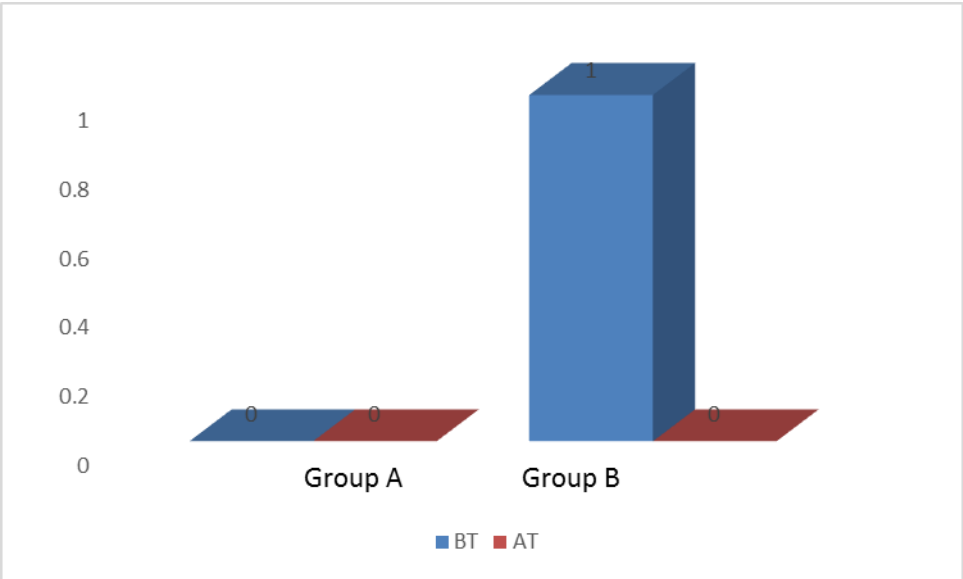
Graph no. 4: Comparative analysis of improvement on Headache.

Table No 8: Showing the comparative improvement on headache.

HEADACHE	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-4.899[a]	0.000	96	Highly Significant
Group B	1	1	-2.828[a]	0.005	33.3333	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Headache.

5) NAUSEA/ VOMITTING



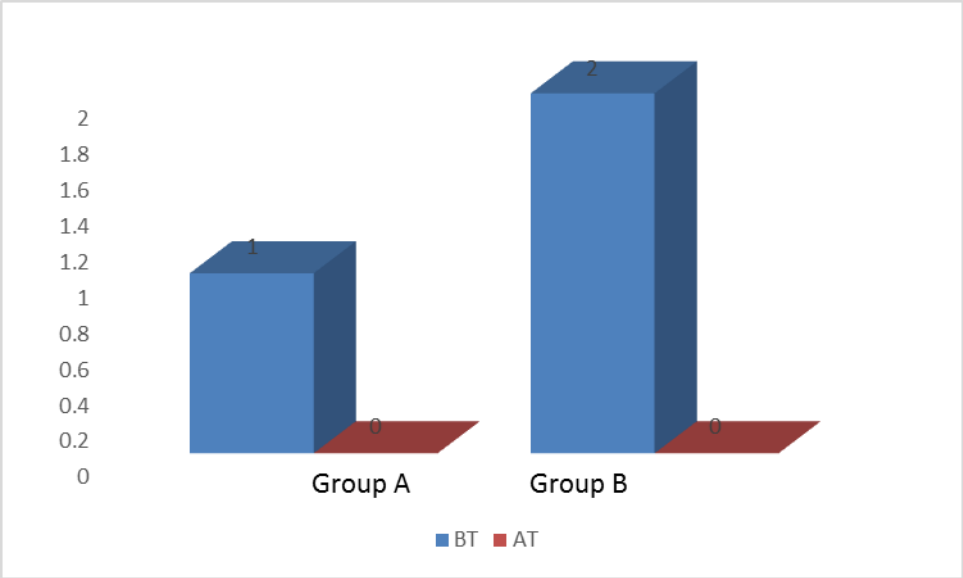
Graph no. 5: Comparative analysis of improvement on nausea/ vomiting.

Table No 9: Showing the comparative improvement on Nausea/ vomiting.

NAUSEA/ VOMITTING	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	0	0	-3.317[a]	0.001	100	Highly Significant
Group B	1	0	-3.000[a]	0.003	64.2857	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Nausea/ Vomitting.

6) TASTE



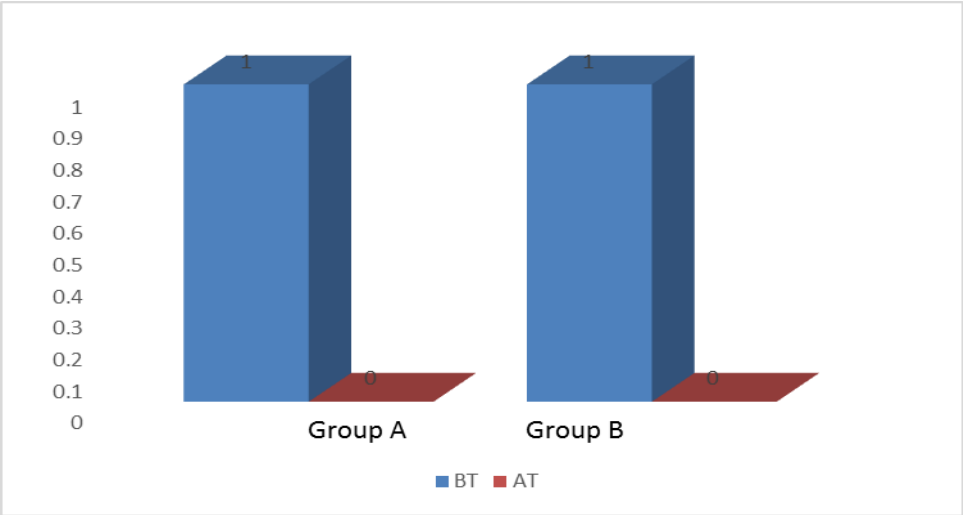
Graph no. 6: Comparative analysis of improvement on taste.

Table No 10: Showing the comparative improvement on taste.

TASTE	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-4.326[a]	0.001	100	Highly Significant
Group B	2	0	-3.947[a]	0.003	84.2105	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Taste.

7) MYALGIA



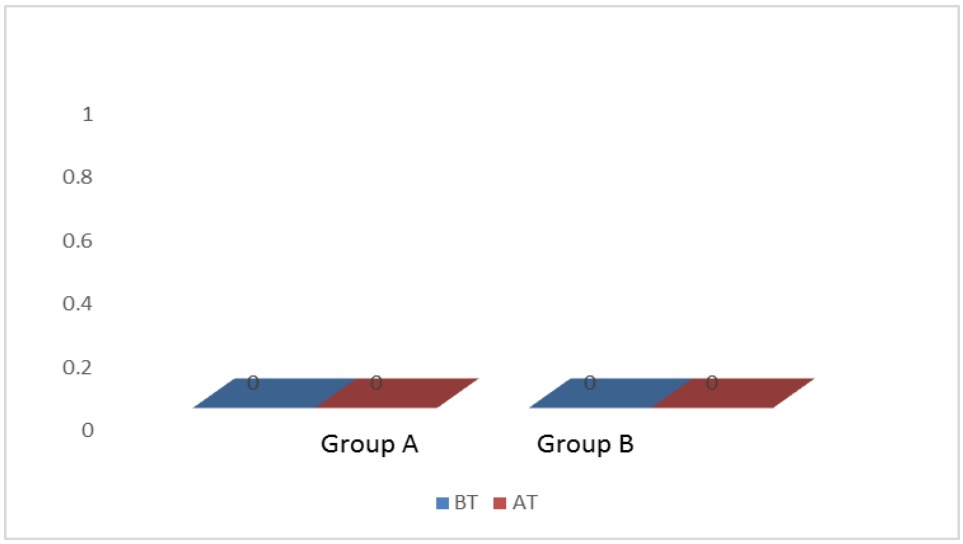
Graph no. 7: Comparative analysis of improvement on Myalgia.

Table No 11: Showing the comparative improvement on Myalgia.

MYALGIA	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-5.000[a]	0.000	100	Highly Significant
Group B	1	0	-3.606[a]	0.005	52	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Myalgia.

8) HEPATO/SPLENOMEGALY



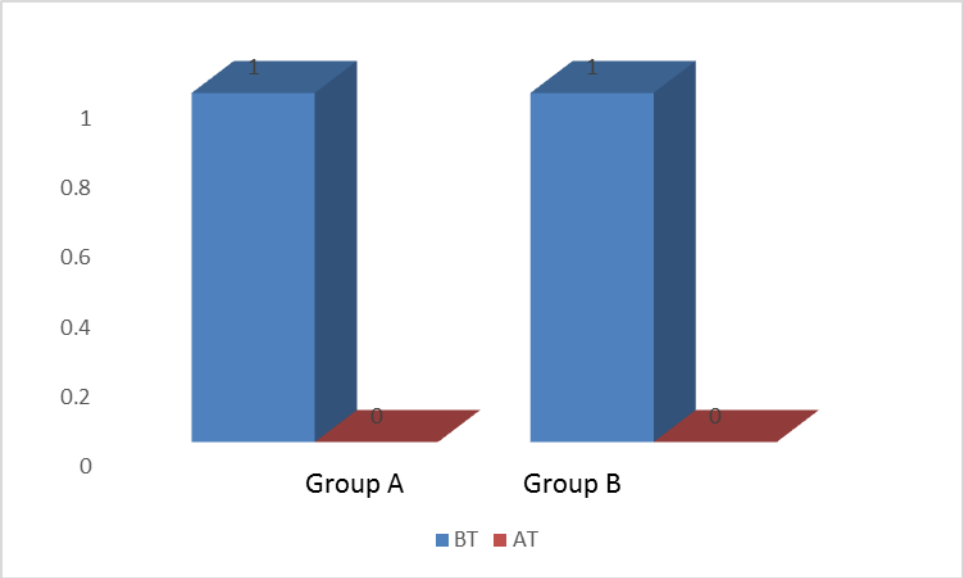
Graph no. 8: Comparative analysis of improvement on Hepato/Splenomegaly.

Table No 12: Showing the comparative improvement on Hepato-splenomegaly.

HEPATO-SPLENOMEGALY	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Trial Group	0	0	-1.000[a]	0.317	11.1111	NS
Control Group	0	0	.000[b]	1.000	0	NS

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are greater than 0.05 hence we conclude that effect observed in both groups are not significant on Hepatomegaly.

9) GIDDINESS



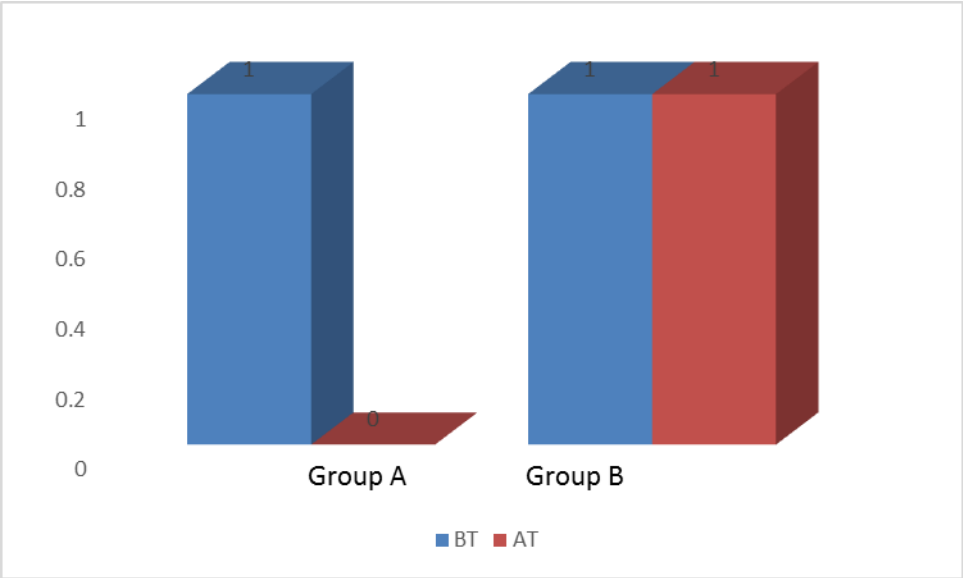
Graph No. 14: Comparative analysis of improvement on Giddiness.

Table No 13: Showing the comparative improvement on giddiness.

GIDDINESS	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-4.690[a]	0.000	100	Highly Significant
Group B	1	0	-4.025[a]	0.002	81.8182	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Giddiness.

10) FATIGUE



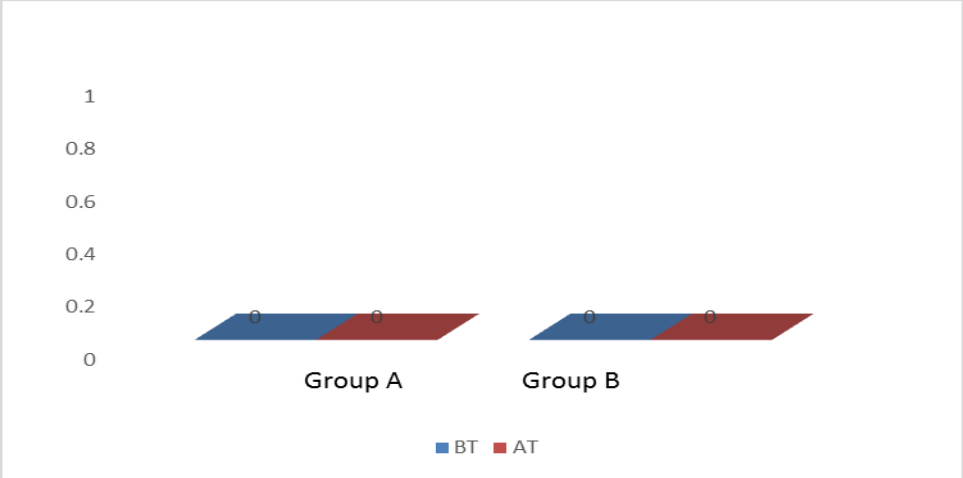
Graph No. 10: Comparative analysis of improvement on Fatigue.

Table No 14: Showing the comparative improvement on Fatigue.

FATIGUE	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	1	0	-4.899[a]	0.000	96	Highly Significant
Group B	1	1	-2.646[a]	0.008	29.1667	Not Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and Group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Fatigue.

11) COUGH



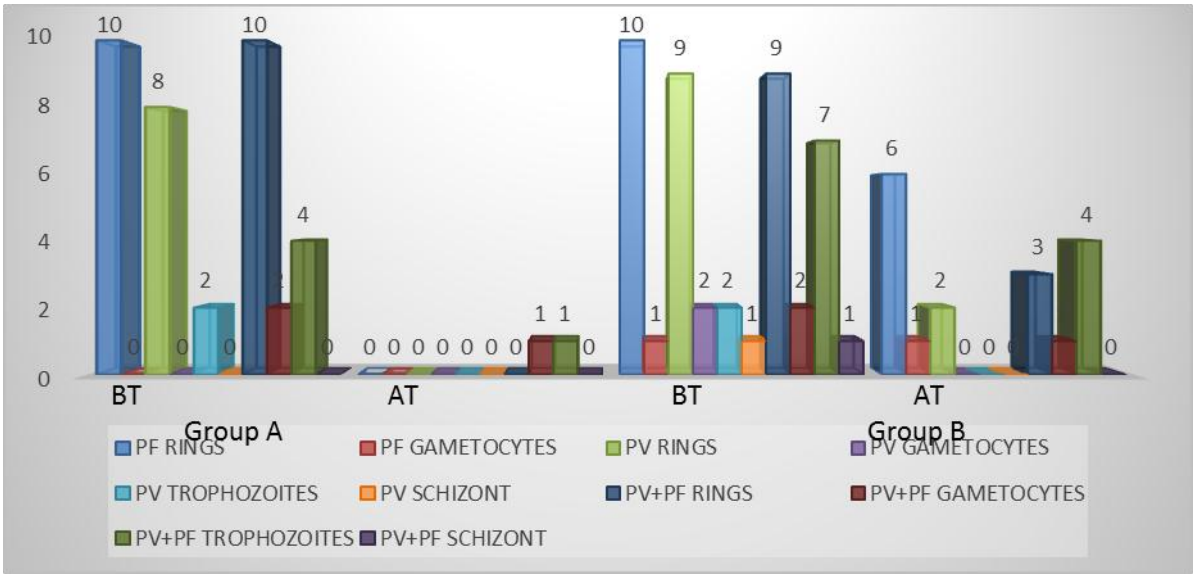
Graph No. 11: Comparative analysis of improvement on cough.

Table no. 15: Showing the comparative improvement on Cough.

COUGH	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Group A	0	0	-2.919[a]	0.001	100	Highly Significant
Group B	0	0	-3.127[a]	0.002	100	Significant

Since observations are on ordinal scale, we have used Wilcoxon Signed Rank test. From above table we can observe that P-Values for Group A and group B are less than 0.05 hence we conclude that effect observed in both groups are significant on Cough.

12) PARASITE CLEARANCE OF MALARIA.



Graph No. 12: Comparative analysis of parasite clearance of malaria.

Table No 16: Showing the comparative of parasite clearance of Malaria.

Parasites	Group A		Group B	
	BT	AT	BT	AT
PF RINGS	10	0	10	6
PF GAMETOCYTES	0	0	1	1
PV RINGS	8	0	9	2
PV GAMETOCYTES	0	0	2	0
PV TROPHOZOITES	2	0	2	0
PV SCHIZONT	0	0	1	0
PV+PF RINGS	10	0	9	3
PV+PF GAMETOCYTES	2	1	2	1
PV+PF TROPHOZOITES	4	1	7	4
PV+PF SCHIZONT	0	0	1	0
Chi-Square Value	24.251		27.142	
P-Value	0.001		0.034	
% Change	98.12%		86.26%	

Since observations are on ordinal scale, we have used Chi square test for comparison of parasites clearance on malaria positive patients. From above table we can observe that P-Values of both the group is less than 0.05 which is significant in both the group but on observing the effect, 98.12% was observed in Group A and 86.26% was observed in Group B. Hence, we conclude that effect was observed in both groups but more in Group A.

DISCUSSION

Total 66 patients were enrolled in the study. Patients were divided into 2 groups-Group A (30 patients) and Group B (30 patients).6patients were dropped out from group A because they failed to maintain regular follow up and rest 60 patients were completed.

Intermittent fever: 0.7% effect is seen in both the groups which are significant. The jwaraghna kashaya in group A are having jwaraghna (anti-pyretics) along with tikta (bitter), katu (pungent) rasa, deepana (increases the digestive fire) pachana (digestant) and srotoshodhaka (clears the channels) properties which helps to clear the strotas (channels) and reduces jwara(fever).

Rigor: 100% effect is seen in both the groups. The ushna virya (hot potency) of Jwarghana kashaya help to reduced symptoms of rigor and chills.

Profused sweating: 100% effect is seen in both the groups. Sweda pravrutti (production of sweat) and shareera laghutva (lightness of the body) are the symptoms of jwaramukta lakshanas (cure of fever) which shows that the effect of the jwaraghna kashaya over jwara which is one of the symptoms of malaria due to its deepana and pachana properties which helps in ama pachana and removing the srotoavarodha which obstruct sweda (sweat).

Headache: 96% effect is seen in group A and 33.3% in group B. The ushna virya and vataghna karma of jwaraghna kashaya help to reduce the symptom of headache.

Nausea/ vomitting: 100% effect is seen in group A and 64.28% is seen in group B. The ushna virya, deepana and pachana of jwaraghna kashaya along with anulomana karma of haritaki helps to pacify vata dosha and pitta dosha which is mainly responsible for excitement of morbidity to forcibly and rapid expel through mouth.

Taste: 100% effect is seen in group A as compare to 84.2% is seen in group B. The deepana and pachana properties of jwaraghna kashaya which not only helps in increasing the digestive power but also helps in bringing back the taste of the palate.

Myalgia: 100% effect is seen in group A as compare to 52% effect is seen in group B. This is reduced due to ushna virya and vataghna properties of jwaraghna kashaya Hepato/ spleenomegaly: No significant effect is seen in both the groups.

Giddiness: 100% effect is seen in group A and 81.81% is seen in group B. The symptom of giddiness is caused by tamo guna and kapha dosha which is reduced by tikta, katu rasa and ushna virya of jwaraghna kashaya.

Fatigue: 96% effect is seen in group A and 29.16% is seen in group B. Jwaraghna kashaya is having properties of rasayana(rejuvenate) which help in boosting up the immunity power of the patients and also yasthimadhu is having glanihara(reduce lassitude) property which help to relieves tiredness and provide more energy to the patients.

Cough: 100% effect is seen in both the group. Kasa(cough) is not possible without morbid kapha which is the main cause of kasa and jwaraghna kashaya is having properties of kasaghna which are ushna virya, katu, tikta rasa which helps to pacify kapha.

Parasites clearance

98.12% effect is seen in Group A and 86.26% effect is seen in group B. Jwaraghna kashaya are having krimighna(anti-microbial) along with tikta, katu rasa, laghu(light), ruksha(dry) properties. These properties of the above drug can pacify the pradhana dosha of jvara i.e. pitta. The tikta, katu rasa of these drugs are also rakta prasadana (blood purifier) in nature and due to dosha dhatu ashraya ashrayi bhava(mutual interdependence) of pitta and rakta dhatu, these properties might have helped in clearing the parasites from the blood.

PROBABLE MODE OF ACTION OF JWARAGHNA KASHAYA

According to the pathology mention in Ayurveda, it is due to vitiation of vata pradhana tridoshaja and the periodicity of fever varies according to the dusthi(vitiation) of different dhatus(tissues) and kala. Jwaraghna kashaya is having the compound effect of tikta rasa along with its deepnana and pachana properties helps in increasing the Agni which in turn does Ama pachana which is the main cause of jwara.

When aggravated dosha enters the amashaya and combine with the Agni, accompanying the rasa dhatu, blocks the channels of rasa and sweda causing swedovaroda and rasavaha srothovarodha. The ushna and katu vipaka properties of jwaraghna kashaya especially along with bhedana karma (penetration property) of katuki help in metabolizing the dosha and clear the marga avarodha.(obstruction of channels).

As the responsible aggravating dosha for vishama jwara are causing rakta dushti which in turn vitiate the pitta and thus increases the daha guna (burning sensation) of the body due to obstruction of swedovaha strotas(channels of sweat), the ingredient of jwaraghna kashaya are having tikta, madhura vipaka and sheeta virya along with jwaraghna, rakta prasadhana, pitta shamaka and daha shamaka which helps in reducing the episode of jwara and daha of the body and reduces the episode of vruddhi of responsible dosha.

Haritaki and yastimadhu are also having rasayana property. This property helps the patients to rejenuvate and boosting up the immunity power of the patients and along with glanihara property of yastimadhu relieves fatigue and help in recovering the dhatu dusti especially rasa dushti and rakta dusti which helps the patients to get relieved and return to normal daily routine.

As malaria is a protozoan disease which is cause by a parasite which can be consider as krimi in Ayurveda, therefore the krimighna property of musta and katuki must have help in killing and removing the parasite. Also, various reseach have been done on these drugs which proved that they have active anti-malarial property such as-

1) A mixture of autoxidation products of β-selinene was found to be the most active antimalarial substances obtained from *C. rotundus*.

2) Mustha shown to possess significant antimalarial activity due to the presence of a, b-unsaturated carbonyl moiety. The a, b-unsaturated carbonyl moiety was suspected to undergo a Michael reaction with nucleophilic sites in the parasite DNA molecule, thereby inhibiting the growth of P. falciparum.

3) The water extract of Terminalia chebula also shows in vitro antiplasmodial activity.

4) The *in vitro* anti-malarial activity of18β Glycyrrhetinic Acid from *Glycyrrhiza glabra* against *P. falciparum*

CONCLUSION

- In assessing overall effect of the treatment, it was seen that – symptoms of Malaria is similar to vishama jwara which is Vatapradhan, Tridoshaj vyadhi.
- Jwaraghna kashaya contains Patola, Katuki, Musta, Haritaki, and Yashtimadhu which are having tikta, katu rasa, laghu, ruksha, snigdha guna, katu vipaka and ushna virya, deepana, pachana, rakta prasadana, krimighna, rasayana and jwaraghna karma.
- This quality of jwaraghna kashaya helps to pacify the Dosha especially vata dosha, increases the Agni and remove the srotorodhaka and thus help in lowering down the temperature and reduces the fever periodicity and other symptoms of malaria.
- Additional to reducing the periodicity of fever, Jwaraghna Kashaya has provided statistically significant results in headache, nausea/vomiting, taste, myalgia, giddiness and fatigue along with parasite clearance.
- Jwaraghna kashaya is also having rasayana property. This property helps the patients to rejenuvate and recovers the dhatu dusti especially rasa dushti and rakta dusti which helps the patients to get relieved and return to normal daily routine. It also helps in reducing fatigue and tiredness which is one of the symptoms of malaria.
- Jwaraghna kashaya has not showed significant result in reducing hepatomegaly and splenomegaly.
- No any adverse effect was found in this study.
- Hence I would like to conclude that jwaraghna kashaya is effective in management of malaria as an adjuvant medicine.

Scope for further study

However this trial was carried out on a very small scale and as an adjuvant medicine. Single or double blind clinical trials on a large scale with variation in doses are needed which may lead to opening of the new horizon.

ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Department of Kayachikitsa, Bharati Vidyapeeth College of Ayurved College, Pune and also to Sahsniang PHC, West Jaintia Hills District Meghalaya, India for providing necessary facilities to carry out this research work.

BIBILIOGRAPHY

1. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228), Sutra sthana 1/41.
2. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228), Sutra sthana 1/15.
3. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228), Nidana 1/16-20.
4. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228), Nidana 1/16-20.
5. Susruta, Susruta Samhita, Varanasi: Krishnadas Academy; 1980. (Krishnadas Ayurveda series 51), Uttara 39/51-57).
6. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228), Nidana 1/16-20.
7. Davidson principles and practice of medicine, 22nd ed. Churchill livingstone Elsevier 2014 Elseveir limited.
8. Ferri FF (2009). "Chapter 332. Protozoal infections". *Ferri's Color Atlas and Text of Clinical Medicine*. Elsevier Health Sciences. p. 1159.
9. Agnivesa, Charaka Samhita, 4th ed. Varanasi: Chaukhambha Sanskrit Sansthan; 1994. (Kasi Sanskrit series 228) Ch.Chi. 3/62.
10. Dr Prasad PVNR. Bhaisajya Kalpana Vijnana. 2nd edition. Varanasi: Chaukhamba Krishnadas Academy. 2008, Pg 245.
11. Susruta, Susruta Samhita, Varanasi: Krishnadas Academy; 1980. (Krishnadas Ayurveda series 51), Utt. 39/110-112.
12. Vagbhatta‘s Ashtanga Hrudyam by K.R. Srikantha Murthy, 2011; Chikitsa sthana 1/151; Chaukhamba Krishnadas academy Varanasi, India.
13. Dravya guna vigyan vol II 2005 ed. by Dr. J.L.N. SASTRY chaukhambha orientalia Varanasi, India, pg no.250, 390, 551,209,152.
14. Sharangdhara Samhita by Brahmanand Tripathi; Madhyama khanda 2/1; Chaukhamba Surbharati Prakashan, Varanasi, India.
15. K.Park, Park‘s textbook of preventive and social medicine 19th ed 2007; Published by Banarasida Bhanot India.