WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 5.990
Volume 4, Issue 5, 1395-1416. Research Article ISSN 2277 – 7105

"EVALUATION OF VYAGHRI HARITAKI IN MANAGEMENT OF KASA-SHWASA OF CHILDREN"

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Article Received on
20 Feb 2015,

Revised on 15 March 2015,
Accepted on 7 April 2015

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ABSTRACT

Respiratory infections are major cause of morbidity and mortality in children. Cough being its commonest manifestation calls for a medicine, which is efficacious, palatable and free of side effects with suitable mode of administration. *Vyaghri Haritaki*, a classical formulation in *Bhaishajya Ratnavali*, is an *Avaleha* (electuary), palatable and can be licked by children having soothing effect on throat. Therefore, a study was planned to evaluate its effect on *Kasa* (cough) due to three *doshas*. Children, aged 1 to 12 years, suffering from cough due to various etiologies were registered and categorized under three groups: group-1, 2 and 3 namely *Vataja*, *Pittaja* and *Kaphaja kasa* and drug was given in dose of 150 mg/kg/dose, 6 hourly for seven days. Two follow-ups were made after two and seven days respectively after registration. Hb, TLC, DLC, ESR, AEC, Throat-C & S, Urine-R&M, X-Ray chest PA view and Mantoux test were advised. Improvement was assessed on basis of scoring table present grades for symptoms in increasing order of severity. After statistical analysis, which was done by SPSS 16 software, suggest that however, *Vyaghri Haritaki* is effective in all three types of *Kasa* but shows better effect on *Vataja kasa*. The trial drug has no significant side effects and no significant effect on Hb%, TLC, DLC and ESR.

KEYWORDS: *Vyaghri haritaki*, *Kasa* in children, *Avleha* in *Kasa*, *Doshaj kasa*.

ABBREVIATION: R= Registration, F1= First follow up, F2= Second follow up

INTRODUCTION

Cough is the commonest symptom reported by patients to doctor and presents as a part of the symptom-complex of many respiratory diseases. Cough accounts significantly for absenteeism from school. According to the World Health Report (WHO, 2004), 6.9% of deaths in children were attributed to respiratory infections. Ayurvedic classics have categorized respiratory challenges into two main categories. These are *Kasa* (cough) and *Shwasa* (dyspnea). *Kasa* (cough) is an important symptom related to *Pranavaha srotasa* and found in various disorders or presents as an independent disease. Ayurveda has described and classified *Kasa* broadly into *Vataja, Pittaja, Kaphaja, Kshtaja* and *Kshayaja Kasa.*[1, 2, 3, 4]

According to a WHO survey, about 70-80% of world population relies on non-conventional herbal medicine for their primary health care. Ayurvedic texts describe many herbal formulations for *Kasa. Vyaghri Haritaki*, one of them; is indicated in *Vataja, Pittaja, Kaphaja, Dwidoshaja, Tridoshaja, Kshayaja and Kshataja Kasa* as well as *Peenasa, Shwasa, Swarakshaya* and *Yakshma* diseases. *Vyaghri Haritaki* possesses other properties like *Deepana, Pachana, Anulomana, Shothahara* (Anti-inflammatory), *Kapha-vatashamaka, Balya* and *Rasayana.*[5]

Therefore, to ascertain the therapeutic effect in combating *Kasa*, a safe drug approved by ethical committee, *Vyaghri Haritaki* was considered for research[6]. The present work projects the study in three groups, namely group-1 (*Vataja kasa*), group-2 (*Pittaja kasa*) and group-3 (*Kaphaja kasa*).

Vyaghri Haritaki Avaleha

Avaleha is the semi-solid dosage form[7], having long shelf-life[8] in comparison to primary dosage forms, and can be administered to all the three age groups, i.e. *Bala* (children), *Yuva* (young) and *Vriddha* (old).[9] The ingredients of *Vyaghri Haritaki* are *Kantakari (*1*Tula*/4.80 Kg*), Haritaki* (100 pieces of medium size/ 1.2 kg), *Trikatu* (2 *Pala* /32 gm each of *Shunthi, Maricha, Pippali*), *Chaturjata* (1 *Pala*/ 12 gm each of *Ela, Twaka, Twakapatra, Nagkeshara)*), *Madhu* (6 *Pala*/288gm) and *Purana Guda* (100 *Pala*/4.8kg), water for decoction (12.3 lit) reduced to 3 liters. [10]Here, the use of *Madhura Dravya* is of great importance because it reduces the *Tikta, Katu and Kashaya* taste of drugs, making it more *Pala*table, and also nourishes all *Dhatus* along with *Ojasa*.[11] *Prakshepa Dravyas* serve specific functions, e.g. *Pippali* (*Piper longum*) acts as a bioavailability enhancer[12] and is antibacterial.[13]

Regarding *Avaleha*, two more points are to be kept in consideration. These are mode of administration, i.e. licking, and high percentage of sugar in the medicament. Both these factors facilitate the oral absorption. Due to its mode of administration, i.e. licking produces soothing effect in throat and relieves local irritation.[14]

MATERIAL AND METHODS

1. After proper screening of children and written consent from the parents, findings were gathered by examination and history-data was recorded on the preformed case sheets.
2. Children were categorised under three groups viz. *group-1* (*Vataja kasa*, n=17*), group-2 (Pittaja kasa*, n=16*), group-3 (Kaphaja kasa*, n=16*).*
3. *Vyaghri Haritaki* was prepared in the Ayurvedic pharmacy, B.H.U. as per *Bhaishajya Ratnavali*, 15/167-170.
4. To make diagnosis, to assess the response of drug including adverse effects, necessary laboratory tests were conducted.
5. Statistical Analysis: All data were statistically analyzed and finally a conclusion was made regarding efficacy of the drug in childhood cough of varying etiology.

Selection of Patients

49 children, suffering from cough due to various aetiologies, were registered from the Kaumarbhritya/Bal Roga OPD, Ayurveda wing, S.S.Hospital, IMS, BHU.

Criteria for Inclusion

1. Patients of both sex and age range from 1 year to 12 years.
2. Patients suffering from cough due to any cause except exclusion criteria.
3. Those have not received any medicine for last 24 hours.

Exclusion Criteria: Patients suffering from-

1. any associated life-threatening disease including aspiration syndrome, emphysema, pneumothorax
2. any congenital anomaly related to respiratory or cardiovascular system.
3. bronchial asthma, empyema, pneumonia or pulmonary TB.

Follow Up

First follow-up was recorded after 48 hours and second follow-up after seven days of registration.

Dose

Avleha was administered in dose of 150 mg/kg/dose every 6 hour, orally for seven days.

Investigations

Hb, TLC, DLC, ESR, AEC, throat swab-culture and sensitivity, urine-routine and microscopy, X-Ray chest PA view and Monteux test were advised to make the diagnosis and to exclude other similar disorders mentioned in excluding criteria.

Scoring System

A scoring system was adopted[15] for the clinical assessment of *Kasa* at the time of registration and on subsequent follow-ups to get the response of drugs after administration in patients of recommended groups (Table no.1). Each symptom/sign was given a grading of 1, 2, 3 and 4 in increasing order of severity. Mean difference in grades scored by patients between registration and first follow up, between first and second follow up and between registration and second follow up was calculated.

Statistical Analysis

Calculation of Mean ($\overline{X}$), Standard deviation (SD), one-way *ANOVA* and paired "t" test was done by the SPSS 16 software.

OBSERVATIONS AND RESULT

Out of total 49 enrolled children, maximum cases (91.84%) belonged to the middle socioeconomic status. The incidence of male children was 76%, while the maximum male patients were observed in group1 (table no. 2 & table no.3.).

Effect of trial drug on each symptom in different groups in terms of mean difference with standard deviation

The effect of the drug, *Vyaghri Haritaki* on various symptoms and signs observed in patients of all the three groups in terms of mean difference with standard deviation of achieved scores and their intergroup and intragroup *comparison* is as follows

1. The mean difference of score of *Parshva/ Shiraha/ Vaksha Shoola*, between R-F2 is observed higher in patients of *group-1* (*Vataja kasa*) than the mean score of group-2 patients as evident from table no.4 but on intergroup and intragroup comparison, no significant change is found.

2. The mean difference of score of *Swara bheda/ Swaramaya*, between R-F2 is observed higher in patients of *group-2* (*Pittaja kasa*) than the mean score of group-1 and group-2. (table no.5)
3. The mean difference of score of *Mukha-kantha shushkta, Shushka kasa* and *Kapha shushka* between R-F2 is observed higher in patients of *group-1* (*Vataja kasa*) than the change in mean score of group-2 and *group-3*. (table no.6, 7 and 8)
4. The mean difference of score of *Mahavega*, between R-F2 is observed higher in patients of group-1 (*Vataja kasa*) followed by the mean score of group-2 and then group-3 patients. This change in score is found significantly higher in group-1 than group-2 and 3 as evident from table no.9.
5. The mean difference of score of cough aggravation at night/evening, noisy breathing and watery nasal discharge between R-F2 is observed higher in patients of group-1 (*Vataja kasa*) than the mean score of group-2 and *group-3* patients (table no.10, 11 and 12).
6. The mean difference of score of *Pitta nishthivan*, between R-F2 is observed higher in patients of *group-2* (*Pittaja kasa*) but no change in score is seen in group-1 and group-3 as evident from table no.13.
7. The mean difference of score of *Aruchi*, between R-F2 is observed higher in patients of group-2 (*Pittaja kasa*) than the mean score of group-1 and *group-3* patients but on intergroup *comparison* by post hoc test significant difference in score is found in *group-1* from group-2 and group-3 as depicted in table no.14.
8. The mean difference of score of *Jwara*, between R-F2 is observed higher in patients of *group-2* (*Pittaja kasa*) than the mean difference of score of group-1and *group-3* patients and significant difference is found in *group-2* than *group-1* and 3 by intergroup comparison (Table no.15).
9. The mean difference of score of *Pandu*, between R-F2 is observed higher in patients of *group-3* (*Kaphaja kasa*) than the mean score of *group-2* patients while no change in mean score is found in patients of *group-1*. (Table no.16).
10. The mean difference of score of pharngeal redness/inflammation is observed higher in patients of *group-2* (*Pittaja kasa)* than the mean score of *group-1* & 2. On applying post hoc test, significant difference in mean difference of score in different follow ups is found between *group-2* and *group-1* & 3 (Table no.17).
11. The mean difference of score of Yellowish Discoloration of Eyes/Urine, between R-F2 is observed higher in patients of *group-2* (*Pittaja kasa*) (table no.18).

12. The mean difference of score of *Chhardi*, in different follow-ups is observed higher in patients of *group-3* (*Kaphaja kasa*) than the mean score of group-1 and *group-2* patients. Also as evident from table no.19 on applying one way *ANOVA* test and post hoc test, significant difference is found between *group-3* from *group-1* and 2 patients.
13. The mean difference of score of *Peenasa, Ghana kapha* and *aruchi*, is observed higher in patients of *group-3* (*Kaphaja kasa*) than the mean score of group-1 and *group-2* patients. When intergroup comparison is done using one way *ANOVA* and post hoc test significant difference in mean of difference of score is found between group three and other two groups (Table no.20, 21, 22).
14. The mean difference of score of cough aggravation at early morning and white sputum between R-F2 is observed higher in patients of in *group-3* (*Kaphaja kasa*) than the mean score of group-1 and *group-2* patients. Also as evident from table no.23 and 24, on applying one way *ANOVA* test and post hoc test, significant difference is found between *group-3* from *group-1* and 2 patients.
15. The mean difference of score of *Kanth kandu*, between R-F1, F1-F2 and R-F2 is observed higher in patients of *group-2* (*Pittaja kasa*) than the mean of difference of score of group-1 and *group-3* as evident from table no.25.
16. The trial drug is observed to have more effect on overall symptoms in *group-1* (*Vataja kasa*) with mean difference in score after therapy of 13.235 (±4.521), while the mean difference is 8.938 (±3.906) in *group-2* and 11.224 (±4.775) in *group-3*. Using one way *ANOVA* test for *comparison* between groups, p value is 0.031 i.e. there is significant difference in improvement in three groups. By using post hoc test, the significant difference is found to be between *group-1* and *group-2* (Table no.26).
17. Change in Hb % has not shown significant difference between the three groups when one way *ANOVA* test and post hoc test was applied. But shows significant difference within group-2 and group-3, when paired 't' test is applied.(Table no.27)
18. Change in TLC has not shown significant difference between the three groups when one-way *ANOVA* test and post hoc test was applied. However, change in TLC shows significant difference within group-2 and group-3. (Table no. 28)
19. Change in DLC and erythrocyte sedimentation rate does not show significant difference between the three groups.

Table no.1. Grading system of *Kasa* to assess the response of drug

SYMPTOMS	1	2	3	4
1. Parshva/ Shiraha/ Vaksha Shoola* (Flank Pain, Headache, Chest Pain)	Absent/ subsided	Present only during coughing	Present occasionally; irrespective of coughing; not affecting routine work	Present continuously irrespective of coughing; affecting normal routine work
2. Swara Bheda/ Swaramaya **(**Hoarseness of Voice)	Absent/ subsided	Irritation of throat while speaking; mild hoarseness	Difficulty in speaking (dysphonia); hoarseness	No clarity in speech/voice; hoarseness, aphonia & painful
3. Mukha-Kantha Shushkta (Dryness Of Mouth & Throat)	Absent/ subsided	Thirst, mild or no dehydration; slight dryness of *Pala*tal mucosa	Patient drinks/feeds eagerly; moderate dehydration; dry *Pala*te	Severe dehydration signs present; parchment, severe dryness of *Pala*tal mucosa
4. Shushka Kasa (Dry Cough)	Absent/ subsided	Occasional dry cough	Intermittent dry cough	Paroxysmal dry cough
5. Kapha Shushka (Dry Sputum)	Absent/ subsided	Mild nasal block; no noisy breathing; normal breathing through nose	Moderate nasal block; breathing through nose with difficulty; noisy nasal breathing present	Severe Nasal block; patient is mouth breather during sleep
6. Mahavega (Paroxysmal cough)	Nil	<5 paroxysms of cough/24 hrs	5-9 paroxysms of cough/24 hrs	>10 paroxysms of cough/24 hrs
7. Cough Aggravated At Night/Evening	Nil	Sleep rarely disturbed by paroxysms of cough; no vomiting following cough	Sleep occasionally disturbed by paroxysms of cough; occasional vomiting after cough	Sleep disturbed frequently by paroxysms of cough; vomiting usually follows coughing
8. Noisy Breathing	Nil	Audible faintly without stethoscope; nearly normal air entry	Audible clearly without stethoscope with relatively good air entry	Audible only with stethoscope with reduced air entry
9. Watery Nasal Discharge	Absent/ subsided	Scanty watery nasal discharge	Watery nasal discharge in moderate amount	Profuse watery nasal discharge

10. Pitta Nishthivan (Yellow Sputum)	Nil	Sputum with yellow-greenish tinge	Thin Yellow green sputum	Thick, viscid, Profuse yellow green sputum
11. Aruchi (Anorexia)	Normal appetite	Loss of appetite without alteration in eating habits	Oral intake altered due to nausea after meals	Oral intake markedly decreased with persistent nausea/ bitterness in mouth
12. Jwara (Fever)	Absent/ subsided	Occasional but mild grade fever; 1/2 episodes/24 hrs	Intermittent high/ moderate grade fever; 2-3 episodes/24 hrs	Continuous high/ moderate fever
13.Pandu **(**Anemia**)**	Nil	Mild pallor (+) on conjunctiva, face and hands; Hb % (10 g/dl to cut off point for patient`s age)	Moderate pallor (++)on conjunctiva, face and hands; Hb% (7-10 g/dl)	Severe pallor (+++) on conjunctiva, face and hands ; Hb% (<7 g/dl)
14. Pharngeal Redness/Inflammation *(Kanth Lalima)*	Absent/ subsided	Mild redness in pharynx; no difficulty in deglutition; no rashes	Moderate redness in pharynx; difficulty in deglutition; papular rashes	Severe redness in pharynx; painful deglutition; papulopustular rashes
15. Yellowish Discoloration of Eyes/Urine	Absent/ subsided	Faint yellow color of sclera/urine	Light yellow color of eyes/urine; urine does not stain nappy	Dark yellow color of eyes/urine; urine stains nappy yellow
16. *Chhardi* (Vomiting)	Absent/ subsided	Occasional vomiting with/without paroxysms of cough	Vomiting episodes usually follow paroxysms of cough/ ingestion of food	Severe vomiting; no relation to cough
17. *Peenasa*	Smell & taste sensation intact	Smell & taste sensation slightly decreased	Smell & taste sensation significantly decreased	Smell & taste sensation absent
18. *Ghana Kapha* (Thick Sputum)	Normal sputum	Relatively thin sputum	Moderately thick sputum	Thick viscid sputum

19. ***Aruchi*** (Impaired Digestive Power)	Normal appetite	Loss of appetite without alteration in eating habits	Oral intake altered moderately without significant weight loss or malnutrition	Associated with significant weight loss or malnutrition
20. Cough Aggravated At Early Morning	No cough at early morning	Sleep rarely disturbed by paroxysms of cough	Sleep occasionally disturbed by paroxysms of cough	Sleep disturbed due to paroxysms of cough
21. White Sputum	No sputum	Scanty thin white mucoid sputum	Thin white mucoid sputum ; intermediate quantity	Copious thick white mucoid sputum
22. ***Kanth Kandu***	Absent/ subsided	Discomfort in throat; swallowing not hampered; no rashes	Mild itching of throat; swallowing with difficulty; papular rashes	Severe itching sensation of throat; patient unable to swallow; papulo –pustular rashes

Table No. 2*: Age and sex wise distribution of cases in *Kasa* of *Group-1,* 2 & 3.

SN	Age group (years)	Group '1' (n=17)		Group '2' (n=16)		Group '3' (n=16)		Total n=49	
		M	F	M	F	M	F	M	F
1.	1 to < 4	7 (41)	0 (0)	3 (19)	0 (0.0)	5 (31)	0 (0)	15 (31)	0 (0)
2.	4 to 8	5 (29)	1 (6)	5 (31)	3 (19)	5 (31)	3 (19)	15 (31)	7 (14)
3.	> 8 to 12	3 (18)	1 (6)	2 (12)	3 (19)	2 (13)	1 (6)	7 (14)	5 (10)
Total		15 (88)	2 (12)	10 (62)	6 (38)	12 (75)	4 (25)	37 (76)	12 (24)

*Number in parenthesis denotes percentage.

Table No. 3*: Socioeconomic status of *Kasa* cases in *Group-1,* 2 & 3.

S.N.	Socioeconomic Status	Subgroup '1' (n=17)	Subgroup '2' (n=16)	Subgroup '3' (n=16)	Total cases (n=49)
1.	Lower	1 (5.88)	1 (6.25)	2 (12.5)	4 (8.16)
2.	Middle	16 (94.12)	15 (93.75)	14 (87.5)	45 (91.84)
3.	Higher	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)

*Number in parenthesis denotes percentage.

Table no. 4. Effect of trial drug on *Parshva/ Shiraha/ Vaksha Shoola* in different groups in terms of mean difference with standard deviation

***Parshva/ Shiraha/ Vaksha Shoola* / Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2 (Paired t test)**
Group-1 (*Vataja kasa*)	0.177 (±0.529)	0.059 (±0.243)	0.235 (±0.562)	0.235(±0.562) T=1.725

				P=0.104
Group-2 (*Pittaja kasa*)	0.063 (±0.250)	0.063 (±0.250)	0.125 (±0.500)	0.125 (±0.500) T=1.000 P=0.333
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	F=1.129 P=0.332	F=0.486 P=0.618	F=1.192 P=0.313	-
Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 5. Effect of trial drug on *Swara Bheda/ Swaramaya* in different groups in terms of mean difference with standard deviation

***Swara Bheda/ Swaramaya/* Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2 (Paired t test)**
Group-1 (*Vataja kasa*)	0.177 (±0.529)	0.000 (±0.000)	0.177 (±0.529)	0.176 (±0.529) T=1.376 P=0.188
Group-2 (*Pittaja kasa*)	0.187 (±0.543)	0.000 (±0.000)	0.188 (±0.544)	0.188 (±0.544) T=1.379 P=0.188
Group-3 (*Kaphaja kasa*)	0.063 (±0.250)	0.063 (±0.250)	0.125 (±0.500)	0.125 (±0.500) T=1.000 P=0.333
Between the group *comparison* (One Way *ANOVA*)	F=0.361 P=0.699	F=1.033 P=0.364	F=0.065 P=0.937	-
Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 6. Effect of trial drug on *Mukha-Kantha Shushkta* in different groups in terms of mean difference with standard deviation

***Mukha-Kantha Shushkta/* Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.588 (±0.507)	0.000 (±0.000)	0.588 (±0.507)	0.588(±0.507) T=4.781 P=0.000
Group-2 (*Pittaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	F=21.458 P=0.000	-	F=21.458 P=0.000	-

Post Hoc Test (Significant Pairs)	(Group1,2) (Group1,3)	-	(Group1,2) (Group1,3)	-

Table no. 7. Effect of trial drug on *Shushka Kasa* in different groups in terms of mean difference with standard deviation

***Shushka Kasa*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	1.118 (±0.485)	1.588 (±0.618)	2.706 (±0.771)	2.706(±0.772) T=14.456 P=0.000
Group-2 (*Pittaja kasa*)	0.313 (±0.479)	0.313 (±0.479)	0.625 (±0.957)	0.625(±0.957) T=2.611 P=0.020
Group-3 (*Kaphaja kasa*)	0.063 (±0.250)	0.063 (±0.250)	0.125 (±0.500)	0.125(±0.500) T=1.000 P=0.333
Between the group *comparison* (One Way *ANOVA*)	F=28.554 P=0.000	F=48.844 P=0.000	F=53.028 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group1,3)	(group1,2) (group1,3)	(group1,2) (group1,3)	-

Table no. 8. Effect of trial drug on *Kapha Shushka* in different groups in terms of mean difference with standard deviation

***Kapha Shushka*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.647 (±0.492)	0.235 (±0.437)	0.882 (±0.781)	0.882(±0.781) T=4.657 P=0.000
Group-2 (*Pittaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	F=27.537 P=0.000	F=4.622 P=0.015	F=20.359 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group1,3)	(group1,2) (group1,3)	(group1,2) (group1,3)	-

Table no. 9. Effect of trial drug on *Mahavega* in different groups in terms of mean difference with standard deviation

***Mahavega*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.882 (±0.697)	0.941 (±0.659)	1.824 (±1.185)	1.824(±1.185) T=6.344

				P=0.000
Group-2 (*Pittaja kasa*)	0.063 (±0.250)	0.063 (±0.250)	0.125 (±0.500)	0.125(±0.500) T=1.000 P=0.333
Group-3 (*Kaphaja kasa*)	0.250 (±0.577)	0.125 (±0.341)	0.375 (±0.885)	0.375(±0.885) T=1.695 P=0.111
Between the group *comparison* (One Way *ANOVA*)	F=10.297 P=0.000	F=19.119 P=0.000	F=16.954 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group1,3)	(group1,2) (group1,3)	(group1,2) (group1,3)	-

Table no. 10. Effect of trial drug on cough aggravation at night/evening in different groups in terms of mean difference with standard deviation

Cough Aggravation At Night/Evening/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	1.294 (±0.771)	1.000 (±0.707)	2.294 (±1.212)	2.294(±1.213) T=7.800 P=0.000
Group-2 (*Pittaja kasa*)	0.188 (±0.544)	0.063 (±0.250)	0.250 (±0.683)	0.250(±0.683) T=1.464 P=0.164
Group-3 (*Kaphaja kasa*)	0.438 (±0.814)	0.188 (±0.403)	0.625 (±1.204)	0.625(±1.204) T=2.076 P=0.055
Between the group *comparison* (One Way *ANOVA*)	F=10.774 P=0.000	F=17.440 P=0.000	F=17.331 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group1,3)	(group1,2) (group1,3)	(group1,2) (group1,3)	-

Table no. 11. Effect of trial drug on noisy breathing in different groups in terms of mean difference with standard deviation

Noisy Breathing/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.529 (±0.515)	0.235 (±0.437)	0.765 (±0.831)	0.765(±0.831) T=3.792 ;P=0.002
Group-2 (*Pittaja kasa*)	0.125 (±1.024)	0.250 (±0.577)	0.375 (±0.957)	0.375(±0.957) T=1.567;P=0.138
Group-3 (*Kaphaja kasa*)	0.063 (±0.250)	0.000 (±0.000)	0.063 (±0.250)	0.063(±0.250) T=1.000;P=0.333
Between the group *comparison* (One Way *ANOVA*)	F=2.351 P=0.107	F=1.812 P=0.175	F=3.654 P=0.034	
Post Hoc Test (Significant Pairs)	-	-	(group1,3)	-

Table no. 12. Effect of trial drug on watery nasal discharge in different groups in terms of mean difference with standard deviation

Watery Nasal Discharge/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	1.118 (±0.697)	1.000 (±0.867)	2.118 (±1.269)	2.118(±1.269) T=6.881 P=0.000
Group-2 (*Pittaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-3 (*Kaphaja kasa*)	0.063 (±0.250)	0.000 (±0.000)	0.063 (±0.250)	0.063(±0.250) T=1.000 P=0.333
Between the group *comparison* (One Way *ANOVA*)	F=34.715 P=0.000	F=21.279 P=0.000	F=41.654 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group1,3)	(group1,2) (group1,3)	(group1,2) (group1,3)	-

Table no. 13. Effect of trial drug on *Pitta Nishthivan* in different groups in terms of mean difference with standard deviation

***Pitta Nishthivan*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-2 (*Pittaja kasa*)	1.063 (±0.929)	0.688 (±0.704)	1.750 (±1.437)	1.750(±1.438) T=4.869 P=0.000
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	F=21.626 P=0.000	F=15.750 P=0.000	F=24.484 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group2,3)	(group1,2) (group2,3)	(group1,2) (group2,3)	-

Table no. 14. Effect of trial drug on *Aruchi* in different groups in terms of mean difference with standard deviation

***Aruchi*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.236 (±0.437)	0.000 (±0.000)	0.236 (±0.437)	0.235(±0.437) T=2.219 P=0.041
Group-2 (*Pittaja kasa*)	0.563	0.562	1.125	1.125(±0.000)

	(±0.629)	(±0.512)	(±0.957)	T=4.700 P=0.000
Group-3 (*Kaphaja kasa*)	0.312 (±0.479)	0.438 (±0.629)	0.750 (±0.683)	0.750(±0.683) T=4.392 P=0.001
Between the group *comparison* (One Way *ANOVA*)	F=1.765 P=0.183	F=6.756 P=0.003	F=6.375 P=0.004	
Post Hoc Test (Significant Pairs)	–	(group1,2) (group1,3)	(group1,2)	-

Table no. 15. Effect of trial drug on *Jwara* in different groups in terms of mean difference with standard deviation

***Jwara*/** **Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.412 (±0.507)	0.118 (±0.332)	0.529 (±0.717)	0.529(±0.717) T=3.043 P=0.008
Group-2 (*Pittaja kasa*)	1.125 (±1.024)	0.500 (±0.632)	1.625 (±0.719)	1.625(±0.719) T=9.043 P=0.000
Group-3 (*Kaphaja kasa*)	0.188 (±0.403)	0.063 (±0.250)	0.250 (±0.447)	0.250(±0.447) T=2.236 P=0.041
Between the group *comparison* (One Way *ANOVA*)	F=7.935 P=0.001	F=4.832 P=0.012	F=20.563 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,2) (group2,3)	(group1,2) (group2,3)	(group1,2) (group2,3)	-

Table no. 16. Effect of trial drug on *Pandu* in different groups in terms of mean difference with standard deviation

***Pandu*/** **Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	Within the group *comparison* of R-F2(Paired t test)
Group-1 (*Vataja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-2 (*Pittaja kasa*)	-0.063 (±0.573)	0.125 (±0.341)	0.0623 (±0.680)	0.063(±0.680) T=0.368 P=0.718
Group-3 (*Kaphaja kasa*)	0.063 (±0.250)	0.000 (±0.000)	0.063 (±0.250)	0.063(±0.250) T=1.000 P=0.333
Between the group *comparison* (One Way *ANOVA*)	F=0.489 P=0.616	F=2.213 P=0.121	F=0.127 P=0.881	

Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 17. Effect of trial drug on pharngeal redness/inflammation in different groups in terms of mean difference with standard deviation

Pharngeal Redness/Inflammation/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.0588 (±0.243)	0.0588 (±0.243)	0.000 (±0.000)	-
Group-2 (*Pittaja kasa*)	0.375 (±0.619)	0.250 (±0.447)	0.625 (±0.957)	0.625(±0.957) T=2.611 P=0.020
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	F=4.499 P=0.016	F=5.107 P=0.010	F=7.041 P=0.002	
Post Hoc Test (Significant Pairs)	(group2,3)	(group1,2)	(group1,2) (group2,3)	-

Table no. 18. Effect of trial drug on yellowish discoloration of eyes/urine in different groups in terms of mean difference with standard deviation

Yellowish Discoloration Of Eyes/Urine/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-2 (*Pittaja kasa*)	0.000 (±0.000)	0.0623 (±0.250)	0.0623 (±0.250)	0.063(±0.250) T=1.000 P=0.333
Group-3 (*Kaphaja kasa*)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Between the group *comparison* (One Way *ANOVA*)	-	F=1.033 P=0.364	F=1.033 P=0.364	
Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 19. Effect of trial drug on *Chhardi* in different groups in terms of mean difference with standard deviation

***Chhardi*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	0.118 (±0.332)	0.000 (±0.000)	0.118 (±0.332)	0.118(±0.332) T=1.461 P=0.163
Group-2 (*Pittaja kasa*)	0.125	0.063	0.188	0.187(±0.544)

	(±0.341)	(±0.250)	(±0.544)	T=1.379 P=0.188
Group-3 (*Kaphaja kasa*)	0.625 (±0.806)	0.250 (±0.447)	0.875 (±1.024)	0.875(±1.025) T=3.416 P=0.004
Between the group *comparison* (One Way *ANOVA*)	F=4.743 P=0.013	F=3.226 P=0.049	F=5.952 P=0.005	
Post Hoc Test (Significant Pairs)	(group1,3) (group2,3)	-	(group1,3) (group2,3)	-

Table no. 20. Effect of trial drug on *Peenasa* in different groups in terms of mean difference with standard deviation

***Peenasa*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (Vataja kasa)	0.647 (±0.492)	0.000 (±0.000)	0.647 (±0.492)	0.647(±0.493) T=5.416 P=0.000
Group-2 (Pittaja kasa)	0.750 (±0.447)	0.063 (±0.250)	0.813 (±0.544)	0.813(±0.544) T=5.975 P=0.000
Group-3 (*Kaphaja kasa)*	0.875 (±0.500)	0.750 (±0.447)	1.625 (±0.619)	1.625(±0.619) T=10.498 P=0.000
Between the group *comparison* (One Way *ANOVA*)	F=0.928 P=0.403	F=32.790 P=0.000	F=14.565 P=0.000	
Post Hoc Test (Significant Pairs)	-	(group1,3) (group2,3)	(group1,3) (group2,3)	-

Table no. 21. Effect of trial drug on *Ghana Kapha* in different groups in terms of mean difference with standard deviation

***Ghana Kapha*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (Vataja kasa)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-2 (Pittaja kasa)	0.125 (±0.341)	0.125 (±0.341)	0.250 (±0.683)	0.250(±0.683) T=1.464 P=0.164
Group-3 (*Kaphaja kasa)*	1.500 (±0.816)	0.875 (±0.619)	2.375 (±1.204)	2.375(±1.204) T=7.889 P=0.000
Between the group *comparison* (One Way *ANOVA*)	F=43.953 P=0.000	F=22.312 P=0.000	F=44.200 P=0.000	

Post Hoc Test (Significant Pairs)	(group1,3) (group2,3)	(group1,3) (group2,3)	(group1,3) (group2,3)	-

Table no. 22. Effect of trial drug on *Aruchi* in different groups in terms of mean difference with standard deviation

***Aruchi* (Impaired Digestive Power)/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (Vataja kasa)	0.235 (±0.437)	0.059 (±0.243)	0.294 (±0.588)	0.294(±0.588) T=2.063 P=0.056
Group-2 (Pittaja kasa)	0.438 (±0.512)	0.438 (±0.512)	0.875 (±0.719)	0.875(±0.719) T=4.869 P=0.000
Group-3 (*Kaphaja kasa)*	0.500 (±0.516)	0.562 (±0.629)	1.062 (±0.929)	1.063(±0.929) T=4.576 P=0.000
Between the group *comparison* (One Way *ANOVA*)	F=1.331 P=0.274	F=4.861 P=0.012	F=4.680 P=0.014	
Post Hoc Test (Significant Pairs)	-	(group1,3)	(group1,3)	-

Table no. 23. Effect of trial drug on cough aggravation at early morning in different groups in terms of mean difference with standard deviation:

Cough Aggravation At Early Morning/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**
Group-1 (Vataja kasa)	0.000 (±0.000)	0.438 (±0.512)	0.000 (±0.000)	-
Group-2 (Pittaja kasa)	0.125 (±0.500)	0.000 (±0.000)	0.125 (±0.500)	0.125(±0.500) T=1.000 P=0.333
Group-3 (*Kaphaja kasa)*	0.936 (±0.854)	0.500 (±0.516)	1.437 (±1.315)	1.438(±1.315) T=4.373 P=0.001
Between the group *comparison* (One Way *ANOVA*)	F=13.177 P=0.000	F=15.927 P=0.000	F=15.927 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,3) (group2,3)	(group1,3) (group2,3)	(group1,3) (group2,3)	-

Table no. 24. Effect of trial drug on white sputum in different groups in terms of mean difference with standard deviation:

White Sputum/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Intragroup *comparison* of**

				R-F2(Paired t test)
Group-1 (Vataja kasa)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-2 (Pittaja kasa)	0.000 (±0.000)	0.000 (±0.000)	0.000 (±0.000)	-
Group-3 (*Kaphaja kasa)*	1.312 (±0.793)	0.938 (±0.680)	2.250 (±1.238)	2.250(±1.238) T=7.268 P=0.000
Intergroup *comparison* (One Way *ANOVA*)	F=45.238 P=0.000	F=31.398 P=0.000	F=54.551 P=0.000	
Post Hoc Test (Significant Pairs)	(group1,3) (group2,3)	(group1,3) (group2,3)	(group1,3) (group2,3)	-

Table no. 25. Effect of trial drug on *Kantha Kandu* in different groups in terms of mean difference with standard deviation

***Kantha Kandu*/ Diagnosis**	**R-F1**	**F1-F2**	**R-F2**	**Intragroup *comparison* of R-F2(Paired t test)**
Group-1 (Vataja kasa)	0.059 (±0.242)	0.059 (±0.242)	0.118 (±0.485)	0.118(±0.485) T=1.000 P=0.332
Group-2 (Pittaja kasa)	0.315 (±0.479)	0.315 (±0.479)	0.625 (±0.957)	0.625(±0.957) T=2.611 P=0.020
Group-3 (*Kaphaja kasa)*	0.250 (±0.447)	0.125 (±0.341)	0.375 (±0.719)	0.375(±0.719) T=2.087 P=0.054
Intragroup *comparison* (One Way *ANOVA*)	F=1.809 P=0.175	F=2.121 P=0.131	F=1.933 P=0.156	
Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 26. Comparison of effect of trial drug on all symptoms in three groups in terms of mean difference with standard deviation (using one way *ANOVA* test)

Group	**Sum of Total change in all symptoms after treatment (R-F2) (mean ±S.D.)**	**Comparison between groups**	
		One way *ANOVA*	**Post Hoc Test (Significant pairs)**
Group-1 (N=17)	13.235 (±4.521)	F=3.731 P=0.031	(*GROUP-1*,GROUP2)
Group-2 (N=16)	8.938 (±3.906)		
Group3 (N=16)	11.224 (±4.775)		

Table no. 27. Comparison of effect of trial drug on hemoglobin percentage within and between the three groups in terms of mean difference with standard deviation (using paired t test and one way *ANOVA* test)

Hemoglobin percentage/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Within the group *comparison* of R-F2(Paired t test)**

Group-1 (*Vataja kasa*)	-0.377 (±1.289)	0.059 (±0.648)	-0.318 (±0.990)	T= -1.323 P= 0.205
Group-2 (*Pittaja kasa*)	0.081 (±0.440)	-0.075 (±0.491)	0.006 (±0.551)	T=2.164 P=0.047
Group-3 (*Kaphaja kasa*)	-0.200 (±0.739)	0.006 (±0.629)	-0.194 (±0.471)	T=3.297 P=0.005
Between the group *comparison* (One Way *ANOVA*)	F=1.068 P=0.352	F=0.211 P=0.811	F=0.856 P=0.432	
Post Hoc Test (Significant Pairs)	-	-	-	-

Table no. 28. Comparison of effect of trial drug on total leucocyte count within and between the three groups in terms of mean difference with standard deviation (using paired t test and one way *ANOVA* test)

Total Leucocyte Count/ Diagnosis	**R-F1**	**F1-F2**	**R-F2**	**Intragroup *comparison* R-F2(Paired t test)**
Group-1 (*Vataja kasa*)	352.94 (±877.58)	182.35 (±1241.59)	535.28 (±1436.55)	T= 1.536 P=0.144
Group-2 (*Pittaja kasa*)	287.50 (±2324.04)	556.25 (±1589.96)	843.75 (±1559.90)	T=2.164 P=0.047
Group-3 (*Kaphaja kasa*)	1056.2 (±1469.22)	493.75 (±888.04)	1550.00 (±1880.77)	T=3.297 P=0.005
Intergroup *comparison* (One Way *ANOVA*)	F=1.072 P=0.351	F=0.413 P=0.664	F=1.660 P=0.201	
Post Hoc Test (Significant Pairs)	-	-	-	-

DISCUSSION

Vyaghri Haritaki is highly significant in subsiding *Mukha-kantha shushkta* and *Shushka kasa* in *Vataja* cases. This may be attributed to antitussive action of *Shunthi* and *Pippali*.[16] This drug is also found effective in reducing the symptoms like *Mahavega* (paroxysmal cough) and cough aggravated at night/evening of *Vataja kasa* cases, may be due to soothing effect of honey used as a base in the drug and *Vatashamaka* properties of all its ingredients. This is also in accordance with the finding of a study, which was carried out on *Vyaghri Haritaki* for the treatment of *Tamaka Shwasa*.[17]

The drug is also found to be more effective in subsiding noisy breathing and watery nasal discharge in patients of *Vataja kasa* in comparison to same features of other groups, which suggests *Vatashamaka* property of *Vyaghri Haritaki Avaleha*. This effect may be explained on basis of *Ushna virya* and *Kapha-vatahara* properties of *Shunthi, Maricha, Kantakari, Twaka, Twaka-patra* and *Nagkesar* as well as *Tridoshaghna* property of *Haritaki* and *Guda*.

Data gathered for *Pitta Nishthivan* symptom appearing in patients of various types of *Kasa* suggest highly significant ($p<0.001$) effect of trial drug in children suffering from *Pittaja kasa*. This effect may be due to *Srotovishodhana* property of honey and *Pittahara* property of *Nagkesar* and *Tridoshghna* property of *Haritaki*, honey and jaggery.

Drug also relieves *Aruchi* appeared in *Pittaja* and *Kaphaja Kasa* due to *Dipana* and *Pachana* effect of *Haritaki, Shunthi, Maricha, Pippali, Kantakari, Ela* and *Guda* and *Pachana* effect of *Shunthi, Kantakari* and jaggery. Also *Shunthi, Pippali* and *Kantakari* have *Amadoshahara* property.[18,19]

In this study, when effect of *Vyaghri Haritaki* on *Jwara* was analyzed, the drug is found more effective in *Jwara* associated with *Pittaja kasa* group when compared to other two groups. This may be due to antibacterial properties of *Cinnamomum.*[20] The trial drug's action on pharyngeal redness may be attributed to mast cell stabilizing property of *Messua* species as proved in research work.[21]

The drug *Vyaghri Haritaki* is found to be more effective in *Peenasa* in *Kaphaja Kasa* as it normalizes the smell sensation by *Sroto-vishodhana* property. According to one study carried out on effect of various *Avaleha* formulations on symptoms of *Tamaka shwasa, Kantakari Avaleha* was found significantly effective on *Peenasa.*[22] Trial drug has significant effect on *Ghana kapha*, more in *Kaphaja kasa* due to the *Kapha vilyana, Chhedan, Lekhana* and *Sroto-shodhana* action of honey, used as base of drug. The trial drug is seen to be more effective on cough aggravation at early morning and white sputum in *Kaphaja kasa* due to *Kaphahara* action of all the contents of *Vyaghri Haritaki.*

Vyaghri Haritaki is also found to be more effective in subsiding *Kanth-kandu* in patients of *Pittaja kasa* cases. This may be explained by the soothing action of honey and *Kanthya* property of *Kantakari*. During the study, some children reported lack of palatability.

On intergroup comparison, the effect of trial drug on all symptoms in patients of three groups in terms of mean difference with standard deviation using one -way *ANOVA* test, *Vyaghri Haritaki* seems more effective in patients of *group-1* (*Vataja kasa*). This overall better effect of trial drug is attributed to *Ushna virya* of *Haritaki, Shunthi, Maricha, Kantakari, Twaka, Twaka-patra, Nagkesar* and *Guda* and *Snigdha guna* of *Shunthi, Pippali* and jiggery.[23]

CONCLUSION

However, *Vyaghri Haritaki* is effective in all three types of *Kasa* i.e. *Vataja*, *Pittaja* and *Kaphaja kasa* but has better effect in *Vatika kasa*. *Vyaghri Haritaki* does not have significant side effect, *and* significant effect of on Hb%, TLC, DLC and ESR.

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