



EFFICACY OF SADYO VAMANA AND CHATUSHASHTI PRAHARI PIPPALI ON KAPHAJA KASA- AN EXPLORATIVE STUDY

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ABSTRACT:

BACKGROUND: *Kaphaja kasa* manifest as cough with white, thick and sticky expectoration. Specific etiology of *Kaphaja kasa* include excessive intake of *guru* (heavy), *abhishyandi* (blocking channels of circulation), *madhura*(sweet), *snigdha* (unctuous) *ahara* (food), *swapna* (sleep) and *vicheshtana*. It is compared to recurrent cough due to seasonal allergy or infections involving lower respiratory tract. A recurrent episode of cough challenges the growth and development in children and their academic performances. Vamana is choice of therapy for kapha disorders including *kasa*. *Chatushashti prahari pippali* (CPP) is a form of fortified *pippali churna* indicated for *vyadhiharana* and *rasayana* purpose. This study explores the *sadyovamana* and *naimittika rasayana* effect of CPP in *kaphajakasa* (recurrent wet cough) in children of 5-15 years. **MATERIALS AND METHODS:** 33 children with *kaphajakasa* attending *Kaumarabhritya* outpatient department and in patient department at Sri Dharmasthala Manjunatheshwara Institute of Ayurveda and Hospital (SDMIAH), Bengaluru were recruited in the trial and screened for *lakshana* of *kaphajakasa* on structured clinical proforma and administered *sadyovamana* followed by CPP tablet 250 mg (5-10years) to 500 mg (10-15years) with 100ml milk on empty stomach for a period of 3 months. Changes assessed using graded features of *Kaphaja kasa* on CASA-Q questionnaire and assessment of *Agni* (Digestive capacity). The data obtained in the survey were tabulated and analysed using SPSS version 20. **RESULTS:** statistically significant results observed in the graded clinical features of *kaphajakasa* with improvements in *Agni*. **DISCUSSION:** *Sadyovamana* followed by CPP with milk on empty stomach act as *Naimittika rasayana* (disease specific drug) on *kaphajakasa*. The improvements are attributed to *kaphahara*, *sthanashodhana* effect of *sadyovamana* and *kaphahara*, *pachana* and *rasayana* effects of *pippali* in CPP.

Keywords: Ayurveda, Bala, CASA-Q, Chatushashti prahari pippali, Kaphajakasa, naimittika rasayana, sadyovamana

INTRODUCTION:

Kasa is very common disease affecting *pranavahasrotas* in *bala* (children) ^[1]. *Kaphajakasa* is one among the 5 types of *Kasa* explained in detail with specific *nidana*(etiology) and treatment ^[2]. Prevalence of *Kaphajakasa* found to be 33.3%^[3]. Specific etiology of *Kaphajakasa* include excessive intake of *guru*(heavy), *abhishyandi*(obstructing), *madhura*(sweet), *snigdha*(unctuous) *ahara* (food), *atiswapna*(sleep) and *vicheshtana*(inactivity)^[4]. Other general etiology includes exposure to *dhumopghata* (smoke), *rajas*(dust), *vyayama* (excessive physical exercise), and *kshavathuvegavrodha*(suppression of sneezing) ^[5]. Among food habits excessive intake of *rukshabhojana* (dry foods), *picchila* (slimy), *kashaya* (astringent), *katu* (pungent), *amla*(sour), *lavana*(salt), *ushna*(hot), *sheeta*(cold), *guru*(heavy), *snigdha*(oily), *utkleedi* (foods antagonistic to dosha), *paryushitashana* (stale foods ingestion), *aayasa*(physical exertion), *diwaswapna*(daysleep) and *ratrijagrana* (awakening at night) ^[6,7].

Kaphajakasa will manifest as cough with *snigdha*(unctuous), *Ghana* (solid), *sandrakaphashthivana* (expectoration) ^[4]. Associated features include *peenasa* (rhinitis), *chardi* (vomiting), *alparuk* in *uras* (mild chest pain), *sthimitya*(heavyness in the chest), *kanthaupalepa* (coating in the throat), *mandagni* (reduced appatite), *aruchi*(anorexia) and *sampurnavakshas*(fullness in the chest) ^[4]. *Utklesha* (aggarvation), *gaurava* (heavyness), *asyamadhurya*(sweet taste in mouth), *kasamanoaruk* (less discomfort on coughing),

mukha lepa (coating in oral cavity), *angaavsada* (body ache), *shiroruja*(headache), *kaphapurnadeha* (cold and clammy body parts), *shwetakapha shteevana*(white cough expectoration)and *loma harsha* (horripilation) ^[8]. Management of *Kaphajakasa* can be divided into *Nidanaparivarjana* (eliminating the factors initiating *kasa*), *shodhana* (cleansing therapy) *avastika chikitsa* (stage wise management as per the acute, sub-acute or chronicity of *kasa*), *shamanoushadhi* (palliative medication) and *rasayana* (prevention of recurrence and immunomodulation) ^[9]. Ample of medicaments are prescribed in ayurveda for this purpose. *Kasa* if not treated at the earliest with due consideration to pathology can end up in next severe stage called *Shvasa*. *Shvasa* involves lower airway and could end up in bronchitis, asthma and later chronic obstructive pulmonary diseases ^[10]. Thus, on a long run recurrent *kasa* can hamper quality of life in children. Hence it is essential to treat (acute stage) and prevent the recurrence of *kasa*. *Pippali* (*Piper longum* Linn.) is one among *Kasahara dashemani aushadha* 10 specific drug to treat *kasa* which is also potent immunomodulator^[11,12]. *Rasayana* action of *Pippali* has been appreciated in the treatises of Ayurveda, where it is even indicated to be consumed for duration of one year with different anupanas^[13]. *Chatuh-Shashti-Prahari Pippali* (CPP) is *pippali* processed in its own decoction and indicated in disorders of *kapha* and *agni*.

This clinical study was done to explore the effect of *sadyovamana* and *naimittika rasayana* effect of CPP on *kaphajakasa* in children

Primary objective:

To evaluate the effectiveness of *SadyoVamana* in *kaphajakasa* (Recurrent wet cough) in children of age 5 -15 years.

MATERIALS AND METHODS

Type of study: open label, single arm, prospective, interventional study

Study setting:

Outpatient department (OPD) and in patient department (IPD) setup of Department of Kaumarabhritya of Shri Dharmasthala Manjunatheshwara Institute of Ayurveda and Hospital (SDMIAH), Bengaluru.

Source population:

Children attending *Kaumarabhritya* OPD and IPD at SDMIAH with manifestation of *Kasa* were screened and those fulfilling the inclusion criteria are recruited for the study between January 2019 to December 2021.

Study population

Children of age group 5-15 years with h/o recurrent *kaphaja kasa* attending OPD and IPD of *Kaumarabhritya* department at SDMIAH, Bengaluru.

Diagnostic criteria

Children of 5-15 years suffering with features of recurrent *kaphaja kasa* at least 3 episodes in last 6 month.

Inclusion criteria

Children of age group 5-15 years with h/o recurrent *Kaphaja kasa* fulfilling diagnostic criteria irrespective of gender, religion and socio-economic status.

Exclusion criteria

Other *kasa* like *Kshataja kasa*, *kshayaja kasa*, *kasa* as an *anubandha lakshana* in other systemic diseases like Pneumonia, Tuberculosis were excluded

Sampling technique: Convenience sampling

Sample Size:30 (Using Cochran formula at 95% confidence interval, 5% precision level and 0.5% estimated proportion, the sample size would be 385. But considering it to be first ever pilot intervention of CPP in children and feasibility, the sample size was fixed to be 30 with 10% dropout rates.

Randomization: single group intervention hence randomization is not applicable

Ethical considerations

The study was carried out as per international conference of Harmonization-Good Clinical Practices Guidelines (ICH-GCP) or as per Declaration of Helsinki guidelines. As this research involved human participants, ethical approval was obtained from **Institutional Ethics Committee (IEC) on 29-01-2020 with IEC no: SDMIAH/IEC/08/2019. And the trial was registered under CTRI/2019/07/020207**

Trial intervention

Includes *sadyovamana* (therapeutic emesis) once in the beginning of the trial and oral administration of *CPP*.

Sadyovamana is handy interventional cleansing therapy where in dosha are eliminated through oral route by inducing vomiting as per the standard guidelines^[14]. It to bring about *srotoshodhana* and to clear *sampurnavakshas* (blocked phlegm in chest).

CPP, commonly known as *Chausat prahari pippali*, is a *Churna Kalpana* which contains *Pippali* as a principle drug ^[15]. It has carminative, stimulant, laxative, thermogenic, anti-cough and appetizing properties Useful in *Vata* and *Kapha* diseases, Cough, asthma, respiratory diseases, Digestive impairment, low appetite, hyperacidity, Hiccups, anaemia, piles, pain, post-partum fever, fever due to cold & cough, chronic fever, Improves breast milk in lactating mothers. Gives strength to the heart ^[16].

Method of drug preparation:

Pippali was procured from the local market and was authenticated from the department of *Dravyaguna* (Pharmacology and Pharmacognosy), SDMIAH, Bengaluru. *CPP* was prepared from *Pippali* (*Piper longum* Linn., *Piperaceae*) by triturating with decoction of *Pippali* (decoction QS) for 64 *Prahara* or 192 hours (*Prahara* is a Sanskrit term for a unit of time and it is approximately three hours long) and dried thoroughly ^[15,16]. The final drug form was packed into 30 tablets in air tight sealed plastic covers, labelled and dispensed. Daily 8hours were spent in triturating the drug. The final product was very soft and of butter consistency. It took 15 days to complete the procedure of CPP preparation followed by 5 days more to convert it into pills by hand rolling of 250mg, dry it and pack with label. The study drug preparation, packing and labelling was done at the teaching pharmacy of SDMIAH, Bengaluru.

Route of administration: Oral

Dose: 250mg (5-10years) to 500mg (10-15years) tablet once a day before food with 100 ml warm milk

Duration: 3 months

Follow up: 2months

Methodology of data collection

100 Children of 5-15 years attending *Kaumarabhritya* outpatient department and in patient department with clinical manifestations of *Kasa* were screened for the features of *Kaphajakasa*. Out of which 33 children fulfilling the inclusion and diagnostic criteria of *Kaphajakasa* were selected for the study under parental consent/assent. Information sheet was provided to each subject, purpose of the trial was explained and written consent was taken for participation in the study. Out of 33 subjects 29 successfully completed the trial. The details about the clinical features, recurrence of *kasa* and details of investigations were recorded on a structured clinical proforma by personal interaction and examination. The data obtained from the study was statistically analysed using Microsoft EXCEL and SSPS version 20.

Monitoring

Children were called for supervision at every 15 days interval and period assessment was done once in a month to note the changes observed during the period of trial.

Assessment criteria:

1. Signs and symptoms of *Kaphajakasa* based on modified Cough and Sputum Assessment Questionnaire (CASA-Q) ^[17].
2. Improvement in *Agni*

Outcomes:

Primary outcomes:

Reduction in signs and symptoms of *Kaphaja kasa* based on CASA-Q

Secondary outcomes:

Reduction in recurrent episodes of *Kasa* and improvement in *Agni* of children with *Kaphaja kasa*

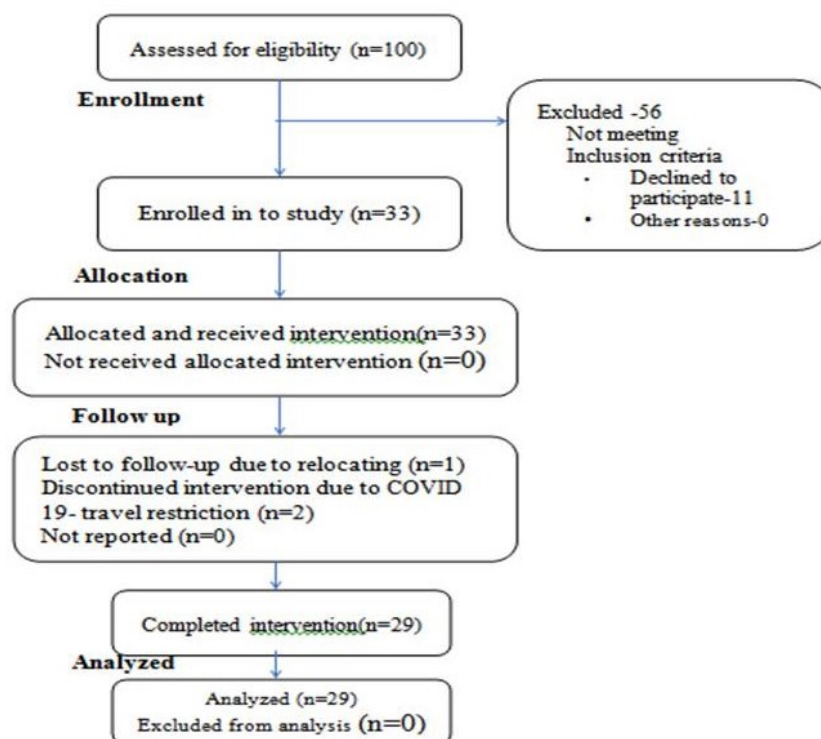


Figure 1: CONSORT flow chart

Statistical analysis

Statistical analysis was done using Microsoft Excel and SPSS (Statistical package for social sciences) version 20. Demographic data was analysed with descriptive statistics and expressed as mean and percentage. Continuous data was analysed using paired t test for anthropometry and laboratory values. Nominal & ordinal data were analysed using non parametric tests namely Friedman's test, Wilcoxon's signed rank test with Bonferroni correction factor for repeated analysis. Changes (one tailed) with p value<0.05 were considered as statistically significant.

OBSERVATION

The general and baseline data are summarized in table 1.

Table 1: Demographic characters

CHARACTER	FREQUENCY	PERCENT (%)
AGE		
5-10 years	22	66.7
11-15 years	11	33.3
TOTAL	33	100.0
GENDER		
Male	22	66.7
Female	11	33.3
RELIGION		
Hindu	32	87
Christian	01	03

SOCIOECONOMIC		
STATUS	16	48.5
Upper Middle Class	12	36.4
Lower Middle Class	03	9.1
Upper Lower class	02	6.1
Lower class		
HABITAT		
Urban	17	51.5
Rural	16	48.5
FAMILY TYPE		
Nuclear	29	87.9
Joint	04	12.1

Among 33 children enrolled for the study on effect of *sadyovamana* and *naimittika Rasayana* effect of CPP on *Kaphaja kasa*, 5 members had family history of cough, 7 had family history of allergy and 10 had history of Asthma in family. Children with history of known allergy were 23 (69.7%). One child was born in each 2nd degree and 3rd degree consanguineous parentage. Common triggering factors were *guru ahara* (81.8%) mostly chocolates and bakery food and rarely egg and meat, *atisheetaahara* (75.81%), street food (63.6%), *viruddhaahara* (unwholesome food especially milk shakes) (39.4%) and *adyashana* (15.2 %). Amongst exposure, pollution (81.8%), *avyayama* (30.3%) and day care (6.1%) precipitated *kaphajakasa*. All of them remained afebrile at the onset of the illness.

OBSERVATION ON SADYOVAMANA:

Sadyovamana was induced with mixture of powders of *vacha* (*acorus calamus*), *pippali* (*piper longum*), *yashtimadhu* (*glycyrrhiza glabra*) and *saindhava* (rock salt). Average quantity of drug used to induce therapeutic emesis was 12.36gram with stomachful (average (924ml) of curd with jiggery (54.5%) and milk (45.5%) prior to administration. *Vamanopaga* liquid used were *yashtiphanta* (infusion), *ushnajala* (hot water) and salt water. Maximum (90.9%) had *pravara shuddhi*. Significant reduction was seen with respect to *kaphakasa*, *kaphapoornavakshas*, quality of sleep and *kapha nishteevana*.

RESULTS

Effect of therapy on various parameters of *Kaphaja Kasa* was assessed using CASA-Q questionnaire.¹⁷ It was assessed using Friedman's Test with Wilcoxon sign rank test as post hoc. Bonferroni correction applied to avoid false positive results in the event of multiple comparisons. Thus, a significance level set at $p < 0.0125$. The results are summarized in table 2, 3, 4 and 5. The effects of CPP on parameters that evaluate *agni* are summarized in table 6. Throughout the therapy no adverse events were recorded except for one child who did not find relief and withdrew due to want of other emergency intervention. Minimal drop out indicates good compliance despite COVID-19 travel restrictions.

Table 2: Effect of Treatment on *Kaphaja Kasa* based on CASA-Q

PARAMETER		FRIEDMAN'S TEST						WILCOXON TEST	
		N	Mean	S D	Mean rank	X ²	P value	Z value	P value
Kasa (Cough) worsening morning	BT	29	1.59	1.323	4.24	56.382	<.001	-3.862 ¹	<.001
	I visit	29	.69	.761	3.31			-2.676 ²	0.007
	II visit	29	.28	.455	2.67			-2.646 ³	0.008
	AT	29	.03	.186	2.22			-1.890 ⁴	0.059
	FU	29	.21	.412	2.55			-3.834 ⁵	<.001
Kasa (Cough) worsening day	BT	29	1.14	1.246	3.97	49.976	<.001	-3.176 ¹	.001
	I visit	29	.59	.628	3.47			-3.357 ²	<.001
	II visit	29	.14	.351	2.60			-2.000 ³	.046
	AT	29	.00	.000	2.34			-2.000 ⁴	.046
	FU	29	.14	.351	2.62			-3.460 ⁵	<.001
Kasa (Cough) worsening in night	BT	29	1.28	1.360	4.00	54.131	<.001	-3.314 ¹	<.001
	I visit	29	.69	.761	3.47			-2.840 ²	0.005
	II visit	29	.31	.541	2.83			-2.714 ³	0.007
	AT	29	.00	.000	2.33			-1.000 ⁴	.317
	FU	29	.03	.186	2.38			-3.502 ⁵	<.001
Annoyed by cough (Kasavega)	BT	29	2.59	1.119	4.41	76.179	<.001	-3.163 ¹	.002
	I visit	29	1.86	.743	3.71			-3.871 ²	<.001
	II visit	29	1.14	.351	2.47			-2.000 ³	.046
	AT	29	1.00	.000	2.21			.000 ⁴	1.000
	FU	29	1.00	.000	2.21			-4.174 ⁵	<.001

BT= before treatment, AT= after treatment, FU=follow up, <= less than, 1: BT_ I visit, 2: I visit_ II visit, 3: II visit_ AT, 4: AT_ FU, 5: BT_ AT

Table 3: Effect of Treatment on impact of *Kaphaja Kasa* based on CASA-Q

PARAMETER		FRIEDMAN'S TEST						WILCOXON TEST	
		N	Mean	S D	Mean rank	X ²	P value	Z value	P value
Cough interfere with sleep						78.589	<.001		
	BT	29	3.10	1.291	4.50			-4.203 ¹	<.001
	I visit	29	2.14	.833	3.69			-3.908 ²	<.001
	II visit	29	1.24	.435	2.48			-2.121 ³	.034
	AT	29	1.00	.000	2.09			-.577 ⁴	.564
	FU	29	1.10	.310	2.24			-4.310 ⁵	<.001
Tiredness due to	BT	29	1.24	.435	1.81	73.875	<.001	-3.350 ¹	<.001

cough	I visit	29	1.38	.494	2.16			-4.025 ²	<.001
	II visit	29	1.97	.186	3.62			-2.000 ³	0.046
	AT	29	2.00	.000	3.71			-2.000 ⁴	0.046
	FU	29	2.00	.000	3.71			-3.992 ⁵	<.001
Cough Interrupts on daily activities	BT	29	2.76	1.300	4.36	68.324	<.001	-3.981 ¹	<.001
	I visit	29	1.86	.789	3.52			-3.350 ²	<.001
	II visit	29	1.24	.435	2.60			-2.449 ³	.014
	AT	29	1.03	.186	2.22			-.577 ⁴	.564
	FU	29	1.07	.258	2.29			-4.028	<.001
Avoiding public place due to cough	BT	29	2.52	1.184	4.21	70.799	<.001	-2.396 ¹	.017
	I visit	29	2.14	.953	3.79			-3.758 ²	<.001
	II visit	29	1.34	.553	2.69			-2.887 ³	<.004
	AT	29	1.00	.000	2.16			.000 ⁴	<1.00
	FU	29	1.00	.000	2.16			-3.999 ⁵	<.001
Interrupted conversation with others due to cough	BT	29	2.03	.981	4.07	62.138	<.001	-3.317 ¹	<.001
	I visit	29	1.66	.721	3.59			-3.626 ²	<.001
	II visit	29	1.03	.186	2.47			-1.000 ³	.317
	AT	29	1.00	.000	2.41			-1.000 ⁴	.317
	FU	29	1.03	.186	2.47			-3.727 ⁵	<.001
Cough of child bothering other people	BT	29	2.21	1.177	3.95	57.466	<.001	-2.428 ¹	.015
	I visit	29	1.86	.953	3.62			-3.256 ²	.001
	II visit	29	1.17	.468	2.64			-1.890 ³	.059
	AT	29	1.00	.000	2.40			.000 ⁴	1.000
	FU	29	1.00	.000	2.40			-3.660 ⁵	<.001

1: BT_ I visit, 2: I visit_ II visit, 3: II visit_ AT, 4: AT_ FU, 5: BT_ AT

Table 4: Effect of Treatment on *kapha nishteevana* in *Kaphaja Kasa* based on CASA-Q

PARAMETER		FRIEDMAN'S TEST						WILCOXON TEST	
		N	Mean	S D	Mean rank	X ²	P value	Z value	P value
Presence of sputum (Kaphanishteeva)	BT	29	1.21	.412	1.83	58.606	<.001	-2.828 ¹	.005
	I visit	29	1.48	.509	2.09			-2.840 ²	.005
	II visit	29	1.86	.351	3.72			-2.000 ³	.046
	AT	29	2.00	.000	3.72			-1.414 ⁴	.157
	FU	29	1.93	.258	3.64			-3.660 ⁵	<.001
Sputum thickness	BT	29	2.24	.786	3.97	60.753	<.001	-2.147 ¹	0.032

(Sandra kapha)	I visit	29	1.86	.833	4.05			-2.982 ²	.003
	II visit	29	1.14	.516	2.40			-1.414 ³	.157
	AT	29	1.00	.000	2.19			-1.414 ⁴	.157
	FU	29	1.14	.516	2.40			-4.332 ⁵	<.001
Difficulty in bringing up sputum (Krichra nishteevana)	BT	29	1.62	.862	3.76	37.915	<.001	-3.127 ¹	.002
	I visit	29	1.17	.384	3.05			-2.236 ²	.025
	II visit	29	1.00	.000	2.71			.000 ³	1.000
	AT	29	1.00	.000	2.71			-1.000 ⁴	.317
	FU	29	1.03	.186	2.78			-3.035 ⁵	.002
Frequency of sputum	BT	29	1.97	.626	3.79	61.675	<.001	-3.067 ¹	0.002
	I visit	29	2.72	1.251	4.17			-3.515 ²	<.001
	II visit	29	1.21	.774	2.41			-1.414 ³	.157
	AT	29	1.00	.000	2.19			-1.414 ⁴	.157
	FU	29	1.21	.774	2.43			-4.460 ⁵	<.001
Sputum Colour (Varna)	BT	29	1.97	1.349	1.83	54.238	<.001	-2.410 ¹	.016
	I visit	29	3.07	2.034	2.43			-2.673 ²	.008
	II visit	29	4.45	1.404	3.40			-2.000 ³	.046
	AT	29	5.00	.000	3.78			-1.414 ⁴	.157
	FU	29	4.72	1.032	3.57			-4.500 ⁵	<.001

1: BT_ I visit, 2: I visit_ II visit, 3: II visit_ AT, 4: AT_ FU, 5: BT_ AT

Table 5: Impact of *kapha nishteevana* in *Kaphaja Kasa* based on CASA-Q

PARAMETER		FRIEDMAN'S TEST						WILCOXON TEST	
		N	Mean	S D	Mean rank	X ²	P value	Z value	P value
Breathing difficulty due to sputum (shvasakrichrata)	BT	29	2.21	.940	4.31	62.593	<.001	-4.185 ¹	<.001
	I visit	29	1.48	.509	3.29			-2.673 ²	.008
	II visit	29	1.14	.351	2.60			-2.000 ³	.046
	AT	29	1.00	.000	2.33			-1.414 ⁴	.157

	FU	29	1.07	.258	2.47			-4.119 ⁵	<.001
Annoyed by Phlegm	BT	29	2.31	1.137	4.33	65.151	<.001	-3.758 ¹	<.001
	I visit	29	1.52	.634	3.33			-2.668 ²	.008
	II visit	29	1.14	.351	2.62			-2.000 ³	.046
	AT	29	1.00	.000	2.36			.000 ⁴	1.000
	FU	29	1.00	.000	2.36			-3.974 ⁵	<.001
Avoiding public place due to sputum	BT	29	2.03	1.180	3.91	47.623	<.001	-3.017 ¹	.003
	I visit	29	1.48	.688	3.33			-2.714 ²	.007
	II visit	29	1.17	.468	2.76			-1.890 ³	.059
	AT	29	1.00	.000	2.50			.000 ⁴	1.000
	FU	29	1.00	.000	2.50			-3.376 ⁵	<.001
Interruption of daily activity due to sputum	BT	29	2.45	1.242	4.19	60.836	<.001	-3.755 ¹	<.001
	I visit	29	1.79	.819	3.45			-2.863 ²	.004
	II visit	29	1.24	.577	2.69			-2.070 ³	.038
	AT	29	1.00	.000	2.31			-1.000 ⁴	.317
	FU	29	1.03	.186	2.36			-3.825 ⁵	<.001
Sputum bothering other people	BT	29	1.97	1.117	3.81	43.562	<.001	-2.636 ¹	.008
	I visit	29	1.59	.825	3.38			-2.486 ²	.013
	II visit	29	1.24	.511	2.84			-2.333 ³	.020
	AT	29	1.00	.000	2.48			.000 ⁴	1.000
	FU	29	1.00	.000	2.48			-3.419 ⁵	<.001

1: BT_ I visit, 2: I visit_ II visit, 3: II visit_ AT, 4: AT_ FU, 5: BT_ AT

Table 6: Effect of Treatment on various factors of *agni* associated with *Kaphaja Kasa*

PARAMETER		FRIEDMAN'S TEST						WILCOXON TEST	
		N	Mean	S D	Mean rank	X ²	P value	Z value	P value
Effect of treatment on	BT	29	2.21	.940	2.22	35.494	<.001	-2.000 ¹	0.46
	I visit	29	2.34	.857	2.43			-1.279 ²	.201

abhyavarana shakti	II visit	29	2.55	.783	2.97			-2.667 ³	.008
	AT	29	3.00	.000	3.69			.000 ⁴	1.000
	FU	29	3.00	.000	3.69			-3.472 ⁵	<.001
Effect of treatment on Jarana shakti	BT	29	1.76	.872	1.86	73.052	<.001	-2.236 ¹	.025
	I visit	29	1.93	.884	2.17			-3.873 ²	<.001
	II visit	29	2.45	.572	3.09			-3.742 ³	<.001
	AT	29	2.93	.258	3.90			-1.414 ⁴	.157
	FU	29	3.00	.000	3.98			-4.158 ⁵	<.001
Effect of treatment on ruchi	BT	29	1.86	.789	4.03	60.527	<.001	-2.828 ¹	.005
	I visit	29	1.59	.568	3.62			-3.464 ²	<.001
	II visit	29	1.17	.384	2.69			-2.236 ³	.025
	AT	29	1.00	.000	2.33			.000 ⁴	1.000
	FU	29	1.00	.000	2.33			-3.852 ⁵	<.001
Effect of treatment on vata mutra purisha mukti	BT	29	2.03	.865	4.09	65.960	<.001	-2.828 ¹	0.005
	I visit	29	1.76	.689	3.72			-3.638 ²	<.001
	II visit	29	1.24	.435	2.71			-2.646 ³	.008
	AT	29	1.00	.000	2.24			.000 ⁴	1.000
	FU	29	1.00	.000	2.24			-3.946 ⁵	<.001

1: BT_ I visit, 2: I visit_ II visit, 3: II visit_ AT, 4: AT_ FU, 5: BT_ AT

DISCUSSION

Kasa is a common clinical condition compared to cough. Cough in children is frequent owing to their physiological and anatomical deficits in the growing age and immature immune system. Recurrent cough if not well managed can be complicating and lead to conditions like hyperactive air way disease and asthma. Ayurveda though first choice for *kasa*, lacks evidence-based documentation. Vamana is described as foremost to relieve acute manifestations in *kasa* and *shvasa*^[4]. Further, *Pippali* is specific drug mentioned for *kasa*, that has both *kaphahara*,

Kasahara, *agnimandiyahara* and *rasayana* property^[11,12]. CPP, discussed in the context of *kasa chikitsa* is used frequently by practitioners of Ayurveda but with no documented clinical trials especially in children. Thus, an open label, prospective, single arm explorative trial of *sadyovamana* and oral administration of CPP on *kaphaja kasa* (recurrent wet cough) in children of 5-15 years was planned. Children of 5 to 10 years age have more exposure to the infectious diseases in the school set up. Even the immune system is not fully evolved to resist the broad spectrum of causative factors so the number is more in this age

group. More over minimum age criteria for *sadyo vamana* was kept as 5 years as it is essential to have active child's participation during *vamana* procedure [3]. Majority presented with wet cough and other constellation of clinical features which are in accordance to the clinical characterization of *kaphaja kasa*. Majority children had issue with freeze food, milk shakes, bakery food. In the current status of society these kinds of food are being very common and available for every class of society. *Sheeta* and *guru guna* of this food readily vitiates *kapha* and *vata*, the innate *dosha* involved in the disease process. Exposure to pollution and sedentary habits in children are the *agantuja* and *nija nidana* that directly vitiate *vata* and *kapha* respectively as discussed in *kasa samprapti* [6,7]. This may be the reason behind increasing incidences of recurrent respiratory tract infections. Thick coated tongue suggesting *mandagni* and presence of *ama*. Infact, *mandagni* and *ama* are the root cause for diseases originating from *amashaya* like *kasa*, *shvasa*, *udara* etc [18]. On inducing *sadyovamana*, all children had spontaneous vomiting. Total approximate vomitus at the end was around 1000 ml. There were no serious complications noted throughout. Major difficulty was to convince them for intake of large quantity of liquids given during *Vamana*.

Discussion on Features of Kaphaja Kasa:

The *Kaphaja Kasa* is predominant of *Kapha* dosha and early morning and first part of night are *Kapha pradhana kala*, the children are getting more attack of *Kasa* in this time is due to dominant *Rogabala* than *Rogibala* hence the disease worsen

with its symptoms. Reduction in manifestation in *kaphaja kasa* features like wet cough and its worsening bouts during morning hours, day and night were statistically highly significant on CASA-Q with both Friedman's test and Wilcoxon sign rank test (all $p < 0.001$). As a matter of fact, *Sadyo vamana* clears off acute phlegm and *kapha sthana (amashaya)* will be cleansed leading to *ama nirharana* and *agni deepti*. *Pippali* have Gunas such as *Ushna*, *Teekshna* and *Kaphahara* properties [11] and thus improved the condition. After 2 months of treatment, it was observed that the severity of increase of symptoms in morning and night were minimal which is because of *Kaphahara* action of *Pippali*. Reduction in severity of bouts of *kasa* can be attributed to the *sthana shodhana* effect of *sadyovamana* and mucolytic, expectorant and antitussive actions of *Pippali* [19]. *Pippali* having *kauturasa* demonstrates *Kaphachedana* property, it irritates respiratory mucosa and increase local secretions aiding in liquefaction of thick adherent sputum leading to mucolytic action. *Pippali* shows its expectorant activity by stimulating mucociliary clearance of respiratory secretions. *Pippali* is a known antitussive; it acts by blocking vagal efferent which carry cough stimulus from the respiratory tract. Reduction in recurrence further suggestive of *Rasayana* property of *Pippali*. Anti histamine activity with its Mast cell stabilizing capacity of *Pippali* in CPP contributes for the control and cure cough.

Discussion on Impact of Kaphaja Kasa:

Significant reduction ($p < 0.001$) was seen in impact of *Kaphaja Kasa* based on CASA-Q assessed with

parameters like interfere with sleep, Tiredness due to cough, Interrupts on daily activities and conversation, bothering other people and Avoiding public place due to cough. *Pippali* in CPP with its immunomodulatory property strengthens the immune system which reduces the recurrent infections and reduces the bouts of cough. *Teekshna* and *ushna guna* of *Pippali* performs *agni deepana* and *ama pachana*; this improves quality of rasa and *Dehabala* of child leading to reduction in getting tired after coughing. The shortness of breath could be due to *kapha poorna vakshas*, *sroto upalepa* and *ama* leading to broncho spasm associated with reduced *Dehabala*. *Sadyovamana* helps in acute *nirharana* of ama and mala roopa kapha thus relieving acute bronchospasm. While, *Pippali* in CPP reduces the broncho spasm and acts as bronchodilator hence reduces the shortness of breath^[20] and improves sleep.

Discussion on Features of *Kapha nishteevana* in *Kaphaja Kasa*:

Remarkable improvements noted on features of sputum like *Kaphanishteeva*, *Sandra kapha*, *Krichranishteevana*, frequency and colour on CASA- Q with both Friedman's test and Wilcoxon sign rank test (all $p < 0.001$ and $p < 0.05$ respectively). *Sadyovamana* clears sputum and brings instant relief in its features. *Katu rasa*, *ushna* and *alpa teekshna guna* of CPP helps in continued *Kapha vilayana* and *agni deepana* leading to clearance of sputum. Reduced incidence of *kasa*, improved *deha bala* and *agni bala* contributes to reduced infections hence change in colour of sputum and its frequency.

Discussion on Impact of *Kapha nishteevana* in *Kaphaja Kasa*:

Reduction in impact of sputum was assessed by breathing difficulty due to sputum, Annoyed by Phlegm, avoiding public place due to sputum and Sputum bothering other people. This could be attributed to potentiated *agnideepana*, *pachana*, *srotoshodhana* action of CPP that prevents accumulation of kapha and efforts to clear it.

Discussion on various factors of *agni* associated with *Kaphaja Kasa*:

Clinically and statistically significant results seen in *abhyavarana shakti*, *Jarana shakti*, *ruchi*, and *vata mutra purisha mukti* with both Friedman's test and Wilcoxon sign rank test (all $p < 0.001$ and $p < 0.05$ respectively). *Agni bala* is assessed based up on *abhyavaharana Shakti* (eating capacity) and *jarana Shakti* (digestive capacity). *Kasa* being disease of *amashaya* and recurrence leads to continuous *agni apachara*, *ama* and *sroto rodha*. *Sadyo vamana* aids in *sthana shudhi* while CPP tablet due to its *alpa teekshna*, *ushna*, *agnivardhana* and *pachana guna* kindles the *agni*, clears the channels, and enhances digestive property. As per recent researches, *Pippali* enhances the *enzymatic actives* Liver and Pancreas, acts as immuno modulator and Bio availability enhancer^[21]. Thus, it improves both capacity of intake and assimilation. Normal evacuation is another parameter that proves normalcy of *agni*. This was further evidenced by improved weight gain, reduced infections and recurrent episodes of the illness. The pungent and

astringent quality of *Pippali* stimulates the taste buds and enhances *ruchi*.

CONCLUSION

An Exploratory trial on *sadyo vamana* and *naimittika rasayana* effect of *Chatushashti prahari Pippali* in *kaphaja kasa* (recurrent wet cough) in children of 5-15 years shown significant results in curbing *kaphaja Kasa* in children. Good compliance adds to the safety of both *sadyovamana* and CPP in children. Randomized controlled trials on the same can improve the precision on their effectiveness. This can be base study for further controlled studies to conduct *vamana* in children as well as CPP on various childhood illnesses.

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