A Randomized Comparative Clinical Study Evaluating the Therapeutic Effect of Pippalyadi Kwatha and Paushkaradi Kwatha in Kaphaja Kasa (Chronic Bronchitis)

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Abstract

Objectives: *To evaluate the therapeutic effect of Pippalyadi Kwatha and Paushkaradi Kwatha individually and comparatively in patients suffering from Kaphaja Kasa.*

Design of Study:*A randomized comparative clinical study.*

Setting *: Sri Dharmasthala Manjunatheshwara Ayurveda Hospital, Kuthpady, Udupi.*

Participants: *30 patients suffering from Kaphaja Kasa / Chronic Bronchitis of either sex were selected for the study and randomly categorized into two groups.*

Intervention: *In GROUP A – Selected patients were orally treated with Pippalyadi kwatha in a dose of 50ml BD before food for 7 days. In GROUP B – Selected patients were orally treated with Paushkaradi kwatha in a dose of 50ml BD before food for 7 days. Follow up duration- 28 days. Total duration of study- 35 days.*

Outcome Measures: *Based on the assessment criteria's, the parameters are graded and statistically analysed.* ***Primary Outcome Measures*** *are changes in the kaphaja kasa lakshana like Kasa (Cough), Aruchi (Anorexia), Anga Gaurava (Heaviness in chest), Uro Gaurava (Heaviness in body), Shirashoola (Headache), Chardi (Vomiting), Lomaharsha (Horripilations) and Changes in the objective parameters like Sputum quantity, Respiratory rate, Crepitation, Rhonchi.****Secondary Outcome Measures*** *are Changes in Hematological investigations – Hb%, TC, ESR, AEC and Changes in the quality of life via the score difference in St George's Respiratory Questionnaire (SGRQ score).*

Results:*On overall assessment comparing the effect of the formulations on individual parameters showed that Pippalyadi Kwatha gave a better relief in kasa,aruchi, sputum quantity, rhonchi, TC, ESR and AEC whereas Paushkaradi Kwatha gave better relief in SGRQ score and respiratory rate. Both the kwatha showed equal response on Hb%.Comparing the effect of drugs showed a statistical significance in SGRQ score and rhonchi parameters and no statistical significance in rest of the parameters. Thus the study revealed that both the formulations have almost equal therapeutic effects without any much difference statistically.*

Conclusions: *Both the kwatha are appropriate medicines in patients suffering from Kaphaja Kasain reducing the symptoms and in improving the quality of life.*

Key Words:*Kaphaja Kasa,* Chronic Bronchitis,*Pippalyadi Kwatha, Paushkaradi Kwatha.*

Introduction:

Respiratory system is in continuous contact with the external environment since birth until one's lifetime, so it is most vulnerable to infections and considered as the prime victim of hyper sensitization in most of the circumstances. *Kasa* is said to be a debilitating disease of *Pranavaha*

srotas, when untreated may lead to dreadful diseases like *swasa* and *kshaya*. Among five types of *kasa*, *kaphaja kasa* is a type of *kasa* with *pratyatma lakshana* of *prabhoota ghana snigdha bahala kapha*[1]. All these features of this disease very well match with the clinical features of chronic bronchitis.

Chronic Bronchitis is a common respiratory ailment with the clinical features of cough with expectoration for atleast three consecutive months for not less than two consecutive years[2]. WHO has given definition of Chronic Bronchitis as Non-Neoplastic disorder of the structures or functions of bronchi usually resulting from prolonged or recurrent exposure to infectious or non-infectious irritants. Chronic bronchitis is an illness which can severely impair and hamper person's physical and mental wellbeing. Now-a-days chronic bronchitis has become more prevalent because of the exposure to both active and passive smoking, air pollution, occupational hazards etc. Recently Indian study on epidemiology of Asthma, Respiratory symptoms and Chronic Bronchitis showed that overall prevalence of chronic bronchitis in adults >35years was 3.49% and based on this the national burden of chronic bronchitis was estimated to 14.84 million[3].

Kaphaja kasa is a *vata-kapha dosha pradhana vyadhi* along with *rasa dushti* afflicting the *pranavaha srotas*. As there will be vitiation of *kapha* in the *pranavaha srotas*, the morbid *kapha* will produce obstruction to the course of *vata* thereby causing specific disease *kaphaja kasa* with *lakshanas* like *bahala madhura snigdha ghana nishtiva, aruchi, chardi, mandagni, peenasa, shiroruja and gaatra gaurava*[1]. The disease Chronic Bronchitis is enlisted under Chronic Obstructive Pulmonary Disease where in chronic obstruction to the airway passage is the main manifestation that produce a set of symptoms depending on degree of bronchial obstruction and course of illness, which is characterized by chronic cough and phlegm, and chronic limitation of the airflow[4].The main pathological changes that take place in the tracheo bronchial tree are the hypertrophy of mucous secreting cells, hyperplasia of goblet cells in respiratory tract and peribronchial or luminal fibrosis[5].COPD is the third leading cause of death and affects >10 million persons in the United States. It is also a disease of increasing public health importance around the world. Estimates suggest that COPD will rise from the sixth to the third most common cause of death worldwide by 2020[4].

As it is a chronic lingering disease, the treatment should fulfil duel targets; one which subsides the disease entity and the other which promotes the immune system. Thus owing to the gravity of situation, the study is planned as randomized comparative clinical trial with two of the *kashaya* preparations with an optimal dosage form. With this background the study evaluates the therapeutic effects of *Pippalyadi Kwatha* and *PaushkaradiKwatha* in patients of *KaphajaKasa* (Chronic Bronchitis) individually and comparatively wherein the study is aimed at providing a safe and an effective treatment, as well as to generate scientific data and validate the effect of these formulations in this disease management.

Objectives of the study:

1. To evaluate the therapeutic effect of *Pippalyadi Kwatha* in reducing the symptoms of *Kaphaja Kasa*.
2. To evaluate the therapeutic effect of *Paushkaradi Kwatha* in reducing the symptoms of *Kaphaja Kasa*.
3. Comparing the therapeutic effect of *Pippalyadi Kwatha* and *Paushkaradi Kwatha* in patients suffering from *Kaphaja Kasa*.

Materials and Methods

Source of data:

Minimum 30 patients diagnosed as *Kaphaja Kasa* were taken for study from OPD and IPD of Sri Dharmasthala Manjunatheshwara Ayurveda Hospital, Udupi. The selected patients were randomly grouped in to two groups irrespective of their gender and cast by adapting the method of permuted block randomization. The formulations (*kwatha choorna*) taken for the study was prepared in the SDM Ayurveda, Pharmacy, Udupi, Karnataka.

Method of collection of data:

The patients were selected irrespective of gender, caste, race, based on the diagnostic inclusion and exclusion criteria. A special proforma was prepared with all points of history taking, physical signs, and symptoms as mentioned in Ayurveda as well as bio medicine. Analysis of the signs and symptoms were corroborated by laboratory investigations.

Design of the study:

Study Type: Interventional
Allocation: Permuted Block Randomized
Endpoint Classification: Efficacy Study
Intervention Model: Parallel Assignment
Masking: Open Label
Primary Purpose: Treatment

Intervention:

Group A – *Pippalyadi Kwatha* (PIP K) group

Selected patients were orally treated with *Pippalyadi kwatha* in a dose of 50ml BD before food for 7 days.

Group B – *Paushkaradi Kwatha* (PAU K) group

Selected patients were orally treated with *Paushkaradi kwatha* in a dose of 50ml BD before food for 7 days.

Follow up duration- 28 days
Total duration of study- 35 days

Diagnostic Criteria:

Patients presenting the symptoms of productive cough with or without other clinical features of kaphaja kasa (chronic bronchitis) with the duration of atleast 3 consecutive months for not less than 2 consecutive years.

Inclusion Criteria:

Patients fulfilling the diagnostic criteria of chronic bronchitis
Age Eligible for Study: 16 Years to 70 Years
Gender Eligible for Study: Both
Socio-economic status Eligible for Study: all categories
Caste Eligible for Study: all

Exclusion Criteria:

Patients suffering from acute bronchitis.
Patients with any other major systemic disorders.

Patients with other chronic and infective respiratory disorders.
Pregnant and lactating women, smokers, alcoholics and drug abusers.
Patients with complications of chronic bronchitis like Emphysema, Cor Pulmonale and Bronchiectasis.

Assessment Criteria

Assessment was done on the basis of subjective and objective criteria before, during and after the treatment i.e. on 0^{th} day, 7^{th} day, 28^{th} day.[Table 1]

Table 1: Grading of assessment parameters

S. No.	CRITERIA	DETAILS	SCORE
1.	Kasa	No cough	0
		Occasional cough but not disturbing	1
		Cough troublesome during attacks	2
		Cough very troublesome and frequent	3
		Cough distress most of the time in day and night	4
2.	Aruchi	Normal taste in food, feeling to eat food in time	0
		Aruchi – feeling to take food but not having taste	1
		Anannabhilasha – not feeling to take food even if hungry	2
		Bhaktadvesha – irritability to touch, smell, seeing and listening about food	3
		Abhaktachchanda – aversion to food because of anger, stress etc	4
3.	Anga Gaurava & Shiro Gaurava	No feeling of heaviness	0
		Occasional feeling of heaviness not affecting the daily routine	1
		Frequent feeling of heaviness mildly affecting the daily routines	2
		Feeling of heaviness throughout the day moderately affecting the daily routines	3
		Feeling of heaviness throughout the day. Daily routines are totally hampered	4
4.	Shirashoola	No pain	0
		Occasional pain did not require treatment	1
		Occasional pain but, required treatment	2
		Constant dull ache pain, required treatment	3
		Severe constant pain, but did not show relief even after treatment	4
5.	Sputum Quantity	Nil	0
		Less than 2.5ml/day	1
		2.5ml-10ml/day	2
		Above 10ml/day	3
6.	Respiratory Rate	Less than or equal to 18cycles/min	0
		Ranging from 19-21cycles/min	1
		Ranging from 22-24cycles/min	2
		More than 24cycles/min	3
7.	Crepitatio	No crepitation upon normal forced expiration	0

	n	Crepitation audible upon forced expiration but not upon deep breathing	1
		Few scattered crepitation audible upon normal deep breathing	2
		Innumerable low intensity crepitation audible upon normal breathing	3
		Innumerable high intensity crepitation audible upon normal breathing	4
8.	Rhonchi	No rhonchi even upon forced expiration	0
		Rhonchi present upon forced expiration but not audible upon deep breathing	1
		A few scattered rhonchi audible upon normal deep breathing	2
		Innumerable low pitched rhonchi audible upon normal breathing	3
		Innumerable high pitched rhonchi audible upon normal breathing	4

Primary Outcome Measures:

Changes in the kaphaja kasa lakshana like*Kasa* (Cough), *Aruchi* (Anorexia), *Anga Gaurava* (Heaviness in chest), *Uro Gaurava* (Heaviness in body), *Shirashoola* (Headache), *Chardi* (Vomiting), *Lomaharsha* (Horripilations).

Changes in the objective parameters likeSputum quantity, Respiratory rate, Crepitation, Rhonchi.

Secondary Outcome Measures:

Changes in Hematological investigations – Hb%, TC, ESR, AEC.

Changes in the quality of life via the score difference in St George's Respiratory Questionnaire (SGRQ score)

Statistical test:

The statistical analysis was done using Sigma Stat Statistics software version 3.5. In this study Wilcoxon signed rank test was taken in the place of paired t test when data was ordinal. Paired t test was used when data was numerical. For statistical analysis between the groups, Mann Whitney test was used for ordinal data. Where in for the numerical data, unpaired t test was used. These tests are selected for the statistical analysis since the study was comparative, which was conducted in 2 groups

Observation and Results:

In this study, out of 38 patients, maximum number of 11 patients i.e. 36.66% belonged to the age group of 61-70 years and about 56.66% i.e. 17 patients were females. A maximum of 90% i.e. 27 patients were belonging to Hindu community. As per the observation, 43.33% i.e. 13 patients were homemakers forming the majority compared to other categories. In both the groups maximum of 83.33% i.e. 25 patients had frequent and troublesome attacks of illness, 13.33% i.e. 4 patients had troublesome during attacks of illness, 3.33% i.e. 1 patient had illness persistent throughout day and night. 76.66% i.e. 23 patients had a mixed dietary habit. Among 30 patients, 23.33% i.e. 7 patients had a habit of smoking. It was observed that 53.33% i.e. 16 patients were having *vata-kaphaja prakriti*. Assessment of *sara* in the present study showed that a maximum of 96.66% i.e. 29 patients had *madhyama sara*. *Satva pariksha* revealed53.33% i.e. 16 patients had *madhyamasatva* and 46.66% i.e. 14 patients had *avarasatva*. Out of 30 patients, a maximum of 96.66% i.e. 29 patients had *madhyamasatmya.* Analysis of Ahara Shakti depicted that a majority of 76.66% i.e. 23 patients had *avaraabhyavaharanashakti* and *avarajaranashakti*. As per the evaluation of vyavama shakti, 56.66% i.e. 17 patients had *avaravyayamashakti*. Observation of nidana exhibited that all the patients had aggravation of symptoms due to cold exposure and on intake of cold food stuffs. A maximum of

93.33% i.e. 28 patients had dust allergy, followed by 90% i.e. 27 patients had allergy to smoke and 40% i.e. 12 patients had allergy on exposure to strong odours.

Effect of the Treatment:

In PIP K Group, it was seen that *Kasa* was reduced by 73%, *Aruchi* by 52%, SGRQ Score by 21%, Sputum Quantity by 73.2%, Respiratory Rate by 80% and Rhonchi by 58%. 3% changes in Hb%, TC was reduced 27.2%, ESR by 63% and AEC by 53%. In PAU K Group, it was seen that *Kasa* was reduced by 67.5%, *Aruchi* by 50%, SGRQ Score by 36.4%, Sputum Quantity by 68.2%, Respiratory Rate by 69% and Rhonchi by 67%. 3% changes in Hb%, TC was reduced 25.2%, ESR by 48.3% and AEC by 49%.

On overall assessment comparing the effect of the formulations on individual parameters showed that *PippalyadiKwatha* gave a better relief in *kasa*, *aruchi*, sputum quantity, rhonchi, TC, ESR and AEC whereas *PaushkaradiKwatha* gave better relief in SGRQ score and respiratory rate. Both the *kwatha* showed equal response on Hb%.

Comparing the effect of drugs showed a statistical significance in SGRQ score and rhonchi parameters and no statistical significance in rest of the parameters. Thus the study revealed that both the formulations have almost equal therapeutic effects without any much difference statistically. [As explained in tables from Table 2 – Table 7 and illustrations 1-10]

Table 2: Effect of treatment on subjective parameters

Parameter	Group	Mean		BT-AT	% Relief	SD		SEM		Median		Z	P
		BT (±SD)	AT (±SD)			BT	AT	BT	AT	BT	AT		
KASA	Group A	2.667 (±0.724)	0.733 (±0.704)	1.934	73%	0.724	0.704	0.187	0.182	3.000	1.000	-3.624	<0.001
	Group B	2.667 (±0.900)	0.867 (±0.834)	1.8	67.5%	0.900	0.834	0.232	0.215	2.000	1.000	-3.626	<0.001
ARUCHI	Group A	1.800 (±1.373)	0.867 (±0.743)	0.933	52%	1.373	0.743	0.355	0.192	2.000	1.000	-2.889	0.002
	Group B	2.533 (±1.060)	1.267 (±0.704)	1.266	50%	1.060	0.704	0.274	0.182	3.000	1.000	-3.272	<0.001
SGRQ SCORE	Group A	742.800 (±82.264)	588.947 (±101.254)	153.853	21%	82.264	101.254	21.240	26.144	742.800	586.900	-3.408	<0.001
	Group B	934.960 (±84.678)	594.367 (±97.078)	340.593	36.4%	84.678	97.078	21.864	25.065	976.800	596.800	-3.408	<0.001

Table 3: Effect of treatment on objective parameters

Parameter	Group	Mean		BT-AT	% Relief	SD		SEM		Median		Z	P
		BT (±SD)	AT (±SD)			BT	AT	BT	AT	BT	AT		
SPUTUM QUANTITY	Group A	2.733 (±0.458)	0.733 (±0.458)	2	73.2 %	0.458	0.458	0.118	0.118	3.000	1.000	-3.873	<0.001
	Group B	2.733 (±0.594)	0.867 (±0.743)	1.866	68.2 %	0.594	0.743	0.153	0.192	3.000	1.000	-3.690	<0.001
RESPIRATORY RATE	Group A	0.667 (±0.617)	0.133 (±0.352)	0.534	80.1 %	0.617	0.352	0.159	0.0909	1.000	0.000	-2.828	0.008
	Group B	1.067 (±0.594)	0.333 (±0.488)	0.734	69%	0.594	0.488	0.153	0.126	1.000	0.000	-3.317	<0.001
RHONCHI	Group A	2.667 (±1.175)	1.133 (±0.640)	1.534	58%	1.175	0.640	0.303	0.165	3.000	1.000	-3.358	<0.001
	Group B	2.400 (±1.595)	0.800 (±0.676)	1.6	67%	1.595	0.676	0.412	0.175	3.000	1.000	-3.025	<0.001

Table 4: Effect of treatment on Lab parameters

Parameter	Group	Mean		Difference in Mean	BT-AT/BT*100	Paired 't' Test			
		BT	AT			SD	SEM	T	P
Hb%	Group A	11.583 (±1.267)	11.283 (±1.047)	0.300	3%	0.316	0.0816	3.674	0.003
	Group B	11.767 (±1.304)	11.467 (±1.213)	0.300	3%	0.380	0.0982	3.055	0.009
TC	Group A	8786.667 (±928.799)	6400.000 (±1235.776)	2386.667	27.2%	1153.793	297.908	8.011	<0.001
	Group B	8340.000 (±1086.147)	6233.333 (±730.623)	2106.667	25.2%	678.724	175.246	12.021	<0.001
ESR	Group A	37.200 (±22.049)	13.467 (±3.420)	23.733	63%	19.278	5.693	4.768	<0.001
	Group B	43.333 (±22.636)	22.400 (±19.338)	20.933	48.3%	7.564	1.953	10.719	<0.001
AEC	Group A	481.400 (±103.985)	227.333 (±33.608)	254.067	53%	88.337	22.809	11.139	<0.001
	Group B	501.200 (±124.626)	255.800 (±76.909)	245.400	49%	64.487	16.650	14.378	<0.001

Table 5: Comparison between the groups on subjective parameters

Parameter	Group	Mean	SD	SEM	Median	U	P
KASA	Group A	2.000	0.378	0.0976	2.000	91.500	0.189
	Group B	1.800	0.414	0.107	2.000		
ARUCHI	Group A	0.933	0.799	0.206	1.000	134.000	0.347
	Group B	1.200	0.676	0.175	1.000		
SGRQ SCORE	Group A	154.473	61.099	15.776	144.200	219.000	<0.001
	Group B	340.593	80.257	20.722	318.100		

Table 6: Comparison between the groups on objective parameters

Parameter	Group	Mean	SD	SEM	Median	U	P
SPUTUM QUANTITY	Group A	2.000	0.000	0.000	2.000	97.500	0.164
	Group B	1.867	0.352	0.0909	2.000		
RESPIRATORY RATE	Group A	0.533	0.516	0.133	1.000	135.000	0.275
	Group B	0.733	0.458	0.118	1.000		
RHONCHI	Group A	1.533	0.743	0.192	2.000	53.000	0.009
	Group B	0.800	0.676	0.175	1.000		

Table 7: Comparison between the groups on Lab parameters

Parameter	Group	Mean		Difference in Mean	Unpaired 't' Test			
		BT	AT		SD	SEM	t	P
Hb%	Group A	11.583	11.283	0	0.316	0.0816	0.886	0.383
	Group B	11.767	11.467	0	0.302	0.0779		
TC	Group A	8786.667	6400.000	280	1153.793	297.908	0.810	0.425
	Group B	8340.000	6233.333	280	678.724	175.246		
ESR	Group A	37.200	13.467	2.8	18.999	4.906	0.698	0.491
	Group B	43.333	22.400	2.8	7.265	1.876		
AEC	Group A	481.400	227.333	8.600	88.372	22.817	0.304	0.763
	Group B	501.200	255.800	8.600	64.487	16.650		

Discussion:

In this clinical trial, none of the patients presented with the lakshana of chardi and lomaharsha. Only 4 patients presented with uro gaurava and anga gaurava respectively. Also 5 patients had shirashoola and 5 patients had crepitation in the study sample. So statistical analysis for these lakshana were not possible to perform as N value is less than 6 but it was observed that there was reduction in severity in these paramertes after the therapeutic intervention.

Pippalyadikwatha is emphasised in *Bhavaprakashakasarogaadhikara* under the heading of *kaphajakasachikitsa*. This formulation consists of *pippali*, *katphala*, *shunti*, *karkatashringi*, *bharangi*, *maricha*, *karavi*, *kantakari*, *nirgundi*, *yavanika*, *chitraka* and *vasaka*. *PaushkaradiKwatha* is illustrated under *kaphajakasa* of *Chakradatta*. This formulation contains *pushkaramoola*, *katphala*, *bharangi*, *shunti* and *pippali*. All these ingredients except *vasaka* have *katu-tikta-kashayarasa*, *laghu-*

snigdha-teeksha-rookshaguna, *ushnaveerya* and *katuvipaka* other than *pippali* as well as *shunti* with *madhuravipaka* along with *kaphavatashamakadoshaghnakarma*. *Vasaka* has *tiktakashyarasa*, *laghurookshaguna*, *sheetaveerya*, *katuvipaka* and *kaphapittashamakadoshaghnakarma*. The above mentioned drugs having *teekshnaguna* and *kaphaghnakarma* act locally at the site of *kanta* causing *vilayana* of the obstructed *kapha* in the *pranavahasrotas*. Thus after removal of *srotoavarodha* caused by *kapha*, due to the *vatanulomanakarma* of drugs like *pippali*, *shunti*, *shringi*, *maricha*, *karavi*, *yavani* it clears the *vatavimargagamana* and brings back the normal *gati* of *vatadosha*. When there is association of *pitta*, the *kaphapittashamakaguna* of the drugs like *vasaka* come into action. The drugs with *kashaya* rasa like *katphala*, *bharangi*, *karkatashringi*, vasa have local *kaphahara* action on the mucosa. This process explains the symptomatic relief in *kasa*. In the later phase drugs like *pippali*, *shunti*, *chitraka*, *bharangi*, *maricha*, *karavi*, *kantakari*, *nirgundi*, *yavanika* do the action of *pachana*, followed by *deepana*, *anulomana* and *rochana*. Thus *ama pachana* and *agnimandya* gets rectified which removes the *ama lakshana* from the body and further the rasa *dhatwagni mandya* can also be corrected which further facilitates the *uttarottara dhatu poshana karma*. These actions in total contribute to the *samprapti vighatana* of the disease. Adding to this due to the *vrishya* and *rasayana* properties of the drugs like *pippali*, *shunti*, *shringi*, *karavi*, *nirgundi*, *kantakari*, *chitraka* the *dhatusara* gets improved along with the restoration of *varna*, *bala*, *oja* and *mamsa*. Finally all these contribute to the enhancement of*vyadhikshamatva*. [6-18]

Based on the pharmacological activities of the drugs in both formulations the probable mode of action can be elucidated as follows. The antitussive action of the drugs like *kantakari*, *vasa*, *shunti*, *shringi*, *yavanika* is purely through interfering with peripheral mechanisms of the cough reflex. The pungent principles present in drugs of both the formulations act as potent antitussives, probably by blocking the vagal sensory afferents by counter-irritant and local anaesthetic mechanism. The drugs like *pippali*, *shunti*, *maricha*, *bharangi*, *karavi*, *chitraka* due to the presence of essential and volatile oils, flavonoids, tannins, saponins possess the antioxidant property which help in scavenging free radicals by reacting with superoxide anion radical and hydroxyl free radicals thus preventing tissue damage. Almost all the drugs in both the formulations have anti-inflammatory action which inhibits inflammatory mediators like leukotriene, interleukins, tumour necrosing factor, prostaglandins released by macrophages, T lymphocytes and neutrophils. Thus they reduce the mucosal oedema and excess mucus secretion in the respiratory tract. Mucolytic and mucokinetic action of drugs such as *bharangi*, *kantakari*, *vasaka*, *karkatashringi* depolymerises the *mucopolysaccharides* and liberates *lysosomal* enzymes which break the tenacious mucus plugs present in respiratory tract and causes expulsion of sputum. Majority of drugs in both the formulations have antiviral, antibacterial, antimicrobial actions which help in eliminating systemic infection[19].

Conclusion:

In this clinical study, both *Pippalyadi kwatha* and P*aushkaradi kwatha* groups showed statistically significancein remission of signs and symptoms as well as by improving the quality of life. *Pippalyadi Kwatha* gave a better relief in *kasa*, *aruchi*, sputum quantity, rhonchi, TC, ESR and AEC whereas *Paushkaradi Kwatha* gave better relief in SGRQ score and respiratory rate. Both the *kwatha* showed equal response on Hb%.

Comparing the effect of drugs showed a statistical significance in SGRQ score and rhonchi parameters and no statistical significance in rest of the parameters. Thus the study revealed that both the formulations have almost equal therapeutic effects without any much difference statistically in both the outcome measures.

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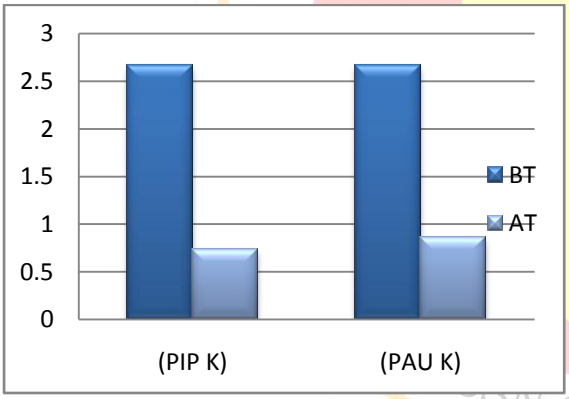
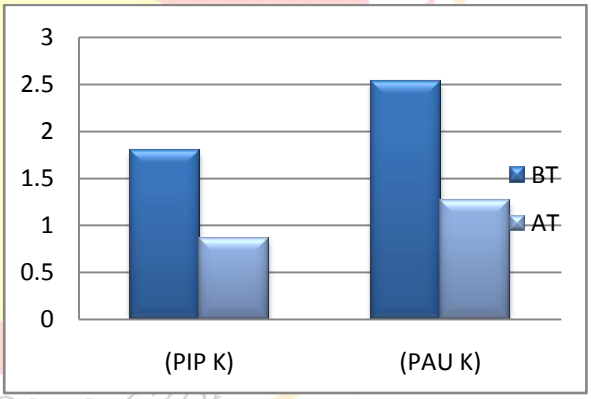
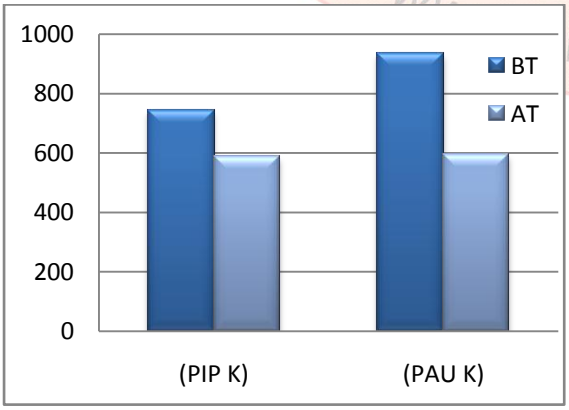
Illustrations:

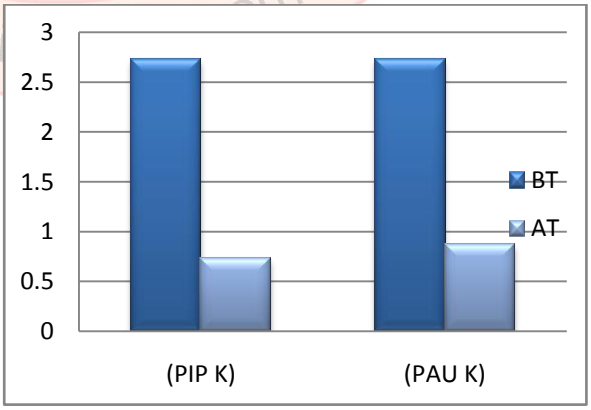
Ill. 1:Effect of treatment on *Kasa* **Ill. 2:Effect of treatment on *Aruchi***



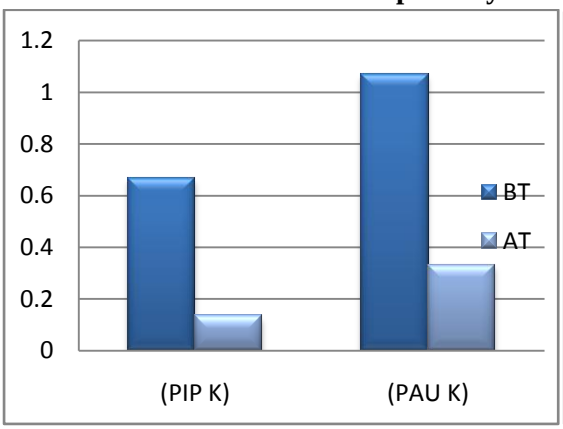


Ill. 3:Effect of treatment on SGRQ Score **Ill. 4:Effect of treatment on Sputum Quantity**

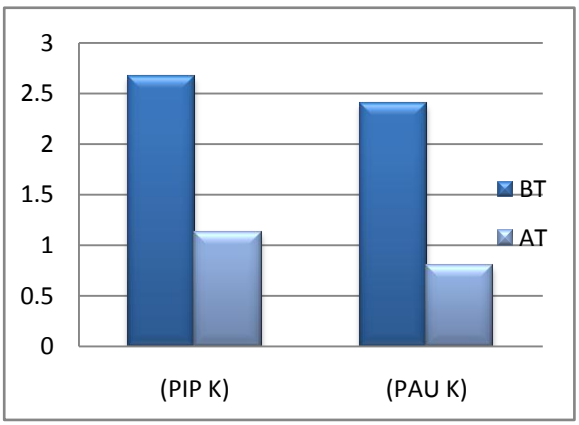




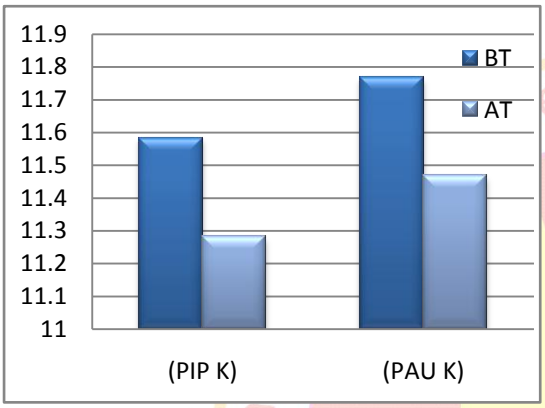
Ill. 5:Effect of treatment on Respiratory Rate



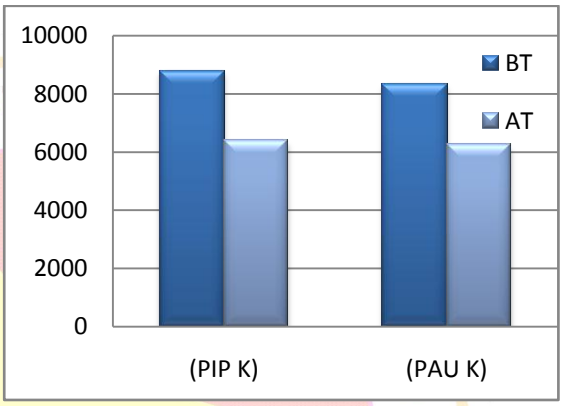
Ill. 6:Effect of treatment on Rhonchi



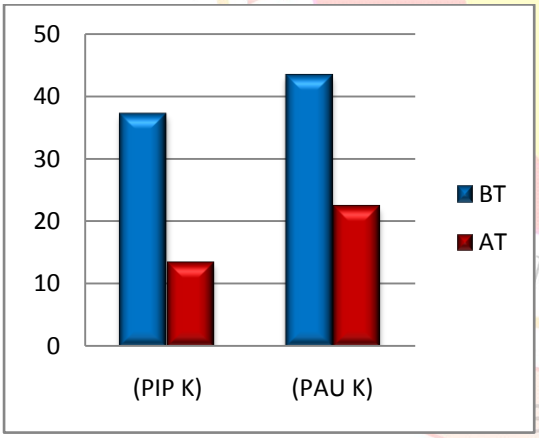
Ill. 7:Effect of treatment on Hb%



Ill. 8:Effect of treatments on TC



Ill. 9:Effect of treatment on ESR



Ill. 10:Effect of treatment on AEC