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A comparative clinical study to evaluate the efficacy of classical *Dhuma Nasya* and modified *Dhuma Nasya* (in the form of nebulization) in *Tamaka Swasa* (Bronchial Asthma)

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ABSTRACT

Background: Bronchial asthma is well-known hypersensitivity disorder which prevalence is being rapidly intensified in present world particularly in developed countries. *Tamaka Swasa* is correlate with Bronchial asthma, symptoms of *Tamaka Swasa* is nearly similar to Bronchial asthma. *Tamaka Swasa* can be treated *by Nasya Karma* followed by classical *Dhuma Nasya* and modified *Dhuma Nasya* (in the form of Nebulization) as *Nasa* is considered *as Shiraso Dwara* will be effective to reduce symptoms and *controlling Prana Vayu*. **Aim:** To compare the efficacy of classical *Dhuma Nasya* with Modified *Dhuma Nasya* (in the form of nebulization) in *Tamakaswasa* (Bronchial asthma). **Materials and Methods**: Total 40 patients of *Tamakaswasa* in the age group of 20 to 50 years fulfilling the inclusion criteria were selected for trial & randomly distributed in Group A and Group B. **Result:** Statistically Group B was found more effective than Group A in the management of symptoms of *Tamakaswasa.* **Discussion:** Properties having *Shatyadi Dravyas* (6 drugs among *Charakokta Swasahara Mahakashaya)* is *Tikta Katu Rasa, Laghu* and *Tikshna Guna, Ushna Virya* and *Vatakaphagna* (decrease *Vata and Kapha Dosha). Shatyadi Dravyas* is effective in break down the *Samprapti* of *Tamakaswasa* and Nebulization procedure can dispense the drug directly into the target organ through inhalation. Hence the study proves its effectiveness in restoring the vital capacity of lungs.

Key words: *Dhuma Nasya, Prana Vayu, Shatyadi Dravyas, Tamakaswasa,Yapya*

INTRODUCTION

Ayurveda is also well known for its role in the management of the chronic and curable diseases. The disease *Tamaka Swasa* is originating from *Pittasthana* caused due to the vitiation of *Kapha* and *Vata* and manifested through *Pranvaha Srotasa. Vata* predominantly associated with *Kapha* obstructed in the *Pranavaha Srotasa* gets more aggravated and in turn causes *Swasa*.[1]

Bronchial Asthma is an episodic disease manifested clinically by paroxysms of dyspnea, cough and wheezing.[2] This condition is due to inflammation of the air passages in the lungs and affects the sensitivity of the nerve endings in the airways so they become easily irritated. In an attack, the lining of the passages swell causing the airways to narrow and reducing the flow of air in and out of the lung.[3] Difficulty in breathing is the main symptom of *Tamaka Swasa*[4] and in severe cases it may be associated with darkness in front of the eyes. It is considered as *Yapya Vyadhi.*[5] Based on the similarities in aetiopathogenesis and symptomatology; Bronchial Asthma can be compared with *Tamaka Swasa in Ayurveda.*[6]

The prevalence of asthma varies widely in different regions of the world due to distinct genetic,

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environmental and occupational risk factors. However, this disparity appears to be closing as the prevalence in high-income countries is reaching a plateau whereas the prevalence in low and middle-income countries continues to rise.[7]

Worldwide, it is estimated that approximately 334 million people currently suffer from asthma, and 250,000 deaths are attributed to the disease each year.[8] India contributes to 10% of the global burden of asthma with around 2.4 crore of its population being asthamatic.[9] The study clearly shows that India has tremendous burden of bronchial asthma as there is no national programme to address it.

The GINA Workshop report 2005 says, "The rate of asthma increases as communities adopt western lifestyles and become urbanized. With the projected increase in the proportion of the world's population that is urban from 45% to 59% in 2025, there is likely to be a marked increase in the number of asthmatics worldwide over the next two decades. It is estimated that there may be an additional 100 million persons with asthma by 2025."[10]

Tamaka Swasa is considered as the most serious disease in *Ayurveda* and stated that none other disease kills as instantaneously as *Tamaka Swasa.*[11] The disease *Tamaka Swasa* is difficult to cure, if it is not properly treated at the appropriate time this disease being exacerbated become fatal.[12] In *Ayurveda, Chikitsa* has been explained under two folds; they are *Langhana* and *Brimhana,*[13] due to *Shodhana* in nature *Panchakarma* comes under the *Langhana* category.[14] Again, the treatment is broadly divided into two categories: *Shodhana* and *Shamana.*[15] In classics our *Acharyas* have given prime importance to *Nasya* especially in *Urdwajatruvikara's*. *Nasya* not only beneficial for *Urdwajatruvikara's* but also for some systemic diseases like *Swasa Roga.*[16] Various types of *Nasya* can also be advisable in *Tamaka Swasa* like *Navana*, *Rechaka*. *Acharaya Charaka* in *Chikitsasthan* describes *Nasya Karma* in *Swasa Roga.*[17] The study will be carried out by using classical *Dhuma Nasya* and modified *Dhuma Nasya* (in the form of nebulization). Drugs used *Shatyadi Dravyas*[18] (6 drugs among *Charakokta Swasahara Maha Kashaya*). The drugs which can be used should have capacity to restrain *Vata, Kapha Dosha* and for amending the *Samprapti* of *Tamaka Svasa* like *Sati, Pushkarmoola, Tulsi*. Herbal drugs which are *Katu, Tikta Rasa, Ushna Virya, Laghu, Tikshna, Ruksha Guna, Katu Madhura Vipaka. Kapha Vata Shamana*[19] contain volatile oils can be used in nebulization. This mode of administration proves to be highly beneficial in saving life in acute life threatening condition such as "Status Asthmatics".[20] But wide range of toxic side effects of modern medicine confines its use as permanent remedy. Thus, in order to search an Ayurvedic formulation to be used for inhalation which is as effective as modern inhalation therapy and have least side effect. It is decided to make some Ayurvedic formulation for inhalation and evaluate its effectiveness in this clinical condition. The nose, according to *Acharya Charaka* is the gateway to the head.[21] The nasal route for the administration of drugs was widely used in *Ayurveda* for treating a variety of ailments. Nasal administration of drugs was indeed one of the chief procedures under the *Panchakarma* therapy of Ayurveda. So, inhalation therapy is not new to Ayurveda, as from very ancient time Ayurvedists are using this route of drug administration in various diseases.

Aim and Objectives

1. To evaluate the efficacy of Classical *Dhuma Nasya* in *Tamakaswasa* (Bronchial asthma).
2. To evaluate the efficacy of Modified *Dhuma Nasya* (In the form of nebulization) in *Tamakaswasa* (Bronchial asthma).
3. To compare the efficacy of classical *Dhuma Nasya* with Modified *Dhuma Nasya* (in the form of nebulization) in *Tamakaswasa* (Bronchial asthma).

Materials and Methods

Drug used for the study is *Shatyadi Dravyas*

Source of data

Literary source

All the Ayurvedic, modern literatures and contemporary texts including the journals, websites

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reviewed and documented about the disease and drug for the study.

Pharmaceutical source

The formulation selected for research work was prepared in Himalayiya Ayurvedic P.G Medical College, Dehradun.

Study plan

Table 1: Study Plan

Study Type	Interventional
Sub Type	Comparative
Purpose	Treatment
Timing	Prospective
Masking	Open trial
Sampling method	Simple random
End Point	Efficacy
Sample Size	40 patients (20 patients in each group)
No. of Groups	2 groups **Group A:** *Dhuma Nasya* (classical method) **Group B:** Nebulization (*Arka*)
Selection of Cases	OPD and IPD
Sample collection	Patients from Himalayiya Ayurvedic (P.G) Medical College, Dehradun.
Duration of treatment	7 Days with 3days gap
Treatment duration	30days (3 Sittings)
Follow up	One month
Total duration	2 months

Assessment will be made by the improvement based on both Subjective and objective parameters before and after treatment.

Drug Review

Shatyadi Dravyas: *Shati, Pushkermoola, Tamalaki, Hingu, Tulsi, Ela* (By using combination of drugs among *Charakokta Swasahara Maha Kashaya*)

शटीपुष्करमूलाम्लवेतसैलाहिङ्ग्वगुरुसुरसातामलकीजीवन्तीच ण्डा इति दशेमानि श्वासहराणि भवन्ति॥ (Ch.U.4/37)

Inclusion Criteria

1. Patients age between 20-50years irrespective of caste, race and gender.
2. The patients having classical signs and symptoms of *Tamakaswasa*.
3. PEFR 60% to 90% (Peak Expiratory flow rate)

Exclusion Criteria

1. The patient with chronic respiratory disease like history of tuberculosis, emphysema, pulmonary effusion, COPD other complicated respiratory disease such as tumor or any anatomical defect in airways.
2. Pregnant and lactating women.
3. Severe and systemic diseases like uncontrolled hypertension, Uncontrolled Diabetes.
4. CKD (chronic kidney disease), severe chronic metabolic disorders.

Diagnostic Criteria

Patients having classical sign and symptoms of *Tamakasvasa* as mentioned below:

1. *Swasakrichrata* (difficulty in breathing)
2. *Peenasa* (rhinitis)
3. *Kasa* (cough)
4. *Ghurghurkam* (wheezing)
5. *Krichrabhasana* (difficulty in speaking)
6. *Shayanaswasapidita* (difficulty to breathe on lying down) (Orthopnea)

Investigations

1. CBC with ESR
2. AEC

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3. Sputum for AFB (Where there is clinical suspicion)
4. Lipid profile
5. RBS
6. Chest X-Ray (PA view)
7. Peak flow meter

Table 2: Intervention Regime

Intervention	Group A	Group B
Procedure	Classical *Dhuma Nasya*	Nebulization
Nasya/Nebulization	Powder form	Liquid form
Dose	4 gram	5ml
Timing of Administration	Morning (8 -11am)	Morning (8-11 am)
Mode of Administration	Nasal route	Nasal route
Duration days	7 days with 3days gap (3 sittings)	7 days with 3days gap (3 sittings)

Gradings:

Table 3: Subjective Parameters

Swasakrichrata	0	No symptoms
	1	Occasional or morning bouts - do not disturb work
	2	Continuous during morning - but disturbing work
	3	Continuous during morning and night with disturbing activity
Peenasa	0	No symptoms
	1	*Peenasa* present before attack and subsides 1-2 days after the attack
	2	*Peenasa* before attack and persist for than a week after the attack
	3	*Peenasa* present often even without attack
Kasa	0	No cough
	1	Occasional or morning bouts-do-not disturb work
	2	Continuous cough during morning disturbing activity
	3	Continuous morning & night cough disturb activity
Ghurghurkam	0	No wheeze
	1	Wheezing at end of respiration
	2	Loud wheezing throughout expiration
	3	Loud inspiration and expiration wheeze
Krichrabhasana	0	No symptoms
	1	Symptoms lasting for <1 hours
	2	Symptoms lasting for 1 - 3 hours
	3	Symptoms lasting for more than 3 hours
Shayanaswasapidita	0	No Orthopnea
	1	Mild difficulty in breathing on lying down position
	2	There is increase dyspnea on lying down position and patient prefers to take sleep in prone or lateral position
	3	Patient is able to take sleep only after taking support of 2-3 pillows (fowler's position)

Peak expiratory flow rate

G0: > 80% of the Predicated value

G1: 70-80 % of the predicted value

G2: 61-70% of the predicted value

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G3: 60% of the predicted value

Statistical Analysis

The effect of the drugs used have been critically analyzed by the statistical data.

RESULT

Results within the Group

Table 4: Wilcoxon Sign rank test Group A.

Group A		N	Mean Rank	Sum of Ranks	Z Values	P Value	% Relief
SWASAKRICHRATA_AT – SWASAKRICHRATA	Negative Ranks	20[a]	10.50	210.00	-4.041	.000	52.54 %
	Positive Ranks	0[b]	.00	.00			
PEENASA_AT – PEENASA	Negative Ranks	20[d]	10.50	210.00	-4.379	.000	65 %
	Positive Ranks	0[e]	.00	.00			
KASA_AT – KASA	Negative Ranks	20[g]	10.50	210.00	-4.472	.000	33.3%
	Positive Ranks	0[h]	.00	.00			
GHURGHURKAM_AT – GHURGHURKAM	Negative Ranks	20[j]	10.50	210.00	-4.379	.000	36.6%
	Positive Ranks	0[k]	.00	.00			
KRICHRABHASANA_AT – KRICHRABHASANA	Negative Ranks	20[m]	10.50	210.00	-4.472	.000	66.6%
	Positive Ranks	0[n]	.00	.00			
SHAYANASWASAPIDITA_AT – SHAYANASWASAPIDITA	Negative Ranks	20[p]	10.50	210.00	-4.472	.000	33.3%
	Positive Ranks	0[q]	.00	.00			
PEAKEXPIRATORY FLOWRATEA_AT - PEAK EXPIRATORY FLOW RATE	Negative Ranks	20[s]	10.50	210.00	-4.379	.000	38.8%
	Positive Ranks	0[t]	.00	.00			

Table 5: Wilcoxon Signed Ranks Test Group B.

Group B		N	Mean Rank	Sum of Ranks	Z Value	P Value	% Relief
SWASAKRICHRATA_AT – SWASAKRICHRATA	Negative Ranks	20[a]	10.50	210.00	-4.300[b]	.000	66.6%
	Positive Ranks	0[b]	.00	.00			

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PEENASA_AT – PEENASA	Negative Ranks	20[d]	10.50	210.00	-4.093[b]	.000	66.6%
	Positive Ranks	0[e]	.00	.00			
KASA_AT – KASA	Negative Ranks	20[g]	10.50	210.00	-3.993[b]	.000	80.3%
	Positive Ranks	0[h]	.00	.00			
GHURGHURKAM_AT – GHURGHURKAM	Negative Ranks	20[j]	10.50	210.00	-4.028[b]	.000	81.4%
	Positive Ranks	0[k]	.00	.00			
KRICHRABHASANA_AT – KRICHRABHASANA	Negative Ranks	20[m]	10.50	210.00	-4.018[b]	.000	81.8%
	Positive Ranks	0[n]	.00	.00			
SHAYANASWASAPIDITA_AT – SHAYANASWASAPIDITA	Negative Ranks	20[p]	10.50	210.00	-4.058[b]	.000	71.1%
	Positive Ranks	0[q]	.00	.00			
PEAKEXPIRATORY FLOWRATEA_AT - PEAK EXPIRATORY FLOW RATE	Negative Ranks	20[s]	10.50	210.00	-4.088[b]	.000	98.07%
	Positive Ranks	0[t]	.00	.00			

Table 6: Mann-Whitney test between the Groups

Between the Groups	Group	N	Mean Rank	Sum of Ranks	Z Value	P Value
SWASAKRICHRATA	Group A	20	21.50	430.00	-1.041	.298
	Group B	20	19.50	390.00		
	Total	40				
SWASAKRICHRATA_AT	Group A	20	25.75	515.00	-3.656	.000
	Group B	20	15.25	305.00		
	Total	40				
PEENASA	Group A	20	21.00	460.00	-1.442	.162
	Group B	20	20.00	360.00		
	Total	40				
PEENASA_AT	Group A	20	21.95	439.00	-1.718	.086
	Group B	20	19.05	381.00		
	Total	40				
KASA	Group A	20	21.50	430.00	-1.041	.298
	Group B	20	19.50	390.00		

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	Total	40				
KASA_AT	Group A	20	30.50	610.00	-5.891	.000
	Group B	20	10.50	210.00		
	Total	40				
GHURGHURKAM	Group A	20	21.50	430.00	-1.432	.152
	Group B	20	19.50	390.00		
	Total	40				
GHURGHURKAM_AT	Group A	20	30.25	605.00	-5.698	.000
	Group B	20	10.75	215.00		
	Total	40				
KRICHRABHASANA	Group A	20	21.50	430.00	-1.041	.298
	Group B	20	19.50	390.00		
	Total	40				
KRICHRABHASANA_AT	Group A	20	25.50	510.00	-3.606	.000
	Group B	20	15.50	310.00		
	Total	40				
SHAYANASWASAPIDITA	Group A	20	21.50	430.00	-1.432	.152
	Group B	20	19.50	390.00		
	Total	40				
SHAYANASWASAPIDITA_AT	Group A	20	30.50	610.00		.000
	Group B	20	10.50	210.00	-5.971	
	Total	40				
PEAK EXPIRATORY FLOW RATE	Group A	20	20.45	409.00	-.035	.972
	Group B	20	20.55	411.00		
	Total	40				
PEAKEXPIRATORYFLOWRATEA_AT	Group A	20	30.33	606.50	-5.762	.000
	Group B	20	10.68	213.50		
	Total	40				

Table 7: Overall effect

Overall effect	Group A		Group B	
	%	N	%	N
Marked improvement	0	0	50%	10
Moderate improvement	10%	2	50%	10
Mild improvement	90%	18	0	0
No change	0	0	0	0
Total	100	20	100	20

DISCUSSION

Tamakaswasa is a chronic disease *of Pranavaha Srotas*. It is among the five varieties of *Swasa.* Out of which it is having *Swantantra* nature and having its own etiology, pathology and management, remaining all are *Pratantra. Tamakaswasa* is a chronic disease of *Pranavaha Srotas* characterized by *Swasa Kastata, Ghurghuraka, Kasa, Shayanasya Swasapidita, Peenasa* with patient feels as if entering darkness during the paroxysmal attack which is due to unwholesome association of *Vata* and *Kapha* obstructing the passage

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of *Pranavata* leads to excitement of *Vata* to produce upward movement or abnormal expiratory dyspnea.[22]

Analysis of textual reference regarding the etiology of *Tamakaswas*a discloses the fact that *Vatakara Nidana, Kaphakara Nidana, Vyanjaka Nidana* and *Rogotha Nidana* plays a significant role in the manifestation of this illness. The etiological factors either in the form of the imperfect dietetic practice, behavioral errors, or due to the abuse by the environmental factors leads to morbidity of *Kapha* and *Vata Dosha* which are judged to be the *Utpataka Hetus* of *Tamakaswasa*. *Agnimandya* is also one of the symptoms usually observed and in case of *Aharaja Nidana, Ama Utpatti* is one of the main factors leading *to Kapha Prakopa*. This shows the involvement *of Annavaha Srotas*.[23] *Prana Vata* is the one which is the prime in *Swasa Karma* and there will be derangement in the function of *Swasa* due to vitiation of it through any means. By the above mentioned *Nidana,* vitiated *Vata* enters to *Pranavaha Srotas* cause *Rukshata* and *Katinyata* of the *Srotomarga* resulting in *Srotosanga.* The *Vata* gets exaggerated in *Pranavaha Srotas* due to *Srotosanga* because of obstruction in *Pranavaha Srotas, Vata* changes its direction (*Vimarga Gamana*) results in *Sankocha*.

Discussion on Pretreatment observation

Total 50 patients were registered for the study, out of which 10 were drop out. 40 patients completed the trial and the observation done on those 40 patients as follows.

1. **Age:** Out of 40 patients of *Tamakaswasa* maximum number of patients i.e., 50% were of 41-50 years of age group. After covid older people mostly effected with chest infections.
2. **Gender:** In the present study, out of 40 patients, 60% were females. This shows the increase incidence of disease in females. Although childhood Asthma is more prevalent in boys than in girls but after puberty the prevalence & severity of Asthma has increased in women, mainly after menarche and due to multiple gestation. This shows the role of sex hormones in the Asthma genesis. Also, testosterone decreases Th2-mediated airway inflammation and that females have increased IL-17A –mediated airway inflammation compared to males.
3. **Religion:** In the present day, maximum number of patients i.e., 97.5% were from Hindu community & 2.5% of patients were Muslims but that is because the study was conducted in Hindu dominant area.
4. **Occupation:** It has been observed that among 40 patients, 52.5% were private job (like factory, mechanics). This may be due to high risk of exposure to dust, irregular dietary habits which is known to produce respiratory disease.
5. **Socio-economic status:** Concerning the socio-economic status of patients, 50% of patients belong to higher middle class. After covid those persons mostly affected who do not do much physical work.
6. **Food habits:** Among 40 patients, maximum numbers of patients i.e., 80% used to take mixed diet. Non vegetarian foods mixed with *Vyanjakas* and its *Guruthva* in getting digested, lead to the formation of *Ama* and *Sroto- Abhishyanda* which in turn causes vitiation of *Tridosha* in *Amashaya*.
7. ***Agni*:** Out of 40 patients regarding the status of *Agni, Mandagni* was seen in 55.0%. This may be because, origin of *Tamakaswasa* is from *Pittasthana* i.e., *Amashaya*.
8. ***Kostha*:** Out of 40 patients regarding the nature of *Kostha, Madhyama Kostha* was noted in 45.0, because of *the Vimargagamana* of *Vata Dosha* which afflicts *the Apana Vata*.
9. ***Prakruti*:** Out of 40 patients, majority belonged to *Vata Kapha Prakruti* i.e., 67.5% because the study was conducted in *Aanup Desha* so maximum patient have *Vata Kapha Prakruti*.
10. ***Vyayama Shakti*:** Out of 40 patients, *Madhyama Vyayama Shakti* was found in majority of the patients i.e., 85%, because during exercise asthmatic patient suffering from dyspnea and *Vata, Kapha* are main aggravating factor for *Swasa Roga*.

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11. ***Swasakrichrata*:** Out of 40 patients, in Group A and Group B, maximum patients were suffering from *Swasakrichrata* continuous during morning and night with disturbing activity i.e., 90.0%, because all patients were suffering from Asthma and this symptom is very common in asthmatic patients.
12. ***Peenasa*:** Out of 40 patients, maximum patients were those suffering from *Peenasa* symptom present often even without attack i.e., 87.5%, because all patient were *Vata Kapha Prakruti*.
13. ***Kasa*:** Out of 40 patients, maximum patients were suffering from *Kasa* symptom continuous during morning and night with disturb activity i.e., 90%.
14. ***Ghurghurkam*:** Out of 40 patients, maximum patients were suffering from symptom *Ghurghurkam* with loud inspiration and expiration wheeze i.e., 95.0%, because chest congestion is very common symptom in asthmatic patients.
15. ***Krichrabhasana*:** Out of 40 patients, maximum patients were suffering from *Krichrabhasana* symptoms lasting for more than 3 hours i.e., 90%.
16. ***Shayanaswasapidita*:** Out of 40 patients, maximum patients were suffering from symptom *Shayanaswasapidita* in which patient was able to take sleep only after taking support of 2-3 pillows i.e, 85%.because due to chest congestion its difficulty in lying down position.
17. **Peak expiratory flow rate:** Out of 40 patients, maximum patients were 60% of the predicted value i.e., 72.5%. because all patients have shortness of breath.

Discussion on Post treatment observation (Result)

***Dhuma Nasya* Group A**

***Swasakrichata*:** The *symptom Swasakrichata* was reduced and showed highly significant (52.5%) result at p<0.000.

***Peenasa*:** The symptom *Peenasa* was reduced and shown highly significant (65.5%) result at p<0.000.

***Kasa*:** The symptom *Kasa* was reduced and shown highly significant (33.3%) result at p<0.000.

***Ghurghurkam*:** The symptom *Ghurghurkam* was reduced and shown highly significant (36.3%) result at p<0.000.

***Krichrabhasana*:** The symptom *Krichrabhasana* was reduced and shown highly significant (66.6%) result at p<0.000.

***Shyanaswasapidita*:** The symptom *Shyanaswasapidita* was reduced and shown highly significant (33.3%) result at p<0.000.

Peak expiratory flow rate: PEFR was changes the readings and shown highly significant (38.8%) result at p<0.000.

Nebulization Group B

Swasakrichta: The symptom *Swasakrichta* was reduced and shown highly significant (66.6%) result at p<0.000.

***Peenasa*:** The symptom *Peenasa* was reduced and shown highly significant (66.6%) result at p<0.000.

***Kasa*:** The symptom *Kasa* was reduced and shown highly significant (80.3%) result at p<0.000.

***Ghurghrkam*:** The symptom *Ghurghurkam* was reduced and shown highly significant (81.4%) result at p<0.000.

***Krichrabhasana*:** The symptom *Krichrabhasana* was reduced and shown highly significant (81.8%) result at p<0.000.

***Shyanaswasapidita*:** The symptom *Shyanaswasapidita* was reduced and shown highly significant (71.1%) result at p<0.000.

Peak expiratory flow rate: PEFR was changes the readings and shown highly significant (98.07%) result at p<0.000.

Inter Group Comparison: Though both the groups were effective but better results were observed in group B comparatively.

1. ***Swasakrichata*:** Group B was found with better results with mean rank 15.25 and p value less than 0.05. Nebulizer relieves muscle tightening in the airways to help a person breathe more easily. The nebulizer turns liquid medicine into a mist, helping

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it reach the lungs faster, because the lungs have a large surface area, so that absorption is fast and ample.

2. ***Peenasa*:** Group B was found with better results with mean rank 19.05 and p value more than 0.05. The observed difference in ranks between Group A and Group B in the *Peenasa* test is not statistically significant.
3. ***Kasa*:** Group B was found with better results with mean rank 10.50 and p value less than 0.05. *Kasa* is an effort to expel the *Kapha* secreted in the *Pranavaha Srotas*. So, nebulization helps in liquefaction of the sputum and then only the diminishing of the cough is possible. In this study reduction of the cough implies the ability of medicine to liquefy the tenacious sputum.
4. ***Ghurghurkam*:** Group B was found with better results with mean rank 10.75 and p value less than 0.05. Wheeze (*Ghurghurkam)* is generated by vibration in the wall of the airway due to smooth muscle contraction. Nebulization helps for the *Kapha Vilayana* and thus helps for the reduction in *Sroto Sanga.*
5. ***Krichrabhasana*:** Group B was found with better results with mean rank 15.50 and p value less than 0.05. Nebulization helps to cure narrowing and irritation of the bronchial tubes, muscle spasms, mucosal inflammation and mucus accumulation.
6. ***Shyanaswasapidita*:** Group B was found with better results with mean rank 10.50 and p value less than 0.05. Nebulization treatment relaxes the breathing muscles and permits air to flow more easily in and out of the lungs.
7. **Peak expiratory flow rate:** Group B was found with better results with mean rank 10.68 and p value less than 0.05. The medication used in nebulizers help by losing the mucus in the lungs so it can be coughed out more easily, and by relaxing the airway muscles so that more air can move in and out of the lungs.

Discussion on mode of action of *Dhuma Nasya*

***Dhuma Nasya Dravyas* -** *Shatyadi Dravyas* (6 drugs from *Charkokt Swasahara Mahakshaya*) are having dominance of *Katu, Tikta* and *Kashaya Rasa, Laghu, Ruksha* and *Tikshna Guna, Ushna Virya, Katu Vipaka* properties of these drugs will remove the obstruction in *Pranavaha Srotas* made by vitiated *Kapha*, leading to *Samprapti Vighatana.*[24] *Dhuma Nasya* mentioned in classics increases the bioavailability of medicines in a gaseous form which can be suggested as an effective form of drug delivery.

According to Ayurveda, *Ushna Virya* helps in pacifying *Kapha* and *Vata. Ushna Virya* increases the basal metabolic rate, oxygen consumption and accelerates the breakdown of fat at the mitochondrial level. Drugs used for *Dhuma Nasya* which helps in stimulation of vasodilator nerves which are spread out on the superficial surface *of Urdhwanga*, this increases the blood circulation to the brain. These drugs are considered as Bronchodilators dilates the bronchial tubes that are constricted due to muscular spasm. These drugs act upon the bronchial tubes and dilate them thus making the breathing easy. When the *Nasya Dravya* are administered through the nasal cavity, the drug gets absorbed by the passive process across the cell wall directly through the cell membrane as lipid soluble medicine has greater passive absorption. The smoke of these drugs reaches lungs, bronchi and alveoli. Due to *Teekshna* property of drug, the tenacious sputum gets liquefy and comes out easily giving comfort to the patient. These drugs act as expectorants. Herbal drugs used in *Dhuma Nasya* are having anti-tussive, anti-inflammatory, anti-bacterial, anti-histaminic and anti-histamine action and also have potent inhibitory effect on prostaglandin synthesis. The anti-inflammation activity helps in reducing the inflammation & edema of the mucous membrane, lining the airway.

- The anti-tussive property helps to liquefy and drain the mucous plugged in airways causing obstruction, which has secreted from inflammatory cells thereby clearing the airway by providing respiration at ease and reducing the cough.
- The antihistamine property helps in inhibition of the mast cells thereby by stabilizing the release of

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chemical mediators like histamine, serotonin, leukotrienes.

- The inhibitory activity of the prostaglandin biosynthesis regulates the contraction and relaxation of smooth muscles of lungs thus helps in reducing the bronchospasm and inflammation.
- The antioxidants property reduces body inflammation in general helps to identify and nullify the disease causing free radicals.

Discussion on mode of action of Modified *Dhuma Nasya* (in the form of Nebulization)

Shatyadi Dravyas Arka mainly acts on *Tamaka Swasa* by its *Vatakaphahara* and *Ushna Veerya* properties. Its *Bhedana Karma* mainly helps in *Kapha Bhedana* and helps in clearing *Marga Avarana* caused by *Kapha* during an episode by providing easy movement of *Vayu.*

Tamaka Swasa can attain acute condition any time during the course of illness. In 69th sloka of *Swasa* and *Hikka Chikitsa Adhyaya* of *Charaka Samhita* it suggests if immediate measure is not instituted it is *Pranahara* (fatal).

Hence, *Atyayiki Chikitsa* i.e., emergency and supportive treatment should be instituted. Thus, the improvised method of inhalation of the drugs which would act on the target organ, the lung directly to the need of hour is established here.

The volatile oils when administered orally or inhaled with steam increase the respiratory secretions probably by direct stimulation. They act like expectorant which help in production of demulcent respiratory tract fluid that covers and protects the mucosa. They liquefy by increasing the secretions, expel out and relax the irritated mucosa. When these constituents are distilled the vapors collected and condensed will be more concentrated. The procedure can dispense the drug directly into the target organ through inhalation. Use of inhalation of *Arka* through nebulizer in mild to moderate condition is of utmost benefit to the patient, as it reduces the chest tightness along with good expectoration and a reduction the intensity of Ronchi.

Figure 1

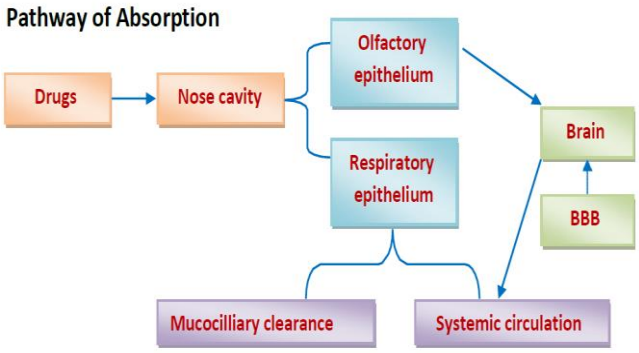
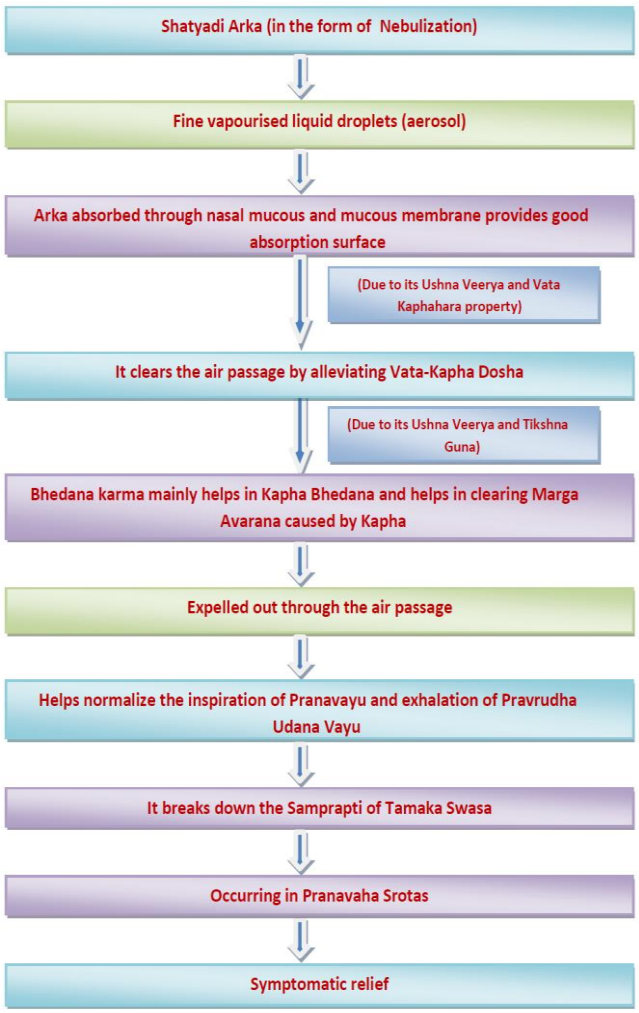


Figure 2



CONCLUSION

In present study, the *Shatyadi Dravyas Arka* has been able to show the effect after administration of nebulization in almost all criterias which proves the high concentration of active principles. Also signifies a faster action. There was statistically significant

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difference between Group A and Group B except *Peenasa.* Moderate reduction in the increased respiratory rate and pulse rate was observed after nebulization. On comparison between the groups, *Shatyadi Dravyas Arka* (Group B) showed a better result in improvement of symptoms such as *Swasakrichata, Kasa, Ghurghurkam, Krichabhasana, Shyanaswasapidita* and Peak Expiratory Flow Rate. Inhalation therapy is one of the oldest approaches to the therapy of respiratory- tract disease and it is well recognized today that the most effective and safe means of treating the lungs is to deliver drugs directly to the airways. Hence the above study proves its effectiveness in restoring the vital capacity of lungs.

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