

TULASI ARKA NEBULIZATION – AN INSTANT MANAGEMENT IN VEGAVASTA OF TAMAKA SWASA

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ABSTRACT

Introduction: *Tamaka Swasa* is a *Kapha pradhana Amashaya samutha vyadhi*, in which patient experiences severe symptoms of respiratory distress which requires emergency management. Study is conducted to achieve an immediate action by incorporating the process of nebulisation, where the medication is directly administered into the respiratory system. *Tulasi* has *Katu, Tiktha rasa, Laghu, Rooksha guna* and *Ushna veerya*, which pacifies *Vata* and *Kapha dosha* of *Tamaka Swasa*. *Charaka* has included *Tulasi* under *Swasagna gana*. On this background, the study is taken up to evaluate the efficacy of *Tulasi Arka* nebulization in *vegavasta* of *Tamaka Swasa*. **Materials and Methods:** Patients with *Vegavasta* of *Tamaka swasa*, fulfilling the diagnostic criteria was given with 5ml *Tulasi Arka* in the Trial group and 5ml Normal saline in the Control group, in the form of nebulization. Signs and Symptoms, PEFr were analyzed after 10 minutes of Nebulization. **Result:** Subjective and objective parameters were suitably graded to assess the results based on clinical observations before and after treatment. In Group A, 30% of patients got marked relief and 70% got moderate relief. In Group B, 90% of patients got moderate relief and 10% got mild relief. *Tulasi* has *Katu, Tiktha rasa, Laghu, Rooksha guna* and *Ushna veerya*. *Vata* and *Kapha Dosha* are pacified by the *Ushna veerya* of *Tulasi* and helps in *Kapha Vilayana*, thus helping in easy evacuation of the sputum. The obstruction thus removed, helped in increasing the functional ability of lungs.

Keywords: *Tamaka Swasa, Vegavasta, Bronchial Asthma, Nebulization, Tulasi Arka*

INTRODUCTION

Bronchial asthma is a respiratory disorder that has increased dramatically over the past two

decades. There has been increased interest in studies regarding effects of human health on

climate changes and urban air pollution. WHO mentions that around 235 million people around the globe are affected by Bronchial Asthma till 2013 and its alarming condition needs to be worked on. World-wide deaths from this condition have reached over 180,000 annually. India has an estimated 15-20 million asthmatics and it is seen as one of the leading cause of morbidity and mortality in rural India. Asthma is considered as a life threatening disease and emergency management is need of the hour.⁵

As per *Ayurveda*, *Tamaka Swasa* is a *yapya vyadhi kapha*. *Prana Vayu* moves in the reverse order, pervades the *srotas*, afflicts the *greeva* and *shira*, and stimulates to cause *pinasa* resulting in *tamaka swasa*.⁴

Nebulisation is a process involving suspension of fine vaporized liquid droplets otherwise known as aerosol, to administer medication directly into the respiratory system.⁸ *Ayurveda* also emphasizes the mode of administration of drug through nasal route (*nasya*) and using the drug in the form of fumes as *dhoomapana*.

Tulasi has *Katu-Tiktha rasa*, *Laghu-Rooksha guna* and *Ushna veerya*. *Vata* and *Kapha Dosha* are pacified by the *Ushna veerya* of *Tulasi*.⁴ *Acharya Charaka* has included *Tulasi* under *Swasagna gana*.¹

From the perspective of *Ayurveda*, there is no specific management which yields the instant effect in acute conditions of Bronchial Asthma. On this background the study has taken up to evaluate the efficacy of *Tulasi Arka* nebulization in *vegavasta* of *Tamaka Swasa*.

MATERIALS AND METHOD:

Materials:

Drug used for the study is *Tulasi Arka*⁶

Objective of the study:

- To find the effect of *Tulasi arka* nebulization in *vegavasta* of *Tamaka Swasa*.
- To find out the adverse effect of *Tulasi arka* nebulization (if any).

Source of data:

Literary source:

All the *Ayurvedic*, modern literatures and contemporary texts including the journals, websites reviewed and documented about the disease and drug for the study.

Pharmaceutical source:

The formulation selected for research work was prepared in Alva's Ayurveda Pharmacy, Mijar.

Table 1: Results of standardization parameters for *Tulasi Arka*

Parameter	Results n = 3 % w/w
Specific gravity	0.986
Viscosity	1.00793
Refractive Index (At 32°C)	1.3237
Volatile Matter	0.02
pH	6.13
Boiling Point	102°-103°C

Clinical source:

Patients were diagnosed and selected from the OPD and IPD of PG studies in *Kayachikitsa* of Alva's Ayurveda Medical College Hospital and also from Medical camps and other referrals.

Inclusion criteria:

- Patients between 16-60 years of age.
- Patients having *Tamaka swasa* with *Swasakastata*, *Ghurghuraka*, *Kasa*, *Muhurmuhu swasa*, *Kapha nishtiva*, *Pinasa* and

other classical symptoms of *Tamaka swasa*.

- Peak flow meter used to assess lung volume.

Exclusion criteria:

- Patients suffering from lung pathology other than Bronchial Asthma like COPD, Pneumonia, Malignancy and Pleural effusion etc.
- Patients with *Asadhya lakshanas* of *Tamaka swasa*.
- Dyspnoea of cardiac origin.
- Pregnant and lactating women.

Investigations:

- Chest X-Ray (for diagnosis wherever necessary)
- ECG (for diagnosis wherever necessary)

Study design:

Single blind randomized controlled clinical study was adopted. 40 patients fulfilling the diagnostic and inclusion criteria were selected randomly and were assigned into two equal groups (Group A and Group B)

Method of sampling: Lottery Method

Intervention:

Patients with *vegavasta* of *Tamaka swasa* were diagnosed and nebulization was given with 5ml *Tulasi arka* and 5ml Normal saline [control group] once for 5 minutes and the assessment was done after 10 minutes. The duration of the study was 15 minutes.

Assessment criteria:

Clinical features of *Tamaka swasa* and Peak Expiratory Flow Rate of patients were assessed before the treatment and after nebuliza-

tion. The improvement was assessed through interrogation and observation of the *lakshanas* with respect to subjective parameters and objective parameters. The findings before and after treatment were recorded in a specially designed case proforma. The details of the assessment criteria's are as follows:

SUBJECTIVE CRITERIA:

SWASA KASTATA:

G0 - No dyspnoea

G1 - Occasional or morning bouts-do not disturb work

G2 - Continuous during morning-disturbing work

G3 - Continuous during morning and night, disturbing activity

GHURGHURAKA:

G0 - No wheeze

G1 - Wheezing at end of respiration

G2 - Loud wheezing throughout expiration

G3 - Loud inspiration and expiration wheeze

MUHURMUHU SWASA:

G0 - No symptom

G1 - Symptoms lasting for <1 hour

G2 - Symptoms lasting for 1-3 hours

G3 - Symptoms lasting for more than 3 hours

KASA:

G0 - No cough

G1 - Occasional or Morning bouts-do not disturb work

G2 - Continuous cough during morning- disturbing work

G3 - Continuous morning & night cough – disturbs activity

KAPHA NISHTIVAM:

G0 - No symptom

G1 - Initially present or occasionally

G2 - Continuous in day with cough

G3 - Continuous in day and night with cough

PINASA:

- G0 - No symptom
- G1 - Initially present or occasionally
- G2 - Continuous in day with cough
- G3 - Continuous in day and night with cough

OBJECTIVE CRITERIA:

Peak Expiratory Flow Rate:

- G0 - >80 % of the predicted value
- G1 - 70-80 % of the predicted value
- G2 - 61-70 % of the predicted value
- G3 - 60 % of the predicted value

STATISTICAL ANALYSIS:

The effect of the drugs used has been critically analysed by the statistical data. Descriptive Statistical Data which includes Mean, Median, Standard Deviation, Standard Error, t-value, and P-value were calculated for all the variables. Post therapeutic effect of the drug administered is assessed by paired ‘t’ test. Comparative study of each parameters of either groups by unpaired ‘t’ test. For all tests, a ‘P’ value of < 0.05 is considered as the statistical significance level for obtaining absolute result.

RESULT:

Table 2: Effect of *Tulasi Arka* Nebulization in Subjective And Objective Parameters After 10 Minutes in Group A

CRITERIA	MEAN BT	MEAN AT	M.D	%	S.D	S.E	‘t’ VALUE	P VALUE
<i>Swasakastata</i>	2.5	0.85	1.675	66	0.671	0.150	11.000	<0.001
<i>Ghurghuraka</i>	2.5	1	1.75	60	0.607	0.136	11.052	<0.001
<i>Kasa</i>	2.65	1.15	1.9	57	0.688	0.154	9.747	<0.001
<i>Muhurmuhu swasa</i>	2.55	1.15	1.85	55	0.754	0.169	8.304	<0.001
<i>Pinasa</i>	0.85	0.4	0.625	53	0.605	0.135	3.327	< 0.001
<i>Kapha nishtivam</i>	1.8	0.45	1.125	75	0.933	0.209	6.469	<0.001
PEFR	2.2	0.85	1.525	61	0.489	0.109	12.337	<0.001

Table 3: Effect of Normal Saline Nebulization in Subjective And Objective Parameters After 10 Minutes in Group B

CRITERIA	MEAN BT	MEAN AT	M.D	%	S.D	S.E	‘t’ VALUE	P VALUE
<i>Swasakastata</i>	2.45	1.4	1.925	43	0.605	0.135	7.764	<0.001
<i>Ghurghuraka</i>	2.4	1.5	1.95	38	0.718	0.161	5.604	<0.001
<i>Kasa</i>	2.55	1.75	2.15	31	0.833	0.186	4.292	<0.001
<i>Muhurmuhu swasa</i>	2.7	1.55	2.125	43	0.670	0.150	7.667	<0.001
<i>Pinasa</i>	0.85	0.55	0.7	35	0.470	0.105	2.854	< 0.001
<i>Kapha nishtivam</i>	1.95	1.1	1.525	44	0.745	0.167	5.101	<0.001
PEFR	2.55	1.55	2.05	39	0.562	0.126	7.958	<0.001

COMPARATIVE EFFECT OF TRIAL GROUP ‘A’ AND CONTROL GROUP ‘B’

The assessment criteria of Group A and Group B are compared and analysed by unpaired t test. Comparison is done between the results obtained after treatment in both the groups.

CRITERIA	MEAN DIFFERENCE		T VALUE	P VALUE
	GROUP A	GROUP B		
SWASAKASTATA	1.65	1.05	2.971	< 0.05
GHURGHURAKA	1.5	0.9	2.854	< 0.05
KASA	1.5	0.8	2.896	< 0.05
MUHURMUHU SWASA	1.4	1.15	1.108	> 0.05
PINASA	0.45	0.3	0.876	> 0.05
KAPHA NISHTIVA	1.35	0.85	1.872	> 0.05
PEFR	1.35	1.00	2.101	< 0.05

OVERALL ASSESSMENT OF THE TREATMENT:

	GROUP A No of pts	%	GROUP B No of pts	%	TOTAL No of pts	%
COMPLETE RELIEF (100%)	0	0%	0	0%	0	0%
MARKED RELIEF (76 - 99%)	06	30%	0	0%	6	15%
MODERATE RELIEF (51 - 75%)	14	70%	18	90%	32	80%
MILD RELIEF (26 - 50%)	0	0%	2	10%	2	5%
NO RELIEF (0 – 25%)	0	0%	0	0%	0	0%

DISCUSSION

Tamaka Swasa is a chronic disease of Prana-vaha Srotas characterized by Swasa Kastata, Muhurmuhur Swasa ie; Teevra Vega Swasa, Ghurghuraka, Kasa, Shayanasya Swasa peeditha, Kaphanishtivam, Uraha peeda, Peenasa, Parshwashoola etc with patient feels as if entering darkness during the paroxysmal attack which is due to unwholesome association of Vata with Kapha obstructing the passage of Pranavata leads to excitement of Vata to produce upward movement or abnormal expiratory dyspnoea.¹

Analysis of textual reference regarding the aetiology of Tamaka Swasa 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, behavioural 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 Tamaka Swasa. Agni-mandya 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 Srotas². 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 the *Srotosanga*. The *Vata* gets exaggerated in *Pranavaha Srotas* due to *Srotosanga* because of localized increase of *Kapha*. Because of obstruction in *Pranavaha Srotas*, *Vata* changes its direction (*Vimarga Gamana*) results in *Sankocha*.⁴

Discussion on observations:

43 patients were registered for the study, out of which 3 were drop outs. 40 patients completed the trial and the observation done on those 40 patients are as follows:

1. Age: Out of 40 patients of *Tamaka swasa* maximum number of patients i.e. 35% were of 16-30years of age group. This corroborates with the fact that *Tamaka swasa* is more prevalent in the younger age groups. W.H.O. stated that prevalence of asthma has increased in the past two or three decades in young adults.

2. Gender: In the present study, out of 40 patients 55% were males. It may be attributed to the fact that most of them have high levels of the exposure to the etiological factors like dust, smoke etc.

3. Occupation: It has been observed that among 40 patients, 37.5% were labour, mechanics etc. This may be due to high risk of exposure to dust, irregular dietary habits which is known to produce respiratory diseases.

4. Socio-economic status: Concerning the socio-economic status of patients, 45% of patients belong to middle class. This might be partly due to higher level of the exposure to different kinds of allergens in the middle class

due to their competitive environment and low health care maintenance in those classes. This can be also accounted to the population characteristics.

5. Food habits: Among 40 patients, maximum numbers of patients i.e., 72.5% used to take mixed diet. Non vegetarian foods mixed with *Vyanjakas* and its *Guruthva* in getting digested, lead to the formation of *Ama* and *Srotho-Abhishyanda* which in turn causes vitiation of *Tridosha* in *Amashaya*.

6. Locality: Out of 40 patients, Maximum of patients belongs to rural area i.e. 67.5%, followed by 20% in urban area and 12.5% in suburban area. This may be due to the place where study was conducted.

7. Sleep habit: Out of 40 patients, Majority of patients i.e. 62.5% had disturbed sleep, whereas only 37.5% had sound sleep and due to which day sleep would be there. Day sleep is one of the contributing factors for *Swasa*. Breathlessness and other factors of the disease is also a reason for disturbed sleep.

8. Prakruti: Out of 40 patients, majority belonged to *Vata Kapha Prakruti* i.e. 47.5% where as 27.5% belonged to *Vata Pitta Prakruti* and 25% belonged to *Pitta Kapha Prakruti*.

9. Vyayama Shakti: Out of 40 patients, *Madhyama Vyayama Shakti* was found in majority of the patients i.e. 65%, followed by *Avara Vyayama Shakti* in 22.5% and *Pravara Vyayama Shakti* was found only in 12.5% patients because *vata* and *Kapha* are main aggravating factor for *Swasa roga*.

10. Koshta: Out of 40 patients regarding the nature of *Koshta*, *Madhyama Koshta* was noted in 55% followed by *Krura Koshta* 40% and *Mrudu* 5%. Majority of patients had *madhyama koshta*, the reason for this may be

the small sample size followed by *krura koshta*. Patient suffering from *Swasa roga* is known to have *krura koshta* because of the *Vimargagamana* of *Vata dosha* which afflicts the *Apana vata*.

11. Agni: Out of 40 patients regarding the status of *Agni*, *Mandhagni* was seen in 65%, *Teekshnagni* and *Vishamagni* in 12.5%, and *Samagni* in 10% individuals. This may be because, origin of *Tamaka Swasa* is from *pitta sthana* ie; *amashaya*.

Discussion on result:

Statistical analysis revealed that the treatment had significant effect on subjective and objective parameters in the trial group.

Effect of treatment on Swasakastata:

The symptom *Swasakastata* was reduced and showed highly significant result at $p < 0.01$ after the time period of 10 mins after Nebulization (66%) in group A and in group B Nebulization (43%). While comparing both the groups, there is Statistically Significant result at $P < 0.05$.

Breathlessness (*Swasakastata*) is due to broncho-constriction (*Srotosanga*) of the airway due to inflammatory causes like increased secretion of bronchial mucous gland and epithelial secretions etc. So this study shows reduction & clearance in the obstruction to the passage of *Pranavayu* by clearing the morbid *Kapha* which results in reduction of *Prana vilomata* by the treatment.

Effect of treatment in Ghurghuraka:

The symptom *Ghurghuraka* was reduced and showed highly significant result at $p < 0.01$ at the time period of 10 mins after Nebulisation (60%) in group A and in group B (38%).

While comparing both the groups, there is statistically significant result at $P < 0.05$.

Wheeze (*Ghurghuraka*) 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*.

Effect of treatment in Kasa

The symptom *Kasa* was reduced and shown highly significant result at $p < 0.01$ in the time period of 10 mins after nebulisation (57%) in group A and in group B, (31%). While comparing both the groups, there is statistically significant result at $P < 0.05$.

Kasa is an effort to expel the *Kapha (Malaroopa)* secreted in the *Pranavaha Srotas*. So on administration of medicine, there would have been action 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.

Effect of treatment in Muhur Muhur Swasa

The symptom *Muhur Muhur Swasa* was reduced and showed highly significant result at $p < 0.01$ in the time period of 10 mins after neb (55%) in group A and in group B (43%). While comparing both the groups, there is statistically insignificant result at $P > 0.05$.

Effect of treatment in Pinasa

The symptom *Pinasa* was reduced and shown highly significant result at $p < 0.01$ in the time period of 10 mins after nebulisation in group A (53%). While in group B it shows significant result (35%). While comparing both group there is statistically insignificant result at $P > 0.05$ was found.

Effect of treatment in *Kapha Nishtivanam*

The symptom *Kapha Nishtivanam* was reduced and shows highly significant result at $p < 0.01$ in the time period of 10 mins after nebulisation (75%) in group A and in group B (44%). While comparing both the groups, there is statistically insignificant result at $P > 0.05$.

Effect of treatment in PEFr

The objective criteria PEFr was reduced and shown highly significant result at $p < 0.01$ in the time period of 10 mins after nebulisation (61%) in group A and in group B (39%). While comparing both groups there is statistically significant result at $P < 0.05$. This may be due to the *Kapha Vilayana* property of the drug and enhances the normal *Gati* of *Vata*. It shows significant reduction in the airway obstruction.

Discussion on probable mode of action of drug:

Tulasi is having *Ushna Veerya*, *Katu Vipaka* and having *Vata Kapahahara*, *bhedana karma*. *Tulasi* is considered as an *Agraoushadhi* for *Tamaka Swasa*⁷. *Kapha Avarana Vata* is observed in the *Samprapti* of *Tamaka Swasa*. *Dhoomapana* is mentioned as one of the *Chikitsa* for *Tamaka Swasa*. In patients who are debilitated, purificatory procedure is not possible. In them *Dhoomapana* alone can be given which helps in the elimination of *Kapha Dosha*. It also brings relief by reducing spasm or stiffness of *Pranavaha Srotas*, thus ensures free movement for *Vata Dosha*. But it has been observed that *Dhoomapana* as a treatment modality is difficult to adapt as the patients feels difficulty in inhalation. The internal administration of *Tulasi* is mentioned in

Ayurvedic classics. The same is used in another route of administration as Nebulization where the drug is facilitated to show its *Guna & Karma* at *Sthanika* level (*Prana Vaha Srotas*).

The leaves of *Ocimum Sanctum* contain 0.7% volatile oil comprising about 71% eugenol and 20% methyl eugenol. The oil also contains carvacrol and sesquiterpine hydrocarbon caryophyllene. Fresh leaves and stem of *Ocimum Sanctum* extract yielded some phenolic compounds (antioxidants) such as cirsilinoleol, circimaritin, isothymusin, apigenin and rosameric acid and appreciable quantities of eugenol. Two flavonoids, viz; orientin and vicenin from aqueous leaf extract of *Ocimum Sanctum* have been isolated. *Ocimum Sanctum* also contains a number of sesquiterpenes and monoterpenes viz; bornyl acetate, elemene, neral, and pines, camphene, campestral, cholesterol, stigma sterol and sitosterol[9] have the anti inflammatory action in Asthma which have been proved.

The bronchial tubes become swollen and narrowed and mucus is secreted into the tubes from glands in the walls of the tubes. Inflammation of the bronchial tubes and their plugging with mucus makes difficulty in breathing. *Ocimum sanctum* has specific aromatic odour because of the presence of essential or volatile oil, mainly concentrated in the leaf. This aromatic volatile oil mainly contains phenols, terpenes and aldehydes.

Besides oil, the plant also contains alkaloids, glycosides, saponines and tannins. The leaves contain ascorbic acid and carotene as well. They promote the removal of the catarrhal matter and phlegm from the bronchial tube.

Since *Tulasi* contains phyto chemical constituents like alkaloids, glycosides, saponines and

tannins when it is administered into lung field directly through nebulisation, due to its Anti Inflammatory action succeeds to restrict the underlying pathology instantly. The anti-inflammatory effects of phenolic compounds are related to the ability in modulating the expression of pro-inflammatory genes, such as NOS, cyclo oxygenase, lipoxygenase.

In another way oxidative stress initiates a number of pathologic processes, including airway inflammation and also in exacerbation of pulmonary disease. The role of any particular phenolic antioxidant is directly associated with the capacity of the hydrogen radical donation from the phenolic group and the presence of an unpaired electron in the aromatic ring.⁹

CONCLUSION

After completion of the study the following conclusions were drawn:

In present study, the Trial drug has been able to show the effect after 10 mins of administration of Nebulization in almost all criterias which proves the high concentration of active principles. And also signifies a faster action. There was statistically significant difference between Trial group and Control group except in *Muhurmuhu swasa*, *Pinasa* and *Kaphanishtiva*.

Moderate reduction in the increased respiratory rate and pulse rate was observed after nebulization.

On comparison between the groups, *Tulasi Arka* showed a better result in improvement of the symptoms such as *Ghurghuraka*, *Muhurmuhu swasa*, *Swasa kashtata* and *Kasa* and in the objective parameter – Peak Expiratory Flow Rate. Hence H₁ hold good and proved.

Hence the above study proves its effectiveness in restoring the vital capacity of Lungs.

REFERENCES

1. *Agnivesha, Charaka Samhita* revised by *Charaka & Dridabala*, with *Ayurveda Dipika* comentary by *Chakrapanidatta*, foreword by *Acharya Yadavji Trikamji*, 5th edition. Varanasi, Choukhamba Sanskrit Sansthan, 2001.
2. *Vagbhata, Ashtanghrdayam Sarvangasundari* commentary of *Arunadatta* and *Ayurveda rasayana* commentary of *Hemadri*, Edited by *Bhishagacharya Harishastri Paradakara Vaidya*, 9th Edition, Varanasi: Choukhambha Orientalia; 2005.
3. *Sushruta, Sushruta Samhita*, with *Nibhandha Sangraha* comentary by *Dalhana*, foreword by *Acharya Yadavji Trikamji*. 8th edition, Varanasi: Choukhamba Sanskrit Sansthan, 2005.
4. *Acharya Madhavakara, Madhavanidanam* with *madhukosha Sanskrit* commentary by *Acharya Vijaya Rakshit* and *Shrikanta Datt*, Edited by Dr. Ravidatt Tripady, 1st Volume, 1st Edition – 1993 published by Varanasi choukamba Sanskrit Sansthan
5. Davidson's Principles and Practice of Medicine. Edited by Christopher Haslett, Edwin. R. Chilvers, Nicholasa. Boon, Nicki R. Colledge. International editor John A.A.Hunter 19th edition 2002
6. *Indradev Tripaty, Arkapraksha of langhapati Ravana* with hindi tika Reprint edition, Varanasi: Chaukamba orientalia; 2006.
7. Prof. P.VSharma, Dravyaguna vijyana, chaukambabharti academy, reprint2001, vol-2, Chaukhamba Bharati Academy, Varanasi, 1995.

8. Nebulizer guidelines. Directorate of Children's Service, 2006, Pg3-4.
 9. Sunitaverma, Chemical constituents and pharmacological action of ocimum sactum, the journal of phytopharmacology, 2016;5(5),pg 205-207
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