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Effect of *Sameera Pannaga Rasa* (arsenomercurial formulation) in the management of *Tamaka Shwasa* (bronchial asthma) - Randomized double blind clinical study

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Abstract

Asthma represents a profound world-wide public health problem. The most effective anti-asthmatic drugs currently available include β2-agonists and glucocorticoids which can controls asthma in about 90-95% of patients. In Ayurveda, this miserable condition is comparable with *Tamaka Shwasa* type of *Shwasa Roga*. In the present study, 52 patients were treated with *Sameera Pannaga Rasa* at a dose of 30 mg twice a day for 4 weeks along with *Nagavallidala* (leaf of *Piper betel* Linn.) The results were assessed in terms of clinical recovery, symptomatic relief, pulmonary function improvement and on subjective and objective parameters. A significant improvement in subjective parameters, control on asthma, recurrence of asthma, increase in peak expiratory flow rate, considerable decrease in total and absolute, acute eosinophil count and erythrocyte sedimentation rate were observed. Overall marked improvement was found in 33.33%, moderate improvement in 44.44% and mild improvement in 20.00% was observed. The study reveals that *Sameera Pannaga Rasa* can be used as an effective drug in bronchial asthma.

Key words: Bronchial asthma, pulmonary function, *Sameera Pannaga Rasa*, *Shwasa*

Introduction

Asthma represents a profound world-wide public health problem. The past decade has witnessed phenomenal increases in the incidences of asthma, asthma-related deaths and Glucocorticoids are the drugs frequently used (about 95%) in the treatment of bronchial asthma.[1] Currently glucocorticoid dependent asthma presents a great clinical burden and reducing the side-effects of glucocorticoids using novel steroid-sparing agents is needed.[2] However, the future therapies will need to focus on the 5-10% patients who do not respond well to these treatments and who account for approximately 50% of the health-care costs of asthma.[3] The surveys in adults show high prevalence of asthma symptoms and reduced lung functions particularly in lower socio-economic groups of the sufferers.[4,5] Asthma causes recurring episodes of wheezing, breathlessness, chest tightness and coughing, particularly at night or in the early morning. Common risk factors for asthma include exposure to allergens (such as those for house dust mites, animal with fur, cockroaches, pollens and mold),[6] occupational irritants,[7] tobacco smoke,[8] respiratory (viral) infections,[9] chemical irritants,[7] food allergies such as milk, peanuts and eggs[10] and psychological stress.[11] When airways are exposed to any of these risk factors; broncho-constriction will get manifested leading to inflammation. The airflow becomes limited and the patient suffers with the symptoms of asthma. The disease is comparable with Tamaka Shwasa type of Shwasa Roga in Ayurveda.[12] Ayurveda prefers a number of formulations to treat *Tamaka Shwasa*, which include few metallic preparation. *Sameera Panaga Rasa* (SPR) is an among such preperation, which is indicated in *Tamaka Shwasa*.[13]

SPR, an arsenal mercurial formulation is mentioned in *Rasa Chandanshu* in which *Manahshila* is not a component and later on it has been added by Ayurveda Aaushadhi Guna Dharma Shashtra. This later version has been accepted by Ayurvedic Formulary of India but, justification regarding the addition of *Manahshila* has not been provided. In addition to this; there is controversy regarding the final product,

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i.e., whether to collect *Talastha* or *Ubhayastha (Galastha + Talastha)*. Considering this, it is planned to prepare SPR with and without *Manahashila* and collect *Talastha* and *Ubhayastha* one and compare their respective clinical efficacies in *Tamaka Shwasa*.

Materials and Methods

Selection of patients

For this study, 52 patients of bronchial asthma were registered from the out-patient department and inpatient department of Rasashastra and Bhaishajya Kalpana including Drug Research, IPGT and RA, Gujarat Ayurved University, Jamnagar. Of all, seven patients were dropped out and 45 completed the prescribed course of treatment. No direct or indirect drug related reason for discontinue of patient was noticed. All the patients registered in the study were informed about the nature of treatment. The study was started after obtaining approval from the Institutional Ethics Committee.

Criteria for inclusion

1. Age between 20 to 60 years
2. Difficulty in breathing
3. Paroxysmal attacks of dyspnea
4. Difficulty in expectoration
5. Wheezing sounds
6. Relief in upright position.

Criteria for exclusion

1. Age below 20 and above 60 years
2. Acute asthma requiring emergency medicines
3. History of Bronchiectasis, Tuberculosis, Pyothorax, Anemia, Malignancy, Diabetes Mellitus, Hypertention, Hepatic or Renal disease in the recent past
4. Dyspnea resulting from cardiac disease
5. *Maha Shwasa*, *Urdhva Shwasa* and *Chhinna Shwasa* (types of breathlessness explained in classics) which have been labeled as incurable in Ayurveda.

Posology

The trial drug (SPR) was prepared in the departmental laboratory by following standard manufacturing procedures (SMP). The formulation composition is shown in Table 1. SPR prepared without *Manahshila* was labeled as SPR and that prepared with *Manahshila* was labeled as SPRM. Groups for clinical trial were as follows:

- Group A: Treated with SPR prepared without *Manahshila* - *Talastha* (SPRT)
- Group B: Treated with SPR prepared without *Manahshila* - *Ubhayastha (Galastha + Talastha)* (SPRU)
- Group C: Treated with SPR prepared with *Manahshila* - *Talastha* (SPRMT)
- Group D: Treated with SPR prepared with *Manahshila* - *Ubhayastha (Galastha + Talastha)* (SPRMU).

A capsule of 250 mg (containing 30 mg SPR + 220 mg starch powder) was administered twice a day for 28 days along with juice of *Nagavallidala* (leaf of *Piper betel* Linn.) as *Sahapana* (adjuvant). Follow-up was done after 2 weeks. Patients were advised not to get exposed to the susceptible triggering or aggravating factors narrated in Ayurveda as well as in modern texts.

Table 1: Formulation composition of *Sameera Pannaga Rasa*

Ingredient	Chemical/ Botanical name	Proportion
Sameera Pannaga Rasa (*Rasa Chandanshu*)		
Parada	Mercury	1 part
Gandhaka	Sulfur	1 part
Somala	White Arsenic	1 part
Haratala	Orpiment	1 part
Tulasi Patra swarasa	*Ocimum sanctum* Linn.	Q.S
Sameera Pannaga Rasa (AFI-I 15:8)		
Parada	Mercury	1 part
Gandhaka	Sulfur	1 part
Somala	White Arsenic	1 part
Haratala	Orpiment	1 part
Manahshila	Realgar	1 part
Tulasipatra swarasa	*Ocimum sanctum* Linn.	Q.S

SPRM: *Sameera Pannaga Rasa* prepared with manahshila, SPR: *Sameera Pannaga Rasa*

Laboratory investigations

Routine hematological, biochemical investigations, and peak expiratory flow rate (PEFR) were done before and after the treatment. Sputum examination and chest X-ray were carried out to exclude pulmonary tuberculosis and other pulmonary diseases.

Assessment criteria

Registered patients were advised to visit the OPD at regular intervals of a week. Subjective and objective parameters were recorded in terms of improvement in pulmonary functions and other investigations. Overall assessment of the treatment was made on the basis of the results of the investigations as well as the symptomatic relief.

Results and interpretation

Overall effect of therapy on each scale was calculated with reference to percentage improvement in all symptoms, the relief was assessed on the below criteria:

1. <25% - Poor response/unchanged
2. 26-50% - Mild improvement
3. 51-75% - Moderate improvement
4. 76-99% - Marked improvement
5. 100% - Complete remission.

Statistical analysis

Wilcoxon signed rank test was applied to evaluate the overall effect of therapy. Paired *t*-test was applied to evaluate the effect on hematological, biochemical investigation and PEFR.

Observations and Results

Four patients (33.33%) of SPRT group, four patients (36.36%) of SPRU group, two patients (20.00%) of SPRMT group and five patients of (41.67%) group SPRMU showed marked improvement. Five patients (41.67%) of SPRT group, five patients (45.45%) of SPRU group, three patients (30.00%) of

SPRMT group and seven patients of (58.33%) group SPRMU showed moderate improvement and three patients (25.00%) of SPRT group, two patients (18.18%) of SPRU group and four patients (40.00%) of SPRMT group showed mild improvement. In SPRMT group, one patient (10.00%) did not respond to the treatment. Overall results have been tabulated in Table 2. All the groups have been found to be statistically highly significant providing in relief [Table 3].

The reduction in eosinophils count, erythrocyte sedimentation rate (ESR) and total leucocyte count are found to be insignificant [Tables 4-7]. It was found in the study that, the duration, paroxysm, wheezing, chest tightness, nocturnal symptoms and dosage of allopathic emergency medicines were drastically reduced.

Interestingly, most of the patients in their follow-up period did not require the need of any emergency medication, particularly in SPRMU group followed by SPRT and SPRU group [Table 8]. Level of asthma control was higher in SPRMT group (50.00%) and in SPRU group (45.55%) [Table 9].

As per ACT score, it was found that by SPRMU and SPRT groups provided statistically significant results in control of asthma [Table 10]. No recurrence of attacks was observed during follow-up period in SPRMU group [Table 11].

Table 2: Overall effect of the therapy (In percentage)

Groups	SPRT		SPRU		SPRMT		SPRMU		Total	
Relief	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Unchanged	0	00.00	0	00.00	1	10.00	0	00.00	1	02.22
Mild improvement	3	25.00	2	18.18	4	40.00	0	00.00	9	20.00
Moderate improvement	5	41.67	5	45.45	3	30.00	7	58.33	20	44.44
Marked improvement	4	33.33	4	36.36	2	20.00	5	41.67	15	33.33
Complete remission	0	00.00	0	00.00	0	00.00	0	00.00	0	00.00

SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila-Talastha*, SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*

Discussion

Survey of available literature points out that, vitiation of *Vata*, *Kapha Dosha* along with *Prana*, *Udaka* and *Anna Vaha Srotas* and *Rasa Dhatu* are the responsible factors in the manifestation of *Tamaka Shwasa*. The disease *Shwasa* has its root in the *Pitta Sthana* endorsed by *Amashayodbhavaja Vikara*.[14]

Considering the aggravated *Vata and Kapha*, *Acharyas* have advised the use of *Vata kaphaghna*, *Ushna*, *Vatanulomaka* drugs as first line of treatment in *Shwasa*. However, adoption of certain specification is always required for the breakdown of the three pathways of *Samprapti*. Furthermore, drugs exhibiting quick control over vitiated *Vata* and *Kapha* are required during *Vegavastha*, while exerting action on *Agni* or *Pittasthana* along with *Vatakaphaghnata*. Hence, logically, the drug administered in the treatment of *Shwasa*, should be able to overcome *Vata* and *Kapha* for immediate and symptomatic relief but should also pacify the *Pitta* for relief. Vagbhata emphasizes that, a drug acts by its *Rasa*, *Vipaka*, *Virya*, *Guna* and *Prabhava*. Normally, the effect of *Rasa* is less than that of *Vipaka*. Effect of *Vipaka* is lesser than that of *Virya*, which further is lesser than *Prabhava*, provided all are present in equal proportions. The overall pharmacodynamics of SPR is *Katu Rasa*, *Ushna Guna*, *Ushna Virya*, *Katu Vipaka* and *Kapha*

Table 3: Effect of drugs on overall effect of therapy: (Applied Wilcoxon rank test)

Group (*n*=45)	*N*	Mean±SEM		Change		Actual rank (D)	'α'
		B.T	A.T	Mean±SEM	%		
SPRT	12	43.17±3.990	13.50±3.230	29.67±4.164	68.72↓	78***	<0.01
SPRU	11	41.36±3.270	13.82±3.46	27.55±3.361	66.59↓	66***	<0.01
SPRMT	10	48.90±5.271	23.70±5.676	25.20±2.719	51.53↓	55***	<0.01
SPRMU	12	48.42±4.222	15.17±2.528	33.25±3.740	68.67↓	78***	<0.01

Data: Mean±SEM, ↓: Decrease; *α<0.05, **α<0.02 ***α<0.01, SEM: Standard error of the mean, SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila-Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila-Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila-Talastha*, SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila-Ubhayastha (Galastha + Talastha)*

Table 4: Hematological results of SPRT (applied paired *t* test)

Parameter	*n*	Before treatment	After treatment	% Changes	*t* value	*P* value
Hb	12	12.36±0.47	12.93±0.93	04.51↑	2.33*	<0.05
TLC	12	7833.33±388.44	6733±217.539	08.80↓	1.46	>0.05
Eosinophils	12	3.75±0.28	5.00±0.73	33.33↑	0.22	>0.05
ESR	12	23.83±5.48	16.41±3.86	31.11↓	1.80	>0.05
AEC	12	279.17±25.72	354.17±55.89	26.87↑	1.28	>0.05
PEFR	12	178.33±32.497	255.00±31.515	42.99↓	3.56**	<0.01

Data: Mean±SEM, ↑: Increase, ↓: Decrease, *P < 0.05, **P < 0.01, ***P < 0.001, TLC: Total leucocyte count, ESR: Erythrocyte sedimentation rate, AEC: Acute eosinophil count, PEFR: Peak expiratory flow rate, SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SEM: Standard error of the mean

Table 5: Hematological results of SPRU (applied paired *t* test)

Parameter	*n*	Before treatment	After treatment	% Changes	*t* value	*P* value
Hb	12	12.77±0.320	12.83±0.27	0.42↑	0.22	>0.05
TLC	12	8463.64±627.59	8081.82±630.41	4.51↓	0.59	>0.05
Eosinophils	12	5.00±1.140	5.19±0.84	3.64↑	0.88	>0.05
ESR	12	26.36±6.230	26.91±8.40	2.07↑	0.08	>0.05
AEC	12	450.00±122.47	454.55±104.33	1.01↑	0.03	>0.05
PEFR	12	185.45±35.275	209.09±31.979	12.74↓	1.12	>0.05

Data: Mean±SEM,↑: Increase, ↓: Decrease, *P < 0.05, **P < 0.01, ***P < 0.001, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, TLC: Total leucocyte count, ESR: Erythrocyte sedimentation rate, AEC: Acute eosinophil count, PEFR: Peak expiratory flow rate, SEM: Standard error of the mean

Table 6: Hematological results of SPRMT (applied paired *t* test)

Parameter	*n*	Before treatment	After treatment	% Changes	*t* value	*P* value
Hb	12	12.01±0.67	11.94±0.50	0.58↓	0.26	>0.05
TLC	12	7300±614.46	7330±481.21	0.41↑	0.10	>0.05
Eosinophils	12	4.50±0.62	4.7±1.49	4.44↑	0.813	>0.05
ESR	12	17.20±3.79	27.1±10.04	57.56↑	1.150	>0.05
AEC	12	355.00±82.14	400.00±172.88	12.68↑	0.28	>0.05
PEFR	12	165.00±28.529	182.00±23.240	13.33↓	1.71	>0.05

Data: Mean±SEM,↑: Increase, ↓: Decrease, *P < 0.05, **P < 0.01,***P < 0.001, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila - Talastha*, TLC: Total leucocyte count, ESR: Erythrocyte sedimentation rate, AEC: Acute eosinophil count, PEFR: Peak expiratory flow rate, SEM: Standard error of the mean

Table 7: Hematological results of SPRMU (applied paired *t* test)

Parameter	*N*	Before treatment	After treatment	% Changes	*t* value	*P* value
Hb	12	12.61±0.53	12.16±0.50	2.38↓	1.19	>0.05
TLC	12	74863.64±783.33	6681.82±529.87	11.83↓	1.83	>0.05
Eosinophils	12	4.55±0.64	4.00±0.83	5.5↓	0.264	>0.05
ESR	12	32.73±7.56	28.09±5.64	10.44↓	1.04	>0.05
AEC	12	381.20±88.55	259.09±51.80	32.14↓	1.17	>0.05
PEFR	12	166.67±24.005	197.50±23.327	18.50↓	2.02	>0.05

Data: Mean±SEM, ↑: Increase, ↓: Decrease, *P < 0.05, **P < 0.01,***P < 0.001, SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*, TLC: Total leucocyte count, ESR: Erythrocyte sedimentation rate, AEC: Acute eosinophil count, PEFR: Peak expiratory flow rate, SEM: Standard error of the mean

Table 8: Effect of drugs on withdrawal of emergency drugs (applied Wilcoxon rank test)

Group (*n*=45)	*N*	Mean±SEM		Change		Actual rank (D)	'α'
		B.T	A.T	Mean±SEM	%		
SPRT	06	4.83±0.401	1.00±0.632	3.83±0.946	79.31↓	21*	<0.05
SPRU	08	4.50±0.327	1.50±0.008	3.00±0.567	66.67↓	28**	<0.02
SPRMT	05	3.00±1.265	1.60±0.748	1.40±1.470	46.67↓	7	>0.05
SPRMU	08	4.50±0.412	1.25±0.696	3.33±0.527	74.07↓	36***	<0.01

Data: Mean±SEM, ↓: Decrease, *α<0.05, **α<0.02, ***α<0.01, SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila - Talastha,* SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*, SEM: Standard error of the mean, AT: After Treatment, BT: Before Treatment

Table 9: Level of asthma control before treatment and after treatment

Level of asthma control	SPRT				SPRU				SPRMT				SPRMU			
	BT	%	AT	%	BT	%	AT	%	BT	%	AT	%	BT	%	AT	%
Controlled	0	00	7	58	1	9	5	45.5	1	10	5	50	0	0	9	75
Partialy controlled	4	33	5	42	3	27	5	45.5	2	20	3	30	5	42	3	25
Un controlled	8	67	0	00	7	64	1	9	7	70	2	20	7	58	0	0

SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila - Talastha,* SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*, AT: After treatment, BT: Before treatment

Table 10: Effect of SPRT on asthma control† (applied 'χ^2)

Group	ACT score	<19	≥19	Row total	χ^2	*P*
SPRT	BT	9	3	12	4.17**	<0.02
	AT	3	9	12		
SPRU	BT	10	1	11	2.063	>0.05
	AT	6	5	11		
SPRMT	BT	9	1	10	3.516	>0.05
	AT	4	6	10		
SPRMU	BT	11	1	12	6.40***	<0.01
	AT	4	8	12		

χ^2 value for Df 1*P < 0.05, **P < 0.02, ***P < 0.01, ****P < 0.002, ******P < 0.001, SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila - Talastha*, SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*, AT: After treatment, BT: Before treatment

Table 11: Recurrence asthma in follow-up period (in percentage)

Follow-up (2 weeks)	SPRT		SPRU		SPRMT		SPRMU	
	n	%	*n*	%	*n*	%	*n*	%
Recurrence	1	8.33	1	9.09	3	30	0	00
No recurrence	11	91.67	10	90.91	7	70	12	100

SPRT: *Sameera Pannaga Rasa* prepared without *Manahshila - Talastha*, SPRU: *Sameera Pannaga Rasa* prepared without *Manahshila - Ubhayastha (Galastha + Talastha)*, SPRMT: *Sameera Pannaga Rasa* prepared with *Manahshila - Talastha*, SPRMU: *Sameera Pannaga Rasa* prepared with *Manahshila - Ubhayastha (Galastha + Talastha)*

Vataghna.[15] These dynamic actions are helpful in breaking the pathogenesis of *Tamaka Shwasa*. Asthma is now accepted as a T-helper type 2 lymphocyte-mediated chronic inflammatory disorder, characterized by airway eosinophilia and airway hyper responsiveness. Eosinophils appear to play a crucial role in the ongoing inflammation due to either an impaired clearance or a delayed apoptosis in the airways, where accumulation of a number of eosinophils cytotoxic proteins including major basic protein, cationic proteins and peroxidase could occur. As2o3 could alleviate the airway inflammation through promoting pulmonary eiosinophils (PE) apoptosis and lower PE infiltration. Low dose of As2o3 is proved to be effective with relative safety, it also has potential value in treating asthma.[16]

In modern point of view SPR is Mercury-Arsenical (*Ubhayastha*) or Arsenical preparation (*Talastha*).

In preparation of SPR, *Tulsipatra Swarasa* (leaf of *Oscimum sanctum* Linn.) as *Bhavana Dravya* is advocated. Studies have been proved that leaf extract of *Ocimum sanctum* is effective against arsenic induced toxicity. *Ocimum sanctum* has significant role in protecting animals from arsenic induced oxidative stress and in the depletion of arsenic concentration.[17] It has been proved that *Ocimum* extract can protect against mercury toxicity in mice. It significantly enhanced reduced glutathione, which is suggested that oral administration of *Ocimum* extract provides protection against mercury induced toxicity in Swiss albino mice.[18] Thus, Oscimum may help in nullifying possible ADRs of SPR.[19]

In the present study, *Nagavallidala* (*P. betel*) was taken as *Sahapana* for SPR. Studies have proved inhibitory effects of *P. betel* Linn. on production of allergic mediators by bone marrow derived mast cells and lung epithelial cells. PE significantly decreased histamine and granulocyte macrophage colony stimulating factors produced by an IgE mediated hypersensitive reaction and inhibited eotaxin and IL-8 secretion in a tumor necrosis factor-α and IL-4 induced allergic reaction.[20] Reduction of oxidative stress induced by free radicals by virtue of its anti-oxidant properties and chelation of heavy metals thereby minimizing its toxic potential and increasing safety margins were also found to be reported.[21] Considering all these, it is assumed that, *Nagavallidala* can reduce arsenic induced oxidative stress as well as the control of allergic diseases through inhibition of production of allergic mediators.

Conclusion

The results reveal that the SPR has a significant action in cases bronchial asthma and it could suppress total leukocyte count, eosinophil count, ESR and can improve PEFR along with providing symptomatic relief. Analysis of the data generated during the study shows that; all the groups of SPR have been highly significant in treating the condition. However, comparative evaluation shows that SPRMU group is better followed by SPRT and SPRU where SPRMT is less effective comparatively. None of the treated patients developed any adverse effects during the study period.

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हिन्दी सारांश

समीर पन्नग रस का तमक श्वास पर चिकित्सात्मक अध्ययन

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तमक श्वास का उल्लेख प्रायः आयुर्वेद के प्रत्येक आर्ष ग्रन्थ में उपलब्ध है । प्रस्तुत संकलन में आयुर्वेदोक्त तमक श्वास का आधुनिक ब्रोन्कियल अस्थमा नामक रोग से साम्यता प्रदर्शित करते हुए आधुनिक निदान के आधार पर अंतरंग एवं बहिरंग विभाग के ५२ रुग्णों पर समीर पन्नग रस का अध्ययन ४ सप्ताह तक ३० मि.ग्रा. मात्रा मे, दिन मे दो बार, नागवल्लीपत्र के साथ किया गया । ३३.३३% रुग्णों मे अति उत्तम लाभ, ४४.४४% रुग्णों में उत्तम लाभ, २०.००% रुग्णों में अल्प लाभ प्राप्त हुआ । किसी रुग्ण पर कोई विषाक्त प्रभाव नही देखा गया एवं चिकित्सा पश्चात मूत्र मे पारद एवं मल्ल का प्रमाण सुरक्षित स्तर से अधिक नही पाया गया । परिणामों के आकंलन से यह ज्ञात होता है कि समीर पन्नग रस तमक श्वास मे अत्यंत प्रभावकारी एवं निर्दोष औषधि है ।