

# Evaluation of anti-microbial effect of Sushrutokta Vayu-Nirvishikarana yoga

## Research Article

Soubhaghyalaxmi B<sup>1</sup>, Gundakalle MB<sup>2\*</sup>, Vinay P S<sup>3</sup>

1. PG Scholar, 2. Associate Professor, Department of Agada Tantra, KAHER's Shri B M Kankanawadi Ayurveda Mahavidyalaya, Belagavi- 590003, Karnataka, India.  
3. Consultant Microbiologist, KLE Centenary Charitable Hospital and MRC, Yellur road, Belagavi and KAHER's Shri B M Kankanawadi Ayurveda Mahavidyalaya, Belagavi- 590003, Karnataka, India.

## Abstract

**Introduction:** With the presence of extensive number of various microbes in the living environment, there is need to explore few sustainable and safe practices to control the ill effects of the microbes. In Indian tradition the *Dhoopana* (fumigation process) is well established since time immemorial and it is practiced regularly for different purposes. Many of the formulations quoted in the classics are already in practice. *Acharya Sushruta*, in *Kalpasthan* quotes the use of *Vayu Nirvishikarana Yoga* for *Dhoopana-artha* in the *chikitsa* of *Dushita Vayu*. Therefore, it is necessary to adopt safer methods like *Dhoopana* with the herbal formulations for the disease control. **Methods:** *Vayu Nirvishikarana yoga* comprising of 11 drugs, predominantly constitutes of volatile oils, alkaloids and tannins from the respective drugs. There are proven studies over the antimicrobial property, anti-oxidant properties of various drugs of this formulation. **Results:** The study was conducted to showcase the efficacy of the *Dhoopana yoga* in an indoor environment in terms of limiting the microbial load. The results of this work showed considerable results with sufficient scope for further studies. **Conclusion:** *Krimighna* and *Vishaghna gunas* of these drugs used in this formulation can be justified as explained in the classics. After evaluating the existing data about *Dhoopana* process and executing the study, its effectiveness becomes self-evident, but scientific approach and evidence are required to mainstream them and to establish the formulations as primary disinfection measures.

**Keywords:** *Dhoopana*, *Vayu Nirvishikarana yoga*, Anti-microbial property, Microbial load.

## Introduction

In the science of Ayurveda, the group of diseases of viral, bacterial or origin from any other microorganism can be conglomerated as the group of Diseases of exogenous origin (*Agantuja rogas*)(1).

Various methods are described in our classics to get rid of from these diseases. *Acharya Charaka* mentions about *Janapadodhwamsa* through the aspects of '*Vayu Dushti*', '*Jala Dushti*', '*Desha Dushti*' and '*Kala Dushti*'(2). The fumes produced by burning the herbal components have been proved effective to reduce airborne infections (3).

The air contains millions of microorganisms. A cubic meter of air has 10 to 10,000 microbes. The species can survive temperatures above boiling point to below -20 degrees Celsius. To reproduce and live, some need moisture. Approximately 20-25% of microbes are not pathogenic. The rest cause various diseases. Statistics of disease prevalence shows that air borne diseases are comparatively more than vector borne

diseases. Thus, it is judicious to disinfect the area where we reside to avoid the manifestation of various infectious diseases (4).

Ayurveda has emphasised the need of disease prevention by outlining several approaches. *Dhoopana* is one of numerous precautions mentioned for cleaning and defence against venomous animals and insects. For *Dhoopana*, formulas of herbal, herbo-mineral, and animal origin are employed that include volatile oil and have antibacterial properties. Utilising such substances for fumigation is a cost-effective, natural, and safe method (5).

Medicinal drug or mixture of medicinal drugs burnt in a specific way to produce smoke is called as *Dhoopa* (6). *Dhoopana* by eliminating the bacteria, generates an aseptic environment that stops infection. In *Dhoopana* only natural substances are used which is harmless for the environment and to the human beings. Herbs, minerals, and sometimes animal products like hair, horn etc are mixed in varying combinations and used. *Ayurveda* explains *Dhoopana* as a part of *Raksha Vidhi* to ensure protection against disease causing microbes (7).

With careful analysis of different *Dhoopana yogas*, it can be found that they are *Agni-Vayu* (~fire and air) *Mahabhuta* (basic constituents of the body as per Ayurveda) dominant being hot and penetrating in nature, these *Dhoopana yogas* helps in mitigation of *Vata-Kapha Dosh*(8). Most of the plant products used

### \* Corresponding Author:

#### Gundakalle MB

Associate Professor, Department of Agada Tantra, KAHER's Shri B M Kankanawadi Ayurveda Mahavidyalaya, Belagavi- 590003, Karnataka, India.  
Email Id: [mahadevgundakalle.kaher@kleayurworld.edu.in](mailto:mahadevgundakalle.kaher@kleayurworld.edu.in)

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for *Dhoopana* are volatile in nature, hence would prove to be advantageous in bringing down the microbial infestations in the atmosphere and on hard-to-reach surfaces. The environmental conditions such as moisture and humidity favour the multiplication of microbes. Medicated fumigation is an exclusively exothermal mechanism which releases heat and smoke. The attributes of *Agni and Vayu Mahabhutas* like *Rukshatva* (~dryness), *Ushnatva* (~heat), *Laghu* (~lightness), *Visada* (~clear), *Teekshnatva* (~penetrating nature) helps to reduce the humidity and dampness of the environment. The fumes and carbon dioxide released during the combustion of drugs promotes the formation an anaerobic atmosphere which destroys the substratum for the survival of the microbes (9).

The chemical disinfectants have been in use worldwide for environmental sanitation and disinfection. But in the transient time, microbial resistance is usually observed from their use. Moreover, constant exposure to these chemicals is hazardous to the environment and be a causative agent for various

respiratory, allergic and skin disorders in the people exposed to it (9).

**Aims and Objectives**

To evaluate the Anti-microbial properties of *Dhoopana* of *Sushrutokta Vayu Nirvishikarana Yoga*.

**Review of Literature**

*Vayu Nirvishikarana yoga* has been mentioned in *Sushruta Samhita, kalpasthana; Jangama visha vijnaniyam kalpa: 3<sup>rd</sup> chapter, 17 sloka* (10).

**Materials and Methods**

**Collection and Authentication of raw materials**

*Vayu Nirvishikarana yoga* contains 11 herbal drugs (Table no. 1) which were collected from GMP certified KLE Ayurveda Pharmacy, Khasbag, Belagavi.

The authentication, analytical test and the quality assessment were carried out in Drug Testing Laboratory (DTL) for ASU drugs, KAHER's Shri B. M. Kankanawadi Ayurveda Mahavidyalaya, Belagavi.

**Table. 1: Name, Botanical name, Part used and Ratio of *Vayu Nirvishikarana yoga Churna***

SL.NO	SANSKRIT NAME	BOTANICAL NAME	PART USED	RATIO
1	<i>Laksha</i>	<i>Lacifera lacca</i> Kerr.	<i>Niryasa</i> (Exudate)	1
2	<i>Haridra</i>	<i>Curcuma longa</i> Linn.	<i>Kanda</i> (Rhizome/Tuber)	1
3	<i>Ativisha</i>	<i>Aconitum heterophyllum</i> Wall.	<i>Mula</i> (Root Tuber)	1
4	<i>Abhaya</i>	<i>Terminalia chebula</i> Retz.	<i>Phala majja</i> (Fruit rind)	1
5	<i>Abda</i>	<i>Cyprus rotundus</i> Linn.	<i>Mula</i> (Tuber)	1
6	<i>Nirgundi beeja (Harenuka)</i>	<i>Vitex negundo</i> Linn.	<i>Beeja</i> (Seeds)	1
7	<i>Ela</i>	<i>Elettaria cardomomum</i> Maton.	<i>Beeja</i> (Seeds)	1
8	<i>Dala</i>	<i>Cinnamomum tamala</i> Nees.	<i>Patra</i> (Leaf)	1
9	<i>Vakra</i>	<i>Valeriana wallichii</i> DC.	<i>Mula</i> (Root)	1
10	<i>Kushta</i>	<i>Saussurea lappa</i> .B.Clarke.	<i>Mula</i> (Root)	1
11	<i>Priyangu</i>	<i>Callicarpa macrophylla</i> Vahl.	<i>Phala</i> (Fruit)	1

**Figure 1:  
LAKSHA**



**Figure 2:  
HARIDRA**



**Figure 3:  
ATIVISHA**



**Figure 4:  
ABHAYA**



**Figure 5:  
ABDA**



**Figure 6:  
HARENUKA**



**Figure 7:  
ELA**



**Figure 8:  
DALA**



**Figure 9:  
VAKRA**



**Figure 10:  
KUSHTA**



**Figure 11:  
PRIYANGU**



### Preparation of *Vayu Nirvishikarana Yoga Churna*:

The required parts of the drugs were taken, cleaned and dried well in shade. The individual drugs were pound into powder using a Pulveriser. The powder was collected and sieved through sieve of 20 mesh size to obtain moderately coarse *Churna*. Individual *churna* were mixed in the quantity of equal proportions and used for the purpose of *Dhoopana* (22)

Packaging and Storage – Stored in an Air tight container to avoid contact with moisture.

**Table 2. Rasapanchaka of *Vayu Nirvishikarana Yoga***

CLASSICAL NAME	RASA	GUNA	VEERYA	VIPAKA	DOSHAKARMA	KARMA
<i>Laksha</i> (11)	<i>Tikta, Kashaya, Madhura</i>	<i>Laghu, Snigdha</i>	<i>Sheeta</i>	<i>Katu</i>	<i>Kapha – Pitta shamaka</i>	<i>Kushtagna.</i>
<i>Haridra</i> (12,13)	<i>Tikta, Katu</i>	<i>Ruksha, Laghu</i>	<i>Ushna</i>	<i>Katu</i>	<i>Kapha – Vata shamaka</i>	<i>Vishagna, Krimighna.</i>
<i>Ativisha</i> (14,15)	<i>Tikta, Katu</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	<i>Kapha – Pitta shamaka, Tridosha hara</i>	<i>Vishagna, Krimighna.</i>
<i>Abhaya</i> (16,17)	<i>All Rasas except Lavana (Kashaya pradhana)</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Madhura</i>	<i>Tridosha shamaka</i>	<i>Vishagna, Hrdya, Lekhana.</i>
<i>Abda</i> (18,19)	<i>Tikta, Katu, Kashaya</i>	<i>Laghu, Ruksha</i>	<i>Sheeta</i>	<i>Katu</i>	<i>Kapha – Pitta shamaka</i>	<i>Vishagna, Lekhana.</i>
<i>Harenuka</i> (20)	<i>Tikta, Katu, Kashaya</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	<i>Vata – Kapha shamaka</i>	<i>Krimighna.</i>
<i>Ela</i> (21,22)	<i>Katu, Madhura</i>	<i>Laghu.</i>	<i>Sheeta</i>	<i>Madhura</i>	<i>Tridosha shamaka</i>	<i>Sugandhi, Hrdya.</i>
<i>Dala</i> (23,24)	<i>Katu, Madhura</i>	<i>Tikshna, Laghu, Picchila</i>	<i>Ushna</i>	<i>Katu</i>	<i>Kapha – Vata shamaka</i>	<i>Deepana, Ruchya.</i>
<i>Vakra</i> (25, 26)	<i>Tikta, Kashaya, Katu</i>	<i>Laghu, Snigdha</i>	<i>Ushna</i>	<i>Katu</i>	<i>Tridosha hara, Kapha – Vata shamaka</i>	<i>Vishagna.</i>
<i>Kushta</i> (27,28)	<i>Katu, Tikta</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	<i>Vata-Kapha shamaka</i>	<i>Vrsya, Varnya, Deepana.</i>
<i>Priyangu</i> (29,30)	<i>Tikta, Kashaya</i>	<i>Ruksha</i>	<i>Sheeta</i>	<i>Katu</i>	<i>Kapha – Pitta hara, Tridosha shamaka</i>	<i>Vishagna.</i>

### Methodology of Anti-microbial Study

Site: A quarantine room of Animal Experimentation laboratory of KAHER's Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahapur, Belagavi.

#### Preparation of the Media plates

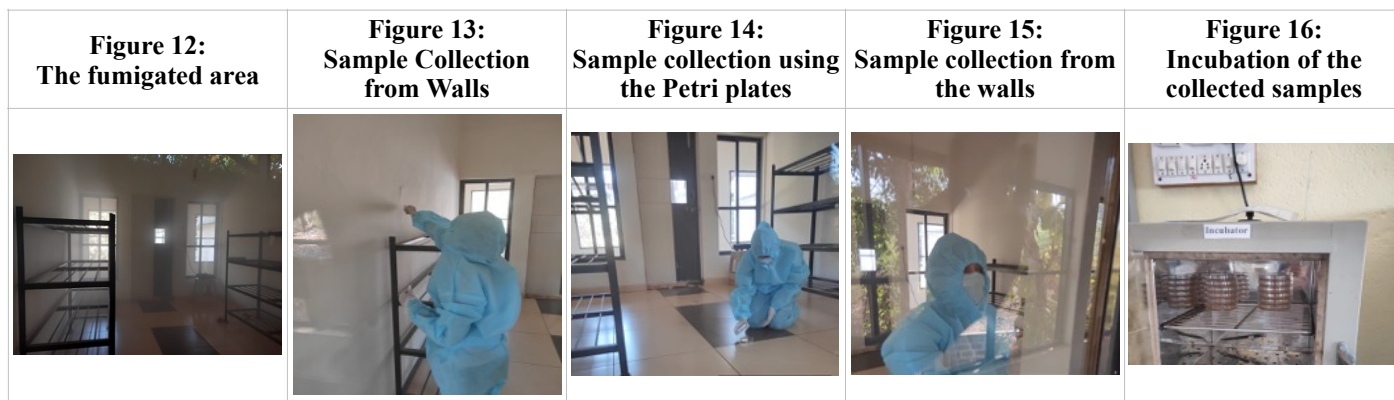
- 28 grams of Nutrient Agar was suspended in 1000ml of distilled water.
- The mixture was boiled well to dissolve the medium completely.
- The media was sterilized by autoclaving at 121°C for 15 minutes and cooled for 15 minutes.
- The media was mixed well and poured into sterile petri plates.
- The plates were incubated to observe for any microbial contamination.
- If remains non-contaminated, it was used for the further study.

### Methodology of *Dhoopana* (Fumigation) and Collection of samples

- A room of 10 x 12 feet dimension was chosen.
- All the doors and windows were properly sealed prior to the procedure.
- All the necessary aseptic measures were adopted while carrying out the sampling.
- The sites of sample collection were marked priorly for the precise results.
- The sampling was done by placing petri plates with the media, kept one at each corner and two plates diagonally in the centre of the room. 1 swab sample was collected from each of the 4 walls of the room.
- The first set of samples were collected on the first day of the study. (Day 1)
- The procedure of *Dhoopana* (Fumigation) was carried out by burning around 400 grams to 500 grams of the formulation *Vayu Nirvishikarana yoga churna* using a hot plate for over 50 minutes after the collection of the first sample.

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- The room was closed thoroughly with restricted access throughout the study.
- The second set of samples was collected after 48 hours of *Dhoopana*. (Day 3)
- The third set of samples was collected after 96 hours. (Day 5)
- All the sampling plates and swabs were incubated for 24 hours at temperature of 37 ° C to allow the growth of bacterial colonies.
- The microbial load was assessed by counting the bacterial colonies in each petri plates.



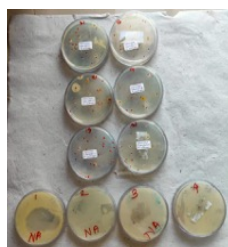
**Observations and results**

**Table 3: Observations of the samples recorded**

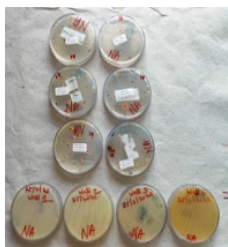
S.No	SITE OF SAMPLE	COLONY COUNTS AFTER INCUBATION		
		Before Fumigation (Day 1)	After Fumigation (Day 3)	After Fumigation (Day 5)
1	Settle Plate 1	21	18	13
2	Settle Plate 2	16	13	13
3	Settle Plate 3	21	17	21
4	Settle Plate 4	14	17	17
5	Settle Plate 5	19	14	11
6	Settle Plate 6	21	22	16
7	Swab 1	Too numerous to count	Too numerous to count	Too numerous to count
8	Swab 2			
9	Swab 3			
10	Swab 4			

Aroma of the yoga persisted up-to 7 days after *Dhoopana*.

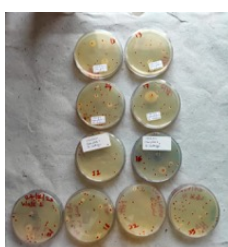
**Figure 17: Media plates of Day 1**



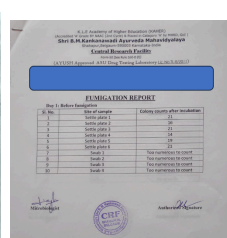
**Figure 18: Media plates of Day 3**



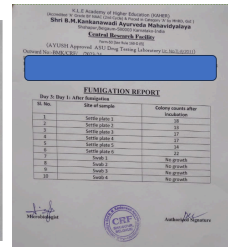
**Figure 19: Media plates of Day 5**



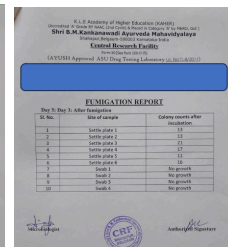
**Figure 20: Fumigation report of Day 1**



**Figure 21: Fumigation report of Day 3**



**Figure 22: Fumigation report of Day 5**



**Discussion**

Upon evaluation, a reduction in the number of microbial colonies was observed on Day 5 following *Dhoopana*. However, wall swab samples exhibited numerous colony growth post-procedure. The lingering aroma from the combustion of *Vayu Nirvishikarana yoga* persisted for almost a week after fumigation.

The *dhoopana* was carried out for 50 minutes by using a hotplate. The room was tightly closed and

sealed when *dhoopana* was being performed. The room was completely filled with fumes. No adverse reaction like irritation to the eyes and nose were recorded as the room was sealed immediately after fumigation and the second set of samples were collected only after 48 hours of *dhoopana*.

All components of *Vayu Nirvishikarana yoga*, including medicinal herbs like *Laksha Haridra*, *Ativisha*, *Abhaya*, *Musta*, *Ela*, *Dala*, *Kushta*, and

*Priyangu* are renowned for their antimicrobial properties. (32-40) The formulation's antibacterial and antiseptic attributes can be attributed to the action of phytoconstituents such as tannins, alkaloids, and volatile compounds like Curcumin, Phytosterols, Cineol, Limonene, Camphene, Terpinene, Eugenol, Isoeugenol, Calareneol, Elemol, Nardol, etc. These make it an effective solution for reducing microbial load in the environment. The fumes produced act as a germicidal agent, safeguarding against harmful effects on nearby individuals. Compared to chemical fumigation, *Dhoopana dravyas* are aesthetically pleasing, cost-effective, and less irritating, rendering them non-toxic and highly safe.

The study did not screen samples for bacterial strains, as its primary focus was to establish the formulation's antibacterial properties in general.

Future research could extend the study duration, increase exposure time, and employ alternative techniques for assessing the drug's antimicrobial efficacy.

## Conclusion

The *Dhanwantari-nighantu* highlights the antimicrobial properties of *Laksha*, *Haridra*, *Ativisha*, and *Musta*. *Bhavprakash-nighantu* includes *Musta* in its list, and *Haridra's* antimicrobial potency is emphasized in *Charaka-samhita*. *Saligram-nighantu* suggests *Ativisha* and *Abhaya* as antimicrobial agents, while *Madnadi-nighantu* recognizes the antimicrobial potential of *Abhaya*. *Laghu-nighantu* and *Sodhala-nighantu* mention *Ela* and *Priyangu*, respectively in the drugs of antimicrobial nature. The selection of ingredients in *Vayu Nirvishikarana yoga* is not arbitrary; rather, their antimicrobial activities are acknowledged in multiple classical Ayurvedic texts and supported by scientific studies.

This study examines the bactericidal capability of *Vayu Nirvishikarana Yoga*. The data offer insights into how *Dhoopana* can effectively curb the growth of microorganisms. The heat and smoke released during *Dhoopana* contribute to its function by reducing moisture and humidity in the treated area, thus reducing the microbial load of the site.

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## Conflicts of interest

There are no conflicts of interest.

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