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VIŚAGHNA DAŚAIMĀNI YOGA - AN EFFECTIVE FUMIGANT IN INDOOR AIR MICROBIAL CONTAMINATION

***Neethu A.P¹ and Dr. Gopikrishna S²**

¹Final year PG Scholar, Department of Agad Tantra, VPSV Ayurveda College, Kottakkal

²Associate Professor, Department of Agad Tantra, VPSV Ayurveda College, Kottakkal

*Corresponding Author's Email ID: neethunambiarmuttannur@gmail.com

Abstract

Indoor air pollution is the degradation of indoor air quality by harmful materials. Biological indoor air pollutants include bacteria, fungus etc. which can cause adverse health effects such as respiratory symptoms and may affect immunity also. Preventing the growth of microbes in indoors is an important mean for avoiding their harmful effects on health. *Viśaghna daśaimāni yoga* had taken from *Caraka Samhita*. Here, we had made an attempt to standardize the drug. Activities as well as *Rasādi pancake* of the component drugs has been assessed and are found to be in accordance with the antimicrobial properties. Hence the yoga can be effectively used as a fumigant in indoor air.

Key words: *Viśaghna daśaimāni yoga*, biological indoor air pollution, Antibacterial effect, Antifungal effect

Introduction

Indoor air pollution is the degradation of indoor air quality by harmful materials. It is of great importance as most people spend around 90% of their time at home or at work place which are of course indoor areas. The biological indoor air pollutants such as dampness & mould are included under the first category of indoor air pollutants of WHO. Biological/ Microbial pollution of indoor air comes from hundreds of species of bacteria, fungi and moulds that grow indoors when sufficient moisture is available. Exposure to them produce respiratory symptoms and can affect the immunological system. Hence preventing their growth in the

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interior surfaces of building structures is the most important means of avoiding harmful effects of indoor air on health. In ancient days, the air pollution was associated with warfare and various pollutants were introduced in to the air intentionally which have polluted the air followed by water and land sequentially as told in *Janapadōdhwamsa* by *Caraka* which generated various communicable diseases also. *Viśaghna daśaimāni yoga* has been taken from *Caraka Samhita Sūtra Stāna*. Testing the efficacy of the yoga is of high importance, as we are not aware of any other effective *dhūpa yoga* from the field of *Agad Tantra* and hence finding out a better one will be beneficial to the people in our premise. *Dhūpana* is the part of therapeutics in Ayurvedic system. It is one of the measures mentioned for the maintenance of internal and external environment. *Dhūpana* is having importance in *Agada*. Purity of external environment effect the purity of food, water and air. Thereby the toxic environment affects the health and wellbeing of human as well as plants, animals and properties.

Drug review

DRUG	BI NOMIAL NOMENCLATURE	FAMILY	PART USED
<i>Haridra</i>	Curcuma longa L.	Zingiberaceae	Rhizome
<i>Manjiṣṭa</i>	Rubia cordifolia L.	Rubiaceae	Stem
<i>Suvaha</i>	Alpinia calcarata var.breviligulata Gagnep.	Zingiberaceae	Root
<i>Sūkṣmēla</i>	Elettaria cardamomum (L.) Maton.	Zingiberaceae	Fruit
<i>Pālindi</i>	Operculina turpethum (L.) Silva Manso.	Convolvulaceae	Root
<i>Candana</i>	Santalum album L.	Santalaceae	Heart wood
<i>Kataka</i>	Strychnos potatorum L.f.	Loganiaceae	Seeds
<i>Śirīṣa</i>	Albizia lebbek (L.) Benth.	Fabaceae	Stem bark
<i>Sindhuvāra</i>	Vitex negundo L.	Lamiaceae	Root
<i>Slēṣmātaka</i>	Cordia dichotoma (Ruiz&Pav.) Gurke	Boraginaceae	Stem

<i>Rasādi pancaka</i>						
Drug	Rasa	Guṇa	Vīrya	Vipāka	Karma	Chemical constituents
<i>Haridra</i>	<i>Tikta, Kaṭu</i>	<i>Rūkṣa, Laghu</i>	<i>Uṣṇa</i>	<i>Kaṭu</i>	<i>Kapha- vātahara, Lēkhana, Viṣaghna, Varṇya</i>	Curcumene, Curcumenone, Curcumerone
<i>Manjiṣṭha</i>	<i>Madhura, Tikta</i>	<i>Guru, Rūkṣa</i>	<i>Uṣṇa</i>	<i>Kaṭu</i>	<i>Kapha-Pitha hara, Viṣaghna, Varṇya</i>	Purpuroxanthin, Rubiatriol, Rubifolic acid
<i>Suvaha</i>	<i>Tikta</i>	<i>Guru</i>	<i>Uṣṇa</i>	<i>Kaṭu</i>	<i>Kapha- vātahara, Vayasthāpana</i>	Galangin, Kaempferide, Diaryl-heptanoids
<i>Sūkṣmēla</i>	<i>Kaṭu, Madhura</i>	<i>Rūkṣa, Laghu</i>	<i>Śīta</i>	<i>Kaṭu</i>	<i>Kapha- vātahara, Dīpana, Rocana, Hṛdya, Śukra nāśaka</i>	Heptane, Camphene, Menthone
<i>Pālindi</i>	<i>Tikta, Kaṭu</i>	<i>Rūkṣa, Laghu, Tikṣṇa</i>	<i>Uṣṇa</i>	<i>Kaṭu</i>	<i>Kapha-Pitha hara, Recana</i>	α and β Turpethins, Scopoletin, Coumarin
<i>Candana</i>	<i>Tikta, Madhura</i>	<i>Rūkṣa, Laghu</i>	<i>Śīta</i>	<i>Kaṭu</i>	<i>Kapha-Pitha hara, Varṇya, Dāhapraśamana</i>	α santalol, β santene, Santenol
<i>Kataka</i>	<i>Tikta, Madhura, Kaśāya</i>	<i>Laghu, Viśada</i>	<i>Śīta</i>	<i>Madhura</i>	<i>Kapha- vātahara, Viṣaghna, Chardikara, Cakṣuṣya</i>	Mannogalactan, Diabolone, Antirrhine
<i>Śirīṣa</i>	<i>Tikta, Madhura, Kaśāya</i>	<i>Rūkṣa, Laghu, Tikṣṇa</i>	<i>Uṣṇa (Anuṣṇa)</i>	<i>Kaṭu</i>	<i>Tridośahara, Varṇya</i>	Albigenin, Albiziagenin, Albegenic acid
<i>Sindhuvāra</i>	<i>Kaṭu, Tikta</i>	<i>Laghu, Rūkṣa</i>	<i>Uṣṇa</i>	<i>Kaṭu</i>	<i>Vāta-Kapha hara, Cakṣuṣya, Keśya, Kṛmighna, Vraṇaropaṇa</i>	Phenol, Dulcitol, Camphene
<i>Sleṣmataka</i>	<i>Madhura, Kaśāya</i>	<i>Snigdha, Picchila, Guru</i>	<i>Śīta</i>	<i>Madhura</i>	<i>Kapha-Pitha hara, Keśya, Viṣaghna</i>	Flavones, Allantoin, B sitosterol

Proven antibacterial property of the 10 component drugs of *Viṣaghna daśaimāni*:

1. *Manjiṣṭha* is having antibacterial property against *B.subtilis*, *E.faecalis*, *S.aureus*, *A.baumanii*, *E.aerogenes*, *P.mirabilis* and *P.aeruginosa* according to study of Yazan Ismail et al.
2. *Pālindi* shows inhibition on *S. aureus*, *B.subtilis*, *S.haemolyticus*, *M.luteus*, *M.pyogenes*, *E.faecalis*, *E.coli*, *P.aeruginosa*, *S.typhi*, *S.dysenteriae* and *S.sonnei*, according to Tasleem Ahmad et al.
3. *Chandana* has proven effect on *E.coli*, *S.aureus* and *Pseudomonas* according to Giriram Kumar. M et al.
4. *Kataka* shows action on *S.aureus*, *P.vulgaris*, *S.typhimurium* and *V.cholerae* according to P.B. Mallikarjuna.
5. *Śirīṣa* inhibited *S.typhi*, *E.coli* and *S.aureus* according to Henok Abriham et al.
6. *Sindhuvāra* shows activity against *S.salivarius*, *S.aureus*, *S.mutans*, *S.sanguis* and *L.acidophilus*, according to Sanjay et al.

Proven antifungal properties:

1. Chloroform extract of *Haridra* has antibacterial and antifungal activity.
2. *Manjiṣṭha* is having largest zone of inhibition against *Fusarium* & *Aspergillus*.
3. *Pālindi* shows maximum activity against *Aspergillus* & *Candida*.
4. *Éla* is a most powerful antifungal than antibacterial. Acetone extract of *Éla* showed inhibition of *Candida albicans*.
5. *Chandana* showed activity against *T.rubrum* according to study on Santalols.
6. *Kataka* showed inhibition of growth of *Aspergillus niger* & *Candida albicans*.
7. Phenolic compounds & flavonoids of Acetone extract of *Śirīṣa* inhibited *F.oxysporum*.
8. Chloroform extract of *Sindhuvāra* inhibited *Candida albicans*.

Materials & Methods

1. Drug collection & Extract preparation

Finely powdered crude drug of *Viśaghna daśaimāni cūrṇa* was obtained from Arya Vaidyasala, Kottakkal.

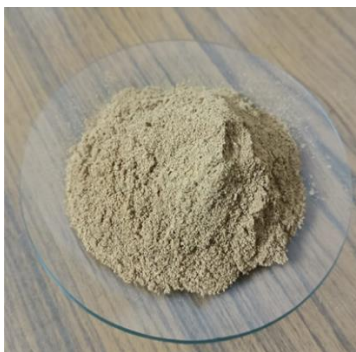
2. Standardisation of drug

a. Physico chemical Analysis

b. Phyto chemical screening

c. HPTLC profiling

HPTLC profiling of *Viśaghna daśaimāni cūrṇa* was done at CMPR, Arya Vaidya Sala, Kottakkal. An accurately weighed powder was extracted with HPTLC grade methanol & made up to 10 ml in a standard flask with methanol. 10µl of solution was spotted on TLC silica gel 60F254 coated on Aluminium sheet of 10*10cm dimension manufactured by Merck using CAMAG Linomat V automatic sample spotter. Test plate were run using a mobile phase of Toluene: Ethyl acetate: formic acid: Methanol in the ratio of 7:5:1:0.5 in a CAMAG twin trough glass chamber of 10 x 10 cm dimension. The samples were run up to a height of 10 cm and plates were taken out of the developing chamber and air dried and shifted on to a photo-documentation chamber (CAMAG REPROSTAR 3) coupled with a CAMAG-TLC Scanner before and after derivatization. The derivatization was done in an iodine chamber. The peaks were recorded at 254 nm and 366 nm of UV wavelength.



Pic 1: *Viśaghna daśaimāni cūrṇa*

Results & Discussion

1. Standardisation of drug

a. Results of Physico - chemical analysis

Test	VD
Total ash	4%
Water soluble extractive	2%
Crude fiber	0.16%
Water insoluble ash	1%
Alcohol soluble extractive	2%
Acid insoluble ash	0.32%
Sulphated ash	0.25%
pH	5.7
Loss on drying	7.2%

b. Results of Phytochemical tests

Phytochemical	Test	VD
Alkaloids	Hager's test	+
Carbohydrates	Molisch test	+
Phenol	Ferric chloride test	+
Glycosides	Kellerkiliani test	+
Saponins	Foam test	+
Phytosterol	Salkowski test	+
Tannins	Ferric chloride	+
Flavonoids	Alkaline reagent	+
Resin	Acetone test	+

(+ sign indicates positive results. - sign indicates negative results)

An attempt was done to screen the phytochemicals of the drug qualitatively. It may be taken as a reference for further studies. Sophisticated methods should be arranged in order to

identify and quantify the phytochemicals which will be helpful in studying the anti-microbial properties of the drug.

3.HPTLC profiling

Rf value & % area of *Viṣaghna daśaimāni yōga* at 254nm

Peak	Max. Rf	Area	Area %
1.	0.08	506.2	1.00
2.	0.26	257.1	0.51
3.	0.38	2816.7	5.57
4.	0.41	2083.1	4.12
5.	0.65	22777.7	45
6.	0.72	996.3	1.97
7.	0.83	2051.4	4.05
8.	0.86	3592.4	7.10
9.	0.90	4538.6	8.97
10.	0.96	10993.1	21.72

Total peak no - 10

Total area - 50612.6 AU

Maximum area obtained was at peak no.5

Rf value & % area of *Viṣaghna daśaimāni yōga* at 366 nm

Peak	Max. Rf	Area	Area %
1.	0.09	543.5	0.97
2.	0.22	504.5	0.90
3.	0.27	788.6	1.41
4.	0.33	1856.9	3.31

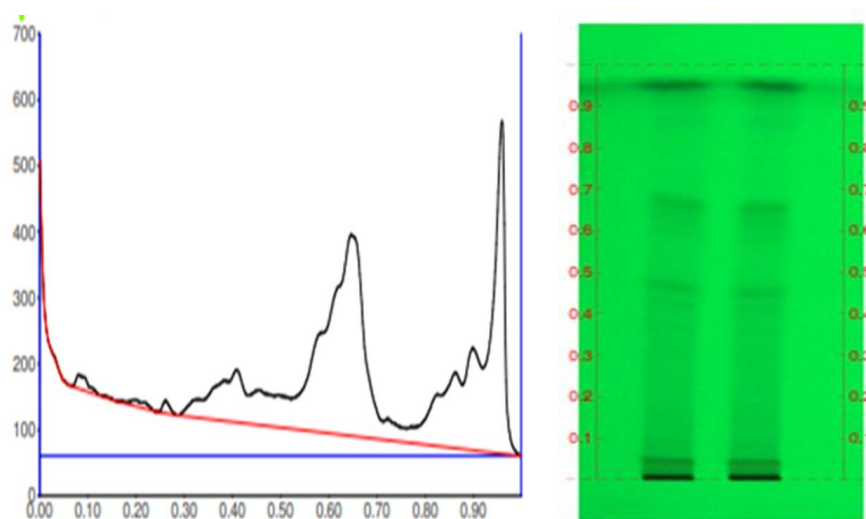
5.	0.37	1536.2	2.74
6.	0.42	2354.7	4.20
7.	0.47	1617.2	2.88
8.	0.67	21350.6	38.06
9.	0.73	1312	2.34
10.	0.85	6448.7	11.50
11.	0.9	5331.8	9.51
12.	0.96	12447.9	22.19

Total peak no - 12

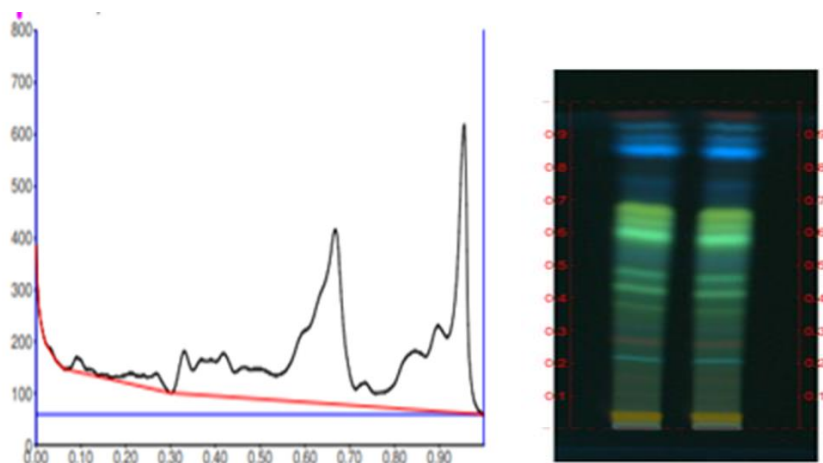
Total area - 56092.6 AU

Maximum area obtained was at peak no.8

254nm



366nm



No. of peaks contribute to activity of component drugs of the *yoga*.

2. Discussion on drug profile

Properties	Yoga
Context	<i>Daśaimāni</i> (Ca.Su 4)
<i>Rasa</i>	<i>Tiktha, Madhura</i>
<i>Guṇa</i>	<i>Laghu, Rūkṣa</i>
<i>Vīrya</i>	<i>Uṣṇa</i>
<i>Vipāka</i>	<i>Katu vipāka</i>
<i>Karma</i>	<i>Kapha - Vātha hara</i> <i>Krimighna, Viṣaghna</i>

The *yoga Viṣaghna daśaimāni* is *Vātha Kapha hara* & *Uṣṇa vīrya* and *Tiktha rasa* predominant. As *Tiktha rasa* is *Krimighna, Viṣaghna* & *Upaśoṣaka*, it destroys micro-organisms by depleting the body components. *Tikta rasa* is also *Ākāśa + Vāyu āthmaka*, hence easily gets immiscible in air while using as *dhūpa*.

In Agad Tantra, usage of drugs in the form of *chūrṇam* applied over drums, flags etc. are mentioned. A mass disinfection is meant by these. *Dhūpana* is also having similar effects. Volatile oil as well as other components of low boiling point gets escaped quickly on fumigating to produce their effect.

The drug is having *Rasa panchaka* in accordance with the antimicrobial property. *Rūkṣa guṇa* dries up the cytoplasmic components as well as *Laghu guṇa* helps the *dhūpa* to get easily miscible in the air. *Uṣṇa vīrya* helps to maintain the temperature. Both *Tikṭha* and *Madhura rasa* contribute to the *Viṣa hara* property. Many of the drugs of the *yōgās* are having *Krimighna* & *Viṣaghna karma* also.

Conclusion

Viṣaghna daśaimāni yoga can be effectively used as a fumigation agent in both fungi & bacteria. Hence it can be tried as fumigant in indoor air microbial contamination. Further efforts can be taken to try it as a surface sterilization agent.

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