KRIMIGHNA (ANTI-BACTERIAL) EFFECT OF DHUPANA (HERBAL FUMIGATION) IN LABORATORY SETUP

B M Rashmi ¹*, Kumari Nisha ²

¹PG Scholar, Department of Roga Nidana, Shri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, B M Road, Thanniruhalla, Hassan, Karnataka, India
²Associate Professor, Department of Roga Nidana, Shri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, B M Road, Thanniruhalla, Hassan, Karnataka, India

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*Corresponding author
E-mail: drashmibm@gmail.com

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ABSTRACT

Curcuma longa, Acorus calamus and Embelia ribes have anti-microbial activity against microorganisms when tested against their active ingredients. Present study examines the efficacy of these drugs when used as a fumigant. Herbal discs prepared out of these were burnt on red hot charcoal in Microbiology-Pathology laboratory set up and in OPD and were exposed to the herbal fumes for a period of fifteen minutes. Petri plates containing Nutrient agar were exposed to the air in respective areas for 2 minutes before fumigation and 15 minutes after fumigation. Later petri plates were incubated for 24 hours at 37 degree Celsius in an incubator. Observed bacterial colonies were identified by Gram’s stain technique. This study was conducted for 3 times. Scanty to moderate growth of aerobic spore forming bacilli observed in the petri plates exposed to air before fumigation. No growth of organisms observed in the petri plates exposed to same air after fumigation. There is a significant decrease in the growth of airborne microorganisms after fumigation with Curcuma longa, Acorus calamus and Embelia ribes – Herbal discs. Hence these herbal drugs which are cost effective, non-irritant and aesthetic can possibly be used for regular fumigation to maintain sterile environment in Laboratory setup.

Keywords: Herbal drugs, fumigation, anti-microbial, petri plates, aerobic spore forming bacilli.

INTRODUCTION

Iatrogenic causes may affect patients as well as health care workers in a hospital set up. Hospitals provide a breeding ground for drug-resistant bacteria which can be transmitted due to poor infection control practices in the hospital. It is estimated that nosocomial infections cost $ 4.5 billion and contribute to 88,000 deaths annually. Although infection control and hospital epidemiology activities have been the subjects of increasing scientific study over the past 30 years, efforts to lower infection risks have been continually challenged by the growing number of immune-compromised patients, antibiotic resistant bacteria, fungal and viral super-invasive functions. Most often, the mode of infection occurs through cross infections. Hence a sterile atmosphere like operation theatre or labour theatre in a health care setup is essential.¹

Fumigation is commonly practised in many developed nations in view of toxic nature of formalin. Too frequent use and inhalation of these is dangerous to health. Several new safe chemicals are emerging, but due to constraints of economy limit the use and closing of operation theatres for long hours can be managed with fumigation.²

In Ayurveda, we have some of the drugs which are known to have antibacterial effect. In this concern, an effective herbal fumigation containing drugs: Haridra (Curcuma longa), Vacha (Acorus calamus) and Vidanga (Embelia ribes) possessing germicidal and anti-microbial action is selected to see the effectiveness against airborne organisms.³ This study is aimed at making a routine practise of herbal fumigation in hospital laboratory set up, to maintain sterile atmosphere and to decrease the health hazards.

MATERIALS AND METHODS

Description of drugs

Haridra⁴
Botanical name: Curcuma longa
Family: Scitamineae / Zingiberaceae
Synonyms: Hattavilasini, nisha, krimighni, gouri, peeta
Varieties: Haridra, Daruharidra, vana haridra & amraraharidra
Chemical constituents: curcumine, curcon
Useful part: Rhizome
Karma: Krimighna, Vishagghi, meghagni
Pharmaceutical actions: Hepato-protective, anti-allergic, antioxidant, anti-microbial, immune-stimulant.

Vacha⁵
Botanical name: Acorus calamus
Family: Araceae
Synonyms: Ugragandh, mangalya and karshani
Varieties: Vacha and Shweta vacha
Useful part: Rhizome
Chemical constituents: 1.5-3% volatile oil having asaraldehyde, asarone and eugenol.
Karma: Jantughna, jwaraghna, bhuaggha, mooctavishodaka
Pharmaceutical actions: Vermifuge, carminative, tranquilizer.

Vidanga⁶
Botanical name: Embelia ribes
Family: Myrsmaceae
Synonyms: Chitra tundula, shweta tundula
Varieties: Embelia ribes, Embelia robusta
Part used: Fruit
Chemical constituents: Embelin, Vilangine, quercitol
Karma: Vishaghna, Krimighna and jantu nashana; Indication: Krimi, udara, kushta
Pharmacological actions: Antimicrobial, anti-helminthic, antifungal, anticonvulsant.

Requirements

Claypot, burning charcoal, Coconut shell, Ghee, camphor, Matchsticks, Chakrikas (cakes) made out of Haridra (Curcuma longa), Vacha (Acorus calamus) and Vidanga (Embelia ribes) Churna, Microscope, Gram stain reagents: Methylene blue, Grams iodine solution, Ethyl alcohol, Saffranin, Glass slides, Cover slips, Petri plates, Hot air oven, Incubator, Autoclave, Nutrient agar.

Method of drug preparation

Above mentioned drugs are taken in powdered form separately. Under all aseptic precautions, these powders are mixed together and made into a fine paste. Later dhupana has been done with five dried chakrikas nearly weighing 25 grams in each of the above places for about 15 min, by using charcoal and coconut shells for burning with the help of camphor and ghee. After 15 minutes once again Nutrient agar petri plates are exposed in the same areas for about 2 min and subsequently incubated for 24 hours. After 24 hours- observed for the colony morphology and identified the morphological features of micro-organisms.

OBSERVATIONS AND RESULTS

<table>
<thead>
<tr>
<th>Number of day</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Dhupana</td>
<td>Single Colony: Medium, creamy, round, opaque, smooth, elevated colony.</td>
<td>Colony 1: Large, irregular, whitish, creamy, opaque, raised colony.</td>
<td>Colony 1: Single, large, irregular, opaque, whitish, raised, smooth colony.</td>
</tr>
<tr>
<td></td>
<td>Colony 2: Large, round, translucent, raised, smooth colony.</td>
<td>Colony 2: Single, large, irregular, brownish, opaque, raised, smooth colony.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Colony 3: Small, round, whitish, opaque, raised, smooth colony.</td>
<td>Colony 3: Few, small, round, whitish, opaque, smooth colony.</td>
<td></td>
</tr>
<tr>
<td>Result on gram staining</td>
<td>-</td>
<td>-</td>
<td>Gram stain: Gram positive aerobic spore forming bacilli.</td>
</tr>
<tr>
<td>After Dhupana</td>
<td>No growths observed.</td>
<td>No growths observed.</td>
<td>Colony: Single, medium, round, translucent, raised, smooth colony.</td>
</tr>
<tr>
<td>Result on gram staining</td>
<td>Gram positive aerobic spore forming bacilli.</td>
<td>Gram positive aerobic spore forming bacilli.</td>
<td>Gram positive aerobic spore forming bacilli.</td>
</tr>
</tbody>
</table>
Picture 4: Dhupana Pot

Picture 5: Burning of Herbal drugs

Picture 6: Petri-plates before and after dhupana procedure

Picture 7: Petri-plates before and after dhupana procedure

Picture 8: Petri-plates before and after dhupana procedure

Picture 9: Day 1-Before dhupana (1 colony)
DISCUSSION
There is a significant decrease in the growth of airborne microorganisms after dhupana with Haridra (*Curcuma longa*), vacha (*Acorus calamus*) and vidanga (*Embelia ribes*) because of their active constituents, tannins and essential oils like acolomone, aconone, calarene, camphene, euginol, quercitol, curcumene, camphor etc. Dhupana dravyas demonstrated antimicrobial property against gram positive aerobic spore forming bacilli which are common saprophytes present in air, water and soil. The smoke and fumes produced by these herbal drugs acts as germicidal and thereby do not produce toxic complications to the people around. Dhupana dravyas are cost effective, less irritant and are more aesthetic in comparison with chemical fumigation methods. Hence, they are very safe to use and are non-toxic in nature. One can use these drugs for regular fumigation in laboratory setup. In this study, fumigation was done first and then air samples were collected immediately after fumigation. Immediate response can be seen and prolonged effect is not yet being analysed. Future research scholars can take up measures on this.

CONCLUSION
Haridra (*Curcuma longa*), Vacha (*Acorus calamus*) and Vidanga (*Embelia ribes*) these three drugs proved their anti-bacterial effect on gram positive aerobic spore forming bacilli, which are commonly found in the environment. Hence, they can be used as an effective drug combination for the microbiota present in the environment, thus protecting us from the hospital acquired respiratory infections.

REFERENCES

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