MICROBIAL GROWTH INHIBITION BY APARAJITHA DHOOMA CHOORNAM

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ABSTRACT:
The antimicrobial activity of Aparajitha Dhooma Choornam was evaluated against microbes commonly found in the manufacturing unit of the Arya Vaidya Pharmacy (CBE) Ltd located at Kanjikode. The study was attempted to discard the microbial contamination of flora of various sections of the manufacturing unit, thereby create an aseptic atmosphere for quality products. The choornam showed total inhibition of coliforms and reduced fungal growth.

KEY WORDS: Aparajitha Dhooma Choornam, Microbial Inhibition

INTRODUCTION
Aparajitha Dhooma choornam is mentioned in Ayurvedic texts in the context of Jwara Chikitsa for fumigation. The fumigation prevents the spread of infectious fever and also disinfects the air from pathogens. In the study, Aparajitha Dhooma choornam was used as a fumigation powder for creating an aseptic condition in the critical areas of production and filling in the factory.

MATERIALS AND METHODS
Preparation of Aparajitha Dhooma Choornam

Eight herbs were used in the preparation of Aparajitha Dhooma choornam. The ingredients of the choornam are described in Table (1). The raw materials obtained from market were air dried in shade at room temperature and powdered mechanically.

MEDIA AND REAGENTS

The chemicals required included Sabouraud Dextrose Agar (SDA) and Nutrient Agar (NA) for preparing agar plates and were of analytical grade.

Methods

The antimicrobial activity was evaluated for each section separately. Duplicate agar plates of SDA and NA were incubated at each section and the microbial flora was studied. The growth
of microbes was calculated by total plate count method.

The same procedure was repeated half-an-hour after fumigation with Aparajitha Dhooma choornam. The following studies were also carried out:

1. Microbial flora study after fumigation for 1 week.
2. Microbial flora study, weekly once for a month with fumigation.

RESULTS AND DISCUSSION

The microbial flora was studied before and after fumigation and results are summarized. The flora before fumigation was rich in coliforms and many saprophytic fungi as shown in Table (2). After fumigation, the data showed a considerable reduction in microbes. Table (3).

The potential of the plant composition in Aparajitha Dhooma choornam and their phytochemical constituents were looked into. The probable chemical structures, producing an antimicrobial effect are charted in Table (5).

The present study establishes the antimicrobial activity of Aparajitha Dhooma choornam. The choornam showed significantly higher inhibition of various Aspergillus species. But, it was observed that the overall activity was more pronounced against bacteriae as compared to fungi. The key result of the data is that, the continuous fumigation totally inhibited the bacterial growth and reduced fungal growth up to one colony of Aspergillus species per plate. Table (4)

CONCLUSION

Possibilities of future studies include the screening of different phytochemicals and antimicrobial activities by disc method along with these studies. Aparajitha Dhooma choornam can be raised to the level of a novel potential agent in the area of surface sterilization in herbal medicine manufacturing industries.
Table (1) The ingredients of Aparajitha Dhooma choornam

| Sl. No | Botanical Names       | Malayalam Names | Family         | Parts used       |
|--------|-----------------------|-----------------|----------------|------------------|
| 1      | Acorus calamus        | Vayambu         | Acoraceae      | The rhizome      |
| 2      | Actiniopteris dichotoma | Nannmukhapullu  | Actiniopteridaceae | The whole plant |
| 3      | Aquilaria agallocha   | Akhil           | Thymelaeaceae  | The wood         |
| 4      | Azadirachta indica    | Veppu           | Meliaceae      | The bark         |
| 5      | Calotropis gigantea   | Erukku          | Asclepiadaceae | The root         |
| 6      | Cedrus deodara        | Devedaram       | Pinceae        | The Wood         |
| 7      | Commiphora mukul      | Gulggulu        | Burseraceae    | The gum resin    |
| 8      | Shorea robusta        | Chenchallyam    | Dipterocarpaceae | The resin       |

Table (2) The results before fumigation in each section

| Sl. No | Section Name       | Total viable aerobic bacterial count | Total yeast & mould count |
|--------|--------------------|-------------------------------------|--------------------------|
| 1      | Fermentation area  | No growth found                     | Abundant growth of Aspergillus species and Saccharomyces cerevisiae colonies |
|        |                    |                                     |                          |
| 2      | Powdering area     | Bacillus sp. Were found. The growth was too numerous to count | -do-                     |
|        |                    |                                     |                          |
| 3      | Main processing area | -do-                           | -do-                     |
| 4      | Pill making area   | -do-                               | -do-                     |
| 5      | Filling area       | -do-                               | -do-                     |

Table (3) Results after each day's fumigation

| Section Names    | Total viable aerobic bacterial count | Total yeast and mould count |
|------------------|-------------------------------------|-----------------------------|
|                  | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| Fermentation area| Nil   | Nil   | Nil   | Nil   | Nil   | 1 Aspergillus colony | Nil   | Nil   | Nil   | Nil   |
| Powdering area   | Nil   | Nil   | Nil   | Nil   | Nil   | 12 Saccharomyces cerevisiae colonies | 2 Aspergillus colonies. | 1 Aspergillus colony | Nil   | Nil   |
| Main Processing area | Nil   | Nil   | Nil   | Nil   | Nil   | 1 aspergillus colony | Nil   | Nil   | Nil   | Nil   |
| Pill making area | Nil   | Nil   | Nil   | Nil   | Nil   | 15 Aspergillus colonies | 7 Aspergillus colonies | 2 Aspergillus colonies | Nil   | Nil   |
| Filling area     | Nil   | Nil   | Nil   | Nil   | Nil   | Too numerous to count | 15 Aspergillus colonies | Nil   | Nil   | Nil   |
### Table (4) Weekly trials after fumigation

| Section Name          | Total viable aerobic bacterial count | Total yeast & mould count          |
|-----------------------|-------------------------------------|-----------------------------------|
|                       | Day 1  | Day 2  | Day 1  | Day 2  |
| Fermentation area     | Nil    | Nil    | 7 Aspergillus colonies | 2 saccharomyces cerevisiae |
| Powdering area        | Nil    | Nil    | 2 Aspergillus colonies | 1 Aspergillus colony |
| Main processing area  | Nil    | Nil    | 1 Aspergillus colony  | Nil                 |
| Pill making area      | Nil    | Nil    | 3 Aspergillus colonies | 2 Aspergillus colony |
| Filling area          | Nil    | Nil    | 10 Saccharomyces cerevisiae colonies | 1 Aspergillus colony |

### Table (5) Phytochemical constituents of Aparajitha Dhooma Choornam

| Sl No. | Plant Name            | Phytochemicals present.                                                                                   |
|--------|-----------------------|----------------------------------------------------------------------------------------------------------|
| 1      | Acorus calamus        | Asarone, β - asarone, calamenol, calamene, euginol, camphene, α- pinene, palmitic, heptylic and butyric acids . |
| 2      | Actiniopteris dichotoma | The stem and leaves contain rutin, hentriacontane, hentriacontanol, β- sitosterol, its palmitate and β- sitosterol- D(+) glucoside. |
| 3      | Aquilaria agallocha   | The wood contain selinene, hydroxy ketone and rhombic sulphur, The main component in agar isol (agarol). |
| 4      | Azadirachta indica    | Nimbidin, nimbin, nimbine, nimbosterol, and numerous steroids were present. Triterpenoids and and polyphenolic compounds were also present. |
| 5      | Calotropis gigantea   | β - stisterols, α- and β- amyrrins , triperinioids , aliphatic esters , aliphatic ketone, and a mixture of n-hydrocarbons were also present. |
| 6      | Cedrus deodara        | Cholesterin , essential oils , gum, lignins , tannins, β – sitosterol.                                    |
| 7      | Commiphora mukul      | From the gum resins sesamine , steroids, were reported. A di terpene alcohol, gulpgulusterone were isolated from gum resin. |
| 8      | Shorea robusta        | Tannins, β-sitosterols.                                                                                  |
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