DHOOPANA REVIEW (AYURVEDIC FUMIGATION): TRADITIONAL PRACTICE AND MODERN EVIDENCE

Abstract

Aim: To summarize traditional Ayurvedic dhoopana practices and recent scientific insights into its antimicrobial, immunomodulatory, and environmental benefits.
Background: Dhoopana (medicated fumigation) is an ancient method to purify environments. Herbal and animal-derived smokes are used therapeutically. Recent interest has surged for infection control and respiratory aid.
Methods: A narrative review of classical texts and modern studies was conducted. Data were organized into tables: ingredients and properties (Table 1), dhoopana types (Table 2), and key studies (Table 3).
Results: Several herbs (turmeric, garlic, neem, frankincense, ajwain) effectively reduce microbial loads. Immunostimulant properties are demonstrated in *Trachyspermum ammi* and *Azadirachta indica*.
Conclusion: Classical wisdom, backed by modern evidence, supports dhoopana as a safe, natural adjunct for disinfection and immune support.

Keywords: Dhoopana; Ayurvedic fumigation; Rakshoghna; antimicrobial smoke; nosocomial infection control; environmental hygiene

Introduction

Dhoopana (also called dhupana or dhumapana) is an Ayurvedic therapy in which herbal or herbo-mineral preparations are burned to generate smoke (fume) that is inhaled or exposed to a space. Classical sources (e.g. *Charaka Samhita*, *Sushruta Samhita*, *Kashyapa Samhita*) emphasize fumigation for both therapeutic and hygienic purposes. It is traditionally used to disinfect sick rooms, operation theaters, incubators and garments, and even for gynecologic and pediatric care[8][9]. For example, *Charaka* (Sharira Sthana) recommends fumigating postpartum rooms and garments with mixes containing barley, mustard, and neem to protect mother and child. *Kashyapa Samhita* devotes an entire chapter (Dhoopakalpa Adhyaya) to formulations for various conditions[10]. The classical term “Rakshoghna” literally means “germ-killing,” and dhoopana is noted in ancient texts as rakshoghna (anti-microbial) practice[2][10]. In summary, Ayurveda regards dhoopana as a preventive and curative measure that cleanses the environment and supports healing.

Despite millennia of traditional use, scientific evaluation of Ayurvedic fumigation is recent. The resurgence of interest is driven by infection control needs (e.g. hospital pathogens, viral outbreaks) and a desire to replace toxic chemicals (like formalin) with natural alternatives[8][7]. This review surveys key classical references and recent peer-reviewed studies (mostly past ten years) on dhoopana. We focus on evidence of antimicrobial efficacy, immune effects, and practical applications of dhoopan formulations. To aid clarity, we include tables of common ingredients (Table 1), dhoopana types and uses (Table 2), and summaries of representative studies (Table 3).

Methods

We performed a narrative review of Ayurvedic texts and modern research. Classical sources (*Charaka*, *Sushruta*, *Kashyapa*, etc.) were consulted via translations and secondary literature on dhoopana[2][7]. For contemporary evidence, PubMed, Google Scholar, and Ayurvedic journals were searched for terms like "dhoopana", "dhupana", "Ayurvedic fumigation", and specific herbal smoke formulations. We prioritized studies from the last decade reporting antimicrobial, immunological or air-quality outcomes. Selected studies were categorized and are summarized in Table 3 (with source, year, methods, outcomes). Tables 1 and 2 were compiled from Ayurvedic manuals and pharmacopeias describing common fumigation materials and techniques, with reference to known herbal properties.

Discussion

Ayurvedic Dhoopana Preparations

Classical texts list many **dhoopana dravya** (fumigation drugs) – herbs, resins, woods, spices – that are antimicrobial and aromatic[7][10]. Table 1 shows common ingredients and their principal properties.

[3] Table 1. **Common Ayurvedic Dhoopana Ingredients and Properties**

Ingredient (English, Latin)	Sanskrit/Usage	Key Actions and Ayurvedic Properties
Neem *(Azadirachta indica A)*	Nimba (leaves, oil)	Broad-spectrum antibacterial, antifungal; immunostimulant; antipyretic; pungent–bitter; Ushna (warming).
Guggulu (Commiphora mukul)	–	Antibacterial, anti-inflammatory; resin with phenolics; tridosha balancing.
Loban/Frankincense *(Boswellia Serrata)*	Shallaki, Loban, Salai (resin)	Antimicrobial, antiseptic, aromatic; used in incense; Kapha-Pitta balancing.
Vacha *(Acorus calamus)*	–	Aromatic nervine, carminative; has antibacterial phenols; clears Kapha.
Daruharidra *(Berberis aristata)*	–	Antimicrobial (berberine content); bitter, Pitta-reducing, digestive aid.
Turmeric *(Curcuma longa)*	Haridra, Pitthanika (rhizome)	Anti-inflammatory, wound-healing; contains curcumin (antibacterial).
Mustard *(Brassica nigra L)*	Sarshapa (seeds)	Warming rubefacient; antimicrobial (allyl isothiocyanate); Kapha-Vata reducing.

Ajwain *(Trachyspermum ammi L)*	Yavani	Carminative, expectorant; immunostimulant; antibacterial volatile oils.
Sandalwood *(Santalum album L)*	Chandanam	Cooling, fragrant; mild antiseptic; used for calming and skin health.
Camphor *(Cinnamomum Camphora*)	Kapur	Volatile stimulant; antimicrobial and decongestant; heats sinuses; Pitta increasing.
Surasadi group (kushtha, vacha, etc.)	–	Many classical herbs for fumes; generally aromatic and "krimighna" (bug-killing).
Honey/Ghee	Madhu	Vehicles for decoctions; ghee (clarified butter) helps burn and release herbs' actives.

Dhoopana Modalities and Applications

Ayurveda categorizes dhoopana by purpose and form. Broadly, three classical types are described: **Dhoopana**(primary fumigation), **Anu-dhoopana** (re-fumigation to reinforce effect), and **Prati-dhoopana** (maintenance fumigation to prevent recurrence)[12]. (In modern terms, these are like initial, repeat, and follow-up fumigation sessions.) Kashyapa Samhita lists dozens of specific dhoopan formulas for various diseases (fever, diarrhea, wounds, etc.) and for general prophylaxis[10][7].

Among these, the most common purpose is environmental disinfection: burning fumigants in wards, therapy rooms or homes to reduce airborne microbes and malodors. This has parallels to modern "air sterilizers." In fact, recent hospital studies explicitly evaluate dhoopana for this: a 1-hour fumigation in an Ayurvedic hospital's pediatric and therapy rooms cut airborne bacterial counts (colony-forming units, CFUs) by over 60% and reduced fungal counts significantly[4]. Table 2 outlines typical types and uses.

Table 2.**Types of Ayurvedic Dhoopana and Applications**

Dhoopana Type/Name	Application & Uses
General Dhoopana (ward fumigation)	Burned in a chamber or vessel to sterilize rooms, instruments, linens; used in surgery, dental, maternity wards. E.g. "Parikarma" or "Kshetra" Dhoopan for whole-room disinfection.
Anudhoopana/Pratidhoopana	Repeated or follow-up fumigation sessions to reinforce

	disinfection or prevent recontamination.
Karna Dhoopana (Ear fumigation)	Smoke from herbs (often mixed with Vacha, mustard, goat's hair, etc.) puffed into ear canal. Used for otitis media, ear pain, hearing issues.
Yoni Dhoopana (Vaginal fumigation)	Directed fumes to vaginal/perineal area. Indicated in puerperal (postpartum) care, abnormal discharge, itching; cleanses the birth canal. Ayurvedic guides list specific "yoni dhoopan" herbs.
Mukha/Shiro Dhoopana (Nasal/head)	Inhale herbal smoke through nose/mouth (similar to dhumapana). Helps relieve sinus congestion, headaches, and respiratory conditions by delivering antimicrobial fumes.
Specific Formulations	E.g. **Grahaghna Dhoop** (removes household evil, general sterilization); **Kumar Dhoop** (purifies newborn's bed); **Sri Dhoop, Maheshwar Dhoop** etc. – named formulas noted in Kashyapa and later texts (used for spiritual and antimicrobial effects).

Antimicrobial and Environmental Effects

Modern studies strongly support dhoopana's **antimicrobial efficacy**.

Study	Year	Methodology	Findings	Reference
Pandey et al.	2017	Immunological assay in rats with ajwain extract; measured delayed-type hypersensitivity (DTH) and white blood cell response.	**Enhanced immune response** and increased macrophage activity.	Pandey et al., 2017
Kaur et al.	2018	Neem oil administration in mice; observed cytokine levels and T-cell proliferation.	Stimulated **innate immunity** and enhanced IFN-γ levels.	Kaur et al., 2018
Balkrishna et al.	2022	Tested Vishaghn Dhoop in vitro on agar plates and in liquid culture; environmental fumigation in	Bacterial growth reduced by **50–85%**, Candida growth by **80%**; no toxicity to	Balkrishna et al., 2022

		unsanitized rooms.	human cells.	
Das et al.	2024	Used "Shodashanga Dhoopa" (16-herb mix) in OPD and therapy room; bacterial and fungal colony count recorded before and after fumigation.	Significant drop in **bacterial and fungal counts** ($P<0.001$ and $P<0.05$ respectively).	Das et al., 2024
Greeshma et al.	2025	Used Sarshapanimbadi Dhoopan Churna in a controlled lab fumigation setting; microbial load tracked over time.	**Complete elimination** of bacterial CFUs in 20 min and fungal CFUs in 15 min.	Greeshma et al., 2025

In summary, multiple recent trials (Table 3) report that Ayurvedic fumigation **significantly lowers microbial counts** in air and on surfaces. These studies typically use settle-plate air sampling or direct colony counts, and consistently find that herb-derived smoke is microbicidal. The active volatiles (e.g. sulfur compounds from garlic, eugenol in clove, thymol in ajwain) likely oxidize or penetrate microbial cells. Importantly, unlike formaldehyde-based foggers, herbal smoke is generally safe for humans at moderate exposures[4][11].

Immunomodulatory and Systemic Benefits

Beyond direct killing of pathogens, many dhoopan ingredients modulate the immune system. As noted, *Trachyspermum ammi* (ajwain) seed extract enhanced delayed-type hypersensitivity (a cell-mediated immunity measure) in rats[5]. Similarly, neem oil markedly stimulated white blood cells and macrophage activity in mice, and induced interferon-γ production, indicating boosted innate immunity[6]. Many essential oils in dhoopan herbs (such as eucalyptol, camphor, and citric aldehydes) have anti-inflammatory effects and can ease respiratory symptoms, helping mucosal immunity. Thus, dhoopana may also serve as a passive **drug delivery** system: volatile anti-pyretic or bronchodilatory compounds in the smoke (like camphor from Kapur, or alcohols from sandalwood) could reach the airways without ingestion. In practice, this is akin to inhalation therapy (like steam treatments), but with added disinfection.

Finally, the environmental benefit extends beyond sterility. By drying moisture and repelling insects, smoke creates a healthier microclimate. Ayurveda explicitly praises dhoopan for **purifying space***("kapshat prajwalanam dhoopena*"… burning smoke to cleanse mosquitoes and bugs)[1]. This aligns with aromatherapy insights: many constituents are **aromatic volatile oils** that lift mood and reduce pathogen load. The classical view is that dhoopana cleanses the "vitiated air" (dhoomaja visha) and prevents disease spread[1].

Conclusion

Dhoopana is a time-honored Ayurvedic fumigation technique for disinfection and disease prevention. Classical literature regards it as an effective way to create a sterile environment and to deliver herbal medicinals via smoke. Recent scientific studies validate many of these claims: natural plant fumigants reduce airborne bacteria and fungi in clinical rooms, and their active compounds possess antimicrobial and immunomodulatory properties. Given the push to replace toxic formaldehyde fumigants, Ayurvedic dhoopana offers a low-cost, eco-friendly alternative. Practical applications include hospital ward fumigation, postpartum and newborn care (yoni dhoopan), dental and surgical suites, and even household sanitation.

For practitioners, tabled references (Tables 1–3) provide guidelines on choosing dhoopan materials and protocols. Future work should standardize doses, safety, and quantify long-term outcomes. Nonetheless, current evidence supports including dhoopana as an adjunct disinfection measure. By combining classical wisdom with modern data, healthcare providers can utilize dhoopana to improve air hygiene and possibly bolster immunity in patient care settings.

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