Review on herbal incense stick

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Abstract

Incense stick is widely used for worship and as mosquito repellent across the world. Various materials used for manufacturing of incense stick and harmful effect of product of their burning on health and environment are reviewed. Various herbal materials which can be utilized in incense stick to nullify these harmful effects are also discussed.

Keywords: Incense stick, Herbal, Camphor

1. Introduction

Incense stick is widely used across the word in temples, churches, mosques and at other places on different occasions for worship of GOD. Also incense stick is used as mosquito repellents .The materials used in manufacturing of incense stick are not totally herbal but contains some synthetic materials which on burning cause air pollution and health effects upon long time exposure of smoke of incense sticks. So, herbal incense stick is very essential. Another problem faced by temples, churches and mosques is managing waste containing flowers. Currently most of the flower waste is dumped into river which causes water pollution. To manufacture herbal incense stick, this flower waste can be utilized which can minimize the water pollution. Materials used in manufacturing of chemicals based synthetic incense sticks, products of burning of incense sticks and their hazardous effects is reviewed and presented here. Also, various herbal components which can be utilized in place of synthetic materials are also reviewed and presented here.

2. Incense stick

2.1 Components of incense sticks and its composition in incense sticks

Following table summarize components of incense sticks and their purpose.

Type of component	Purpose
Adhesive material	To make slurry/paste
Combustible material	To initiate and sustain burning
Fragrant material	To provide pleasant fragrance
Base material	To provide base to slurry/paste

Table 2.1 : components of incense sticks and their purpose

The various components used for the manufacturing of incense sticks are as follows: nargis powder, raw bamboo sticks, water, variety of oils, aromatics including flower essence, sandalwood oil, rose petals, natural as well as chemical aromatic ingredients, sawdust, thick

paper, gelatin paper, various color powder, charcoal and sticky powder such as Jigat, Sal gum, Guggul (Gum/gum of Commiphor amukul) [1].

The stick of incense is manufactured from "bamboo sticks" and fragrance oils whereby both the component are natural material. A paste formed of sawdust through machine wood, a sort of hardwood, is covered with the upper part of each stick. The sawdust is extremely permeable and holds perfume easily. Charcoal is often employed to manufacture the permeable punk . The aromatic oils derived from the oil through naturally aromatic plants or several other perfumes including fragrances that are blended together in an oil base. Small amounts of paint have been used to color-code the ends of the incense sticks. Aromatic ingredients (oils), both natural and chemical, are used to add aroma in incense sticks.[1]

The components of incense are secrets and vary from one manufacturer to other, but mainly it has fragrant gums, resins, wood powders, herbs, and spices in the following compositions:- 1) Herbal and wood powder 21%: (coal powder and sawdust) 2) Fragrant materials 35% traditionally would be a masala (powder of ground ingredients) 3) Adhesive powder 11%: or pastegenerally made of charcoal dust or sawdust and joss/jigit/gum/tabu powder– an adhesive made from the bark of Litsea glutinosa and other trees). In India, wood glue called patta or bummi powder or jigat powder is used. 4) Bamboo sticks 33%: by weight. Moreover, Indian incense stick manufacturers add 40% calcium phthalate to reduce the particulate matter and gaseous products formed during incense sticks' burning. Since incense sticks are fully burned, 1/3rd ash by weight of the ash is formed. About 60-70% weight of incense sticks comprises of hazardous material.[1]

2.2 Products from burning of incense sticks

Following chart describes products from burning of incense sticks.[3,4,5]

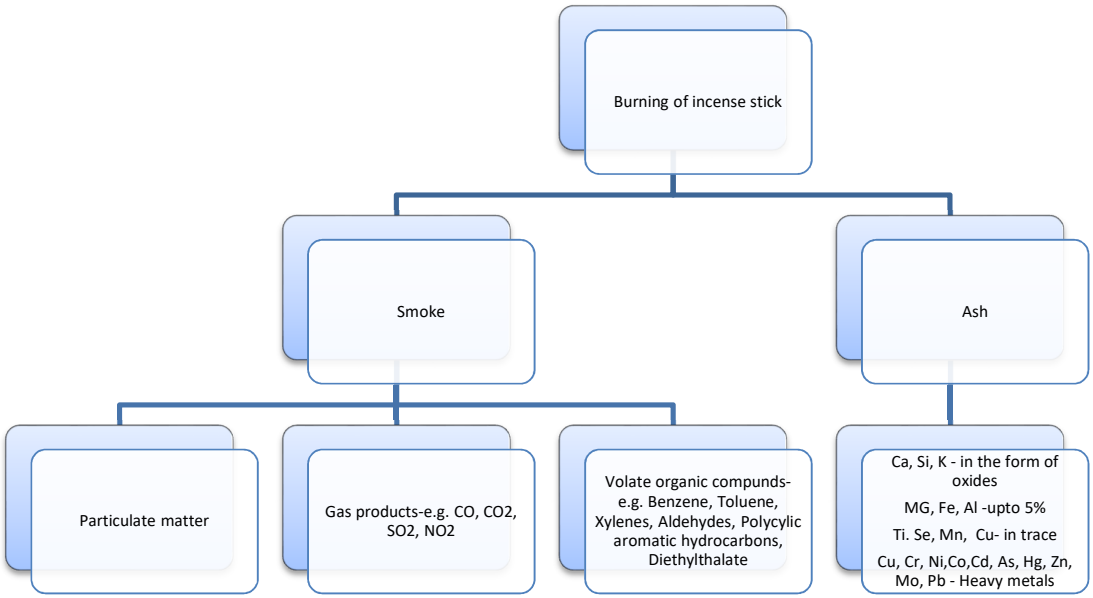

Figure 2.1 : products from burning of incense sticks

2.3 Effect of products from burning of incense sticks

1. Particulate matter: Particulate matter from incense burning is 45 mg/g on average. It is more compared to that of a cigarette, which is 10 mg/g. In a study of particulate and carbon monoxide (CO) associated with burning incense and cigarette, it was concluded that incense generated more persistent aerosols, greater particulate mass, and a greater ratio of particulate mass to CO mass concentration. Exposure to particulate matter can aggravate chronic respiratory and cardiovascular diseases, alter host defenses, damage lung tissue, lead to premature death and possibly contribute to cancer.[3,4,11]

2. Gas products: various gas products from incense burning causes headaches, dizziness, weakness, nausea, lung irritation, respiratory illness, alter lung defense system, reduce work capacity. [3,4]

3. Volatile organic compounds: Acute symptoms of volatile organic compounds exposure include eye/nose irritation, throat irritation, headaches, vomiting chronic symptoms include cancer, liver pathology, kidney pathology and central nervous system involvement.[3,4]

4. Ash : Ash of incense burning contents various metals so its disposal into water without examining its content can harm the aquatic life.[5]

Number of case studies showing harmful effects of products from burning of incense sticks have been reported by Ta-Change Lin et al. in 2008[3] , Oshan Shrestha in 2020[4], and by Yadav et al. in 2022. [5]

Though incense stick burning produces various pollutants, its harmful effect on human health depends on (i) smoke density in air which depends on number of incense stick burning (ii) room area and ventilation when incense stick is burning (iii) time of exposure.

2.4 Components of herbal incense sticks

Component	Advantages	Reference
Sandalwood, mogra, musk, Jigat powder	- The fragrance released from sandalwood coated sticks marks a religious significance and is believed to act as an antiseptic -Mogra flower has a soothing and long-lasting aroma without producing a harmful matter to breathe in. The fragrance has an aesthetic appeal - Musk type is also an excellent fixative, which minimizes the evaporation rate and allows the original	[1]

	composition to last longer by preserving its right fragrance - Jigat powder act as an binding material	
Patchouli powder	- It can replace saw dust/wood powder up to about 5% - 10% level of incense masala mix, substituting 2/3 of 15% of wood powder requirement which will help to conserve the natural forest resources reduce harmful effect of burning of wood powder - It is a medicinal and aromatic herb and is notable for its various health beneficiary applications such as: a reducer of appetite, water retention, and inflammation; a cell rejuvenator and antiseptic; an aphrodisiac. An aid in the treatment of acne, eczema, nervousness, depression, and insomnia; a fungicide; an insecticide; an aid in combating menstrual problems; an antirheumatic; a treatment for headaches; and a tranquilizer, sedative and hypotensive.	[2]
Nimba , Haridra, Maricha, Chandana, Vidanga	- It has good mosquito repellent property	[6]
Neem, Vitex Negundo, Holy Basil, Garlic, Starch, Lemon grass oil	- It gives a pleasant smell and repel mosquitoes	[7][12]
Lavender oil, Ghee	- Lavender oil has an antimicrobial property - Ghee enhance the antimicrobial activity	[10]
Camphor	- It has qualities of making soothing atmosphere of calm serenity	[12]
Clove oil, Citronella oil, Eucalyptus essential oil	- Clove oil has anti-carcinogenic, anti-allergic, anti-oxidant, insecticidal properties - Citronella oil acts as insect	[13]

	repellant - Eucalyptus essential oil is used as an antiseptic, insect repellent	
Extracts obtained from flowers of marigold, leaves and bark of Cashew, latex of Satyanshi, aerial parts of Kuntze, leaves of Pumiaya, leaves of Harad, essential oils from Eucalyptus, peppermint oil	- Marigold has antimicrobial, nematocidal, wound healing and insecticidal properties - Cashew nut shell liquid is larvicidal, molluscicidal, antifungal and antibacterial - Satvanshi is useful in the treatment of tumors, warts, skin diseases, inflammations, rheumatism, jaundice, leprosy, piles, warm infestations and dysentery. Juice of the plant is used as a remedy against scorpion bite - Kuntze root is used as an antidote to snake bite, powdered leaves have sternutatory action and relieve headache and also useful in treating hysteria - Leaves of Pumiaya plant is useful in therapeutic activities to manage diseases state like leprosy, tumors, skin disease, indolent ulcers, cough bronchitis, inflammations, intermittent fevers, malarial fever, helminthiasis, ascarides, abscesses, general debility and proctoptosis - Harad plant is used as an antidote against bites of snakes - Essential oil of Eucalyptus has strong antibiotic, anti viral and anti fungal action - Pippermint's chief therapeutic value lies in its ability to relive wind, flatulence, bloating and colic	[14]

Table 2.2 : Components of herbal incense sticks

There are number of essential oil available which act as an insect repellant but Ranasinghe MSN et al. says that the mosquito repellent activities occurred in the following order:

Citronella essential oil and Eucalyptus essential oil (100%) > Tulsi essential oil (97.94%) > Clove bud essential oil (95.81%) > Sweet Orange essential oil (93.75%) > Turmeric essential oil (89.56%) > Nika extract (85.44%) > Neem extract (81.25%). It is also observed that Plant essential oils showed higher mosquito repellent activities compared to plant extracts.[13]

Ashwin Trivedi et al. prepared 16 different samples of different combination of various essential oil and concluded that Lemongrass oil showed good mosquito repellent activity in performed test.[12]

Other base materials used by Charu Gupta and Dhan Prakash in their patent are sticky pulp of green Adusa leaves or gums like gum Arabic or gum Tragacanth to bind the mixture together while an oxidizer such as sodium nitrate or potassium nitrate to sustain the burning of incense. Fragrant materials are combined into the base prior to formation as in the case of powdered incense materials or after formation as in the case of essential oils. Besides this, a small amount of waste cardboard pulp or charcoal is also added to help with easy burning.[14]

3. Conclusion

Materials used in incense stick causes production of harmful components on burning incense stick whose long exposure produces harmful effects on human health. Use of herbal materials in incense stick can not only resolve this problem but purifies the air and produces positive effects on the health as well as use of temple flower waste minimizes the water pollution. Furthermore, new herbal materials should be find out which can be used to produce multifunctional herbal incense stick.

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