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Review on Role of *Dhoopan* in the prevention of airborne infections (COVID-19)

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ABSTRACT

Dhoopan is a procedure in which fumes or smoke produced from defined drug formulations are inhaled/exposed by patients for the therapeutic relief or externally as a cleanser to the environment. There is a significant risk of spread of airborne infections with hospital-acquired infections and to mitigate *Dhoopan* is safe and effective to prevent such infections. The aim and objectives were to review and re-publicize the efficacy of *Dhoopan* in the prevention of diseases with the published data and Ayurveda compendium. The literature has been searched from database like Pubmed, Google Scholar, Scopus, Dhara online, other database and Ayurveda compendia from 1980 to 2020. *Dhoopan* is an ancient method of sterilization for *Vranitagar* (*vran/wound* healing), *Sutikagar*, *Kumaragar*, etc. with preventive as well as curative efficacy. Smoke can be facilitated to expose or inhale in various diseases such as cough, coryza, piles, epilepsy, insanity, Asthma and wounds. The content of *Dhoop* are herbs, animal products (skin, hair, bones, horn, etc.) and minerals, described in Ayurveda compendia are potent anti-microbial, anti-fungal and antiviral action. Since time immemorial, sages used to clean the environment by *Homa-havanadi* rituals. However, due to the lacking scientific validation, these *Dhoop* methods are not popular, which bring attention to research opportunities and understand its safety and efficacy to prevent airborne infections. *Dhoopakalpas* are beneficial in dealing with airborne infection because of antioxidant and anti-microbial activity with safe, economical and eco-friendly potential. Thus, it can be publicized in the prevention of COVID 19 like a pandemic situation as an adjuvant.

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INTRODUCTION

Ayurveda is a life science; it has given more emphasis on prevention of diseases than therapeutic cure. Ayurveda is an applied philosophy, while modern science is the applied study. To combat with the COVID-19 like pandemic, several measures and medicines are mentioned in Ayurveda. Use of culinary herbs, spices like turmeric and herbal tea with ginger may protect from the COVID-19 menace effectively (Rathi et al., 2020). *Dhoopan* means fumigation, which is one of the measures of prevention (Byrns and Fuller, 2011). The decontamination of an enclosed environment is an essential consideration for the control of pathogens. Chemical

Table 1: Dhoopana Dravyasin Charaka Samhita

Sr.No.	Name & Reference	Therapeutic indication	Ingrednts
1	<i>Dhoopana Dravya</i> 8/61	Sha. Disinfecting clothes, bed, environment	<i>Sarshap, Atasi, Hinga, Guggulu, Vacha, Chor- pushpi, Brahmi, Duba, Jatamansi, Ashok, Kutki, snake molt</i>
2	<i>Chi. 3/269</i>	<i>Sheeta Jwara</i>	<i>Agaru</i>
3	<i>Chi. 3/307</i>	<i>Vishama Jwara</i>	<i>Guggulu, Neem, Vacha, Kustha, Haritaki, Sarshap, Yava & Ghee</i>
4	<i>Chi. 10/38</i>	<i>Apasmara</i>	<i>Pippali, Saindhava Lavana, Chitraka, Hingu, Vanshapatri, Kakoli, Sarshap, Kakanasha, Bakayana, Chandana, bones and nails of dog. Levigation-urine of goat in Pushya Nakshatra</i>
5	<i>Chi. 23/98</i>	Vishato remove toxins from clothes, bed and rooms.	<i>Peacock feathers, Bagulabones, Sarshap & Chandana</i>
6	<i>Sarvavinashaka</i> <i>Dhooma</i> <i>Chi. 23/99</i>	To eliminate all kinds of Vishas	<i>Tagara, Kushtha, Bhujakpati Shira, Shirisha & Ghee</i>

Table 2: Dhoopkalpa in Charak Samhita on Urdhvajatrugatyadhis

Name of Kalp	Herbal dravyas	Jangam/ Animal products	Minerals	Indication	Action
<i>Manashiladi Dhoom</i>	<i>Palash, Ajmoda, Shunthi, Vanshlochana</i>	Cow ghee	<i>Manashila</i>	<i>Kasa/cough</i>	<i>Kasahar, antibacterial, antioxidant,</i>
<i>Nav pratishyaya har Dhoo</i>	<i>Yava</i>	<i>Ghrit</i>	—	<i>Nav pratishyaya</i>	Antimicrobial
<i>Shirashoolahar</i>	<i>Erandmool, Jatamansi, Agaru, guggul, Chandan</i>	<i>Ghrit</i>	—	Headache	antibacterial, antioxidant, antifungal, aromatic, anti-inflammatory

Dhoopankalp described in *Sushrut Samhita* as shown in Table 2

fumigation with costly technology has many toxic effects (Bhinde and Joshi, 2015). Ayurveda recommends fumigation as a method of sterilization with economic, readily available, safe and ecofriendly aromatic substances which not only provide physical, and mental health but also purify and sanitize environment to kill microbes. It is a therapeutic procedure for various human diseases, including microbial infections, vector-borne, airborne viruses and psychological disorders (Vishnuprasad et al., 2013). However, it has not gained much attention as a prospective field with multiple research opportunities. Fumigation is an age-old method of sterilization since time immemorable. There are few examples mentioned in *Kashyap Samhita*, *Dhupkalpadhyaya* for the use as *Rakshoghna* in treat-

ment of *Jwara*, *Vishamjwara*, *Dushtavrana*, insanity, obstructed labour, newborn care and retention of placenta. Ayurveda has mentioned the concept of *Janapadodhwasa*, refers to the situation where there is extensive damage to the environment and lives. Epidemics and outbreaks of highly infectious diseases have shattered humanity many times up till now.

Airborne infections are commonest one, originate respiratory ailments. COVID 19 is one of the viral respiratory problems, created pandemic with death toll crosses over 1 lakh across the globe (CDC.gov, 2020). These spreads from droplets, aerosol and fomite by affected patient's cough, sneeze, sputum or nasal discharge and easily contaminate

Table 3: Dhoopana Dravyasin Sushruta Samhita

Sr.No.	Name & Reference	Therapeutic indication	Ingredients
1	<i>Su. 19/28</i>	Fumigation of Vranagara Twice a day for ten days	<i>Sarshap, Neem, Ghee & Lavana</i>
2	<i>Dhoopana Dravya Su. 36/22</i>	<i>Vrana Dhoopana</i>	<i>Shreevestaka, Sarjarasa, Sarala, Devdaru & Salaradigana</i>
3	<i>Ka. 3/17</i>	Air purification	<i>Laksha, Haridra, Ativisa, Abhaya, Musta, Harenuka, Ela, Tagara, Kustha & Priyangu</i>
4	<i>Chi. 1/80</i>	Wounds of Vataja Dosha, pain and discharge	<i>Kshauma, Yava, Ghee & Dhoopana Dravyas (Shrivestaka, Sarjarasa)</i>
5	<i>Utta.28/6</i>	<i>Skanda Graha</i>	<i>Snake molt, hairs of camel, goat, sheep and cow, Vacha, Gunja, Sarshap & Ghee</i>
6	<i>Utta.39/262</i>	<i>Vishama Jwara with chills</i>	<i>Leather and hairs of goat, sheep, Vacha, Kustha, Guggulu, Neem & honey</i>
7	<i>Utta.39/262</i>	<i>Vishama Jwara</i>	<i>Excreta of cat</i>
8	<i>Utta.50/19</i>	<i>Hikka Pratishedha</i>	<i>Sarjarasa & Manashila, Ghee, Horn, leather & hairs of cow</i>
9	<i>Utta.32/6</i>	<i>Putana Graha Pratishedha</i>	<i>Devdaru, Vacha, Hingu, Kustha, Girikarnika, Kadamba, Ela, Harenu & Ghee</i>

Dhoopankalp described in *Ashtanga Sangraha* by *Vagbhat* as shown in Table 4

the environment. Airborne infections can quickly spread in masses through breathing and inhalation of microbes ([World Health Organization, 2011](#)). Therefore, there is a need to sterile the area by disinfectant solution or fumigation. There are a plethora of microbes everywhere in the environment. Hence, it is a protocol to fumigate operation theatre prior surgery to prevent hospital-acquired infections (HAI) It needs to be carried out as per the established protocol and guidelines to ensure patient safety ([Rutala and Weber, 2008](#)). Recently, *Dhoopan* is seldom used as a fumigation method. Therefore, this review study aimed to review and re-publicize the benefits of *Dhoopan* and to evaluate the efficacy of various *Dhoopkalpas* for fumigation purpose as *Rakshoghna* (anti-microbial/sterile) with safe and instant action to prevent airborne infections.

MATERIALS AND METHODS

The literature has been searched from database like Pubmed, Scopus, Dhara online, etc. and Ayurveda abstracts from 1980 to 2020. *Dhoopanyog* has been gathered with ingredients, indications and summarized them.

Observations and Results

There are many common drugs such as *Guggulu*, ([Rout et al., 2012](#)) *Sarja/Loban*, *Arishtak/Neem*, *Rason peel* ([Münchberg et al., 2007](#)), *Haridra* ([Teow et al., 2016](#)), *Sarshapa* ([Braithwaite et al., 2008](#)), *cow dung cakes* ([Rajeswari et al., 2016](#)), *Ghee* ([Zope et al., 2017](#)), *Hingu* ([Lad and Palekar, 2016](#)), *Vidanga* ([Kaur and Arora, 2009](#)), *Yava* ([Prabhu et al., 2009](#)) *Aparajita* ([Akram et al., 2018](#)), *Vacha* ([Kumar, 2016](#)), *Devdaru* ([Zeng and He, 2012](#)), *Daruharidra*, *Bilva* ([Ganapathy and Karpagam, 2016](#)), *Lakh*, *Atasi*, *Bramhi*, *Jatamansi*, *Sarpanirmok/skin of snake* etc. Almost all the *Dhoopa* ingredients have an action of deodorant, antiseptic, antipyretic, anti-inflammatory, analgesic, *Rakshoghna/Vishhar* (anti-microbial) etc. by spreading pleasant aroma to fill in the air ([Tambekar and Dahikar, 2010](#)). The action of these drugs has been proven the efficacy for maintenance of health as well as prevention of diseases as they are anti-microbial ([Anantkumar and Shekokar, 2013](#); [Bhatwalkar et al., 2019](#)). Their bifurcation has been done as per *Samhita (Charak, Sushrut, Ashtang Hridaya and Sangraha)*, diseases, indications and confirmed action with references as shown in Table 1, Table 2, Table 3 and Table 4.

Concept of DhoopanainKashyapa Samhita

Kashyapa Samhita is a medical text dealing with

Table 4: Dhoopana Dravyasin Ashtanga Sangraha

Sr.No.	Name & Reference	Therapeutic indication (Purpose)	Ingredients
1	<i>Jatwadi Dhoopa Su. 8/91</i>	<i>Vishaghna</i> destroys poison of animal & vegetable origin witchcraft, magic does not have any effect	<i>Jatu, Sarjarasa, Ushira, Sarshap, Patra, Valaka, Vella, Aruskara, Pura & Arjuna</i>
2	<i>Chi. 2/45</i>	<i>Visham Jwara</i>	<i>Agaru</i>
3	<i>Aparajita Dhoopa Chi. 2/67</i>	<i>Jwara</i>	<i>Guggulu, Neem, Vacha, Kustha, Haritaki, Sarshap, Yava & Ghee</i>
4	<i>Chi. 2/68</i>	<i>Sarva Jwara</i>	<i>Sahadeva, Vacha, Bhadra & Nakuli</i>
5	<i>Utta. 1/17</i>	<i>Balaupchara (Shanti karma)</i>	<i>Guggulu, Agaru, Sarjarasa, Vacha, Sarshap, Hingu, Lavana, Neem & Ghee</i>
6	<i>Sarvagraha DhoopaUtta. 4/3</i>	<i>Sarva Graha</i>	<i>Puti, Dashanga, Sarshap, Vacha, Bhallataka, Dipyaka, Kustha, Ghee and Sarshap, Nimba, Ashwagandha, Vacha, Bhurjapatra & Ghee</i>
7	<i>Utta. 6/9</i>	<i>Sheetaputana Graha Chikitsa</i>	<i>Excreta of Gridha, owl, Ajagandha, Nirmoka & Nimba</i>
8	<i>Utta.6/11</i>	<i>Mukhamanditika Graha Chikitsa</i>	<i>Yava, Kustha, Sarjarasa</i>
9	<i>Karpasthyadi Dhoopana Utta. 8/10</i>	<i>Skanda, Unmada, Pisacha, Rakshyas, Sura</i>	<i>Karpasasthi, Mayur, Patra, Brihati, Nirmalya, Madan, Twaka, Wanshi, VrishaDansha, Vita, Tusha, Vacha, Kasha, Nirmochan, Nagendra Beeja, Shringa, Hingu & Maricha</i>
10	<i>Utta. 6/10</i>	<i>Andhaputana Graha Chikitsa</i>	<i>Rakshoghna, Bhallataka, Sarjarasa & Madhu</i>
11	<i>Utta. 43/56</i>	<i>Raksha Vidhana</i>	<i>Gomaya & Agaru</i>
12	<i>Agardhooma Utta.46/15</i>	<i>Aakhuvisha</i>	<i>Manjistha, Rajani & Lavana</i>

Table 5: Popular Dhoopdravyas but not included in Samhitas

Name of Kalp , Ref.	Indication	Action
<i>Tulsi- (Prabhu et al., 2009)</i>	Respiratory ailments	Olianic acid-Anti-flu, immunomodulatory
<i>Nilgiri (Chaieb et al., 2007)</i>	Respiratory ailments	Alpha-terpinol against E.coli, S.aureus
<i>Menthol</i>	Respiratory ailments	Menthol, menthone: Against C.albicans
<i>Lavang oil (Briozzo et al., 1989)</i>	Respiratory ailments	Eugenol- Larvicidal agent (combat dengue) Antimicrobial, antiviral, anti-cancerous
<i>Camphor- (Wang et al., 2019)</i>	Respiratory ailments	Linalool: Antimicrobial, Krimighna, Tridoshhara, Biofuel

diseases of newborn and children. *Acharya* has given a completely separate chapter describing near about 40 *Dhupana* formulations for newborn, growing child prophylaxis and therapeutics to a diseased child. He also opined that the physician should always possess fumigating material with him at the time of the visit to the patient. The procedure of preparation of fumigation material and their collection in *Pusya* or *MaitrayaNaksatra* from southeast or north direction is also described. *Acharya* has also mentioned chanting hymn at the time of fumigation. He also focused on the anti-microbial potential of *Dhupana* drugs by indicating them in various *GrahaRoga* as morphology and fate of *Graha* mentioned in different Ayurveda texts could be unequivocally interpreted as microscopic pathogenic organisms like virus and bacteria etc. (Zope et al., 2017).

In *BhaishjyaRatnavali* Out of total 14 *Dhoomkalpas*, three indicated for fever, 3 for *Kasa* and remaining for *Graha*, *shool*, *Arsha*, *Pilla*, *Vranaropan*. In *Ras RatnaSammuchhaya*, a total of 8 *kalpas* mentioned for *Kasa*, *Shwas* and *Graha*. In *BharatBhaishjya Ratnakar*, many *Dhoomkalpas* are mentioned for *Hikka*, *Kandu*, *Krimi*, *Shoola*, *Netravikar* and *Jwar* diseases taken from *Gadnigraha*, *VangSen*, *Yogaratanakar*, *Bhavprakash* and *Brihat Nighantu Ratnakar*. In *Sharangdhar Samhita* also fumigation is indicated in ulcer and respiratory ailments in a separate chapter named *Dhumrapanvidhi*.

DISCUSSION

Many *Acharya* such as *Charak*, *Sushruta*, *Vagbhat*, *Sharangdhar* has suggested *Dhoomkalpa* on *Kasa*, *Shwas*, *Unmad*, *Arsha* and *Vrana*. *Acharya Kashyap* has advised total 40 *Dhoomkalpas* and dedicated the whole chapter as *Dhupakalpadyay*. He emphasized mainly on *GraharDhoomkalp* (out of 40/23*kalpa*) to kill non visible microbes which causing diseases in children. He added so many animal products such as hair, horn, skin, nails, feathers and bone ash in *Dhoomkalpas* having anti-microbial properties as animals follow food chain and eat to other small animals carrying some infective residues. Thus, body parts of Vulture like animals are the best source of anti-microbial action (Mendoza et al., 2018). Other eleven *kalpas* are mentioned to feel pleasant, auspicious, to become attractive, healthy (boost growth and development) and to increase prosperity. *Acharya Vagbhat* has advocated same *Dhoomkalpas* as *Charak*. *Ghrith* is the common ingredient for all *Dhoomkalpas* as an excellent binder, facilitates the combustion of herbs by provoking fire with anti-microbial properties (Rathi and Rajput, 2018). Cow dung cakes are also common ingredient but

not mentioned in *kalpas* having potent antibacterial and antiviral properties (Rajeswari et al., 2016). Many drugs which are mentioned in Table 5, not described under *Dhoomkalpas* in Ayurveda *Samhitas* but having anti-microbial properties also cited in this review with references.

There are lots of airborne infections, and hospital-acquired diseases with a plethora of microorganisms in the environment which poses a threat to humans, so it is the need of the hour to find a good alternative to chemical fumigation which is very hazardous to humanity. Some *Dhoomkalpas* are proven and validated by some studies that they improve the air quality microbiologically (cfu/m³ of air) by assessing microbes pre and post-experiment on Agar plate and swabs. Methicillin-resistant *Staphylococcus aureus* strains (MRSA 1-3) are the commonest microbes causing HAI or nosocomial infections. (Bhatwalkar et al., 2019) a study has proved to kill these bacteria to a great extent with *Dhoom* of *Rason* peels, *Loban*, *Carom seeds/Ajmoda* and *Curcuma longum*. (Braithwaite et al., 2008) and (Yassin and Almouqatea, 2010) study has evaluated the efficacy of herbal fumigation having *Devdaru* in airborne infections (Nautiyal et al., 2007; Bisht et al., 1988).

In another study but under publication by Rathi Renu et al. on *Maheshwar Dhup*, it shows significant outcome (p<0.0001) with one-week residual effect when compared with *Basilocid* to fumigate minor operation theatre and procedure rooms.

CONCLUSION

Dhoomkalpas are very safe, cheap and environment friendly as compared to other chemical fumigation in the prevention and control of airborne diseases. Thus, it is the need of the hour to explore the potential of Ayurveda herbs with minerals, animal products by research and then propagate Ayurveda *Dhoomkalpa* to avert COVID19 like epidemic outbreaks in future.

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Conflict of Interest

Authors declare no conflicts of Interest.

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