

Gandusha prayoga (oil pulling): as a preventive measure for Mucormycosis.

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ABSTRACT:

INTRODUCTION: Ayurveda is the traditional medical science not only aims at cure of disease but also gives equal importance to prevention of health. *Mucormycosis* cause loss of eye vision and can be life-threatening as well.

Gandusha is a powerful detoxifying Ayurvedic technique. *Gandusha* is the procedure of holding any liquid in the mouth to its full capacity without any movement inside. *Gandusha* acts as preventative as well as curative. **AIMS & OBJECTIVES:** To analyze the efficacy of *Gandusha* in *Mucormycosis*.

MATERIALS & METHODS: *Mucormycosis* (Zygomycosis, phycomycosis) is an acute opportunistic infection caused by a saprophytic fungus that belongs to the class of Phycomycetes. *Gandusha* is the procedure of holding any liquid in the mouth completely to its full capacity without any movement inside.

DISCUSSIONS: *Gandusha* (Oil pulling) consists of medicated oil and fluid which are proven to protect the oral cavity from infection and inflammation by their antioxidant properties. Research has shown that oral mucosa does not act as a semi-permeable membrane to allow toxins to pass through.

RESULTS: Oral hygiene is a key to oral health and is equally important in maintenance of general health. *Gandusha* cleanses the whole oral cavity by collecting the debris from inter dental spaces, gingival and gingival margins. Thus *Gandusha* can be given as a prophylactic measure for *Mucormycosis*.

Keywords: Ayurveda, *Gandusha*, *Mucormycosis*, Prevention.

INTRODUCTION:

Ayurveda is the traditional medical science not only aims at cure of disease but also gives equal importance to prevention of health.^[1] Ayurveda is the ancient Indian system of health-care and

longevity. It involves a holistic view of man, his health and illness. Though there is no separate chapter explaining about *MukhaSwasthya* (oral hygiene), *Acharyas* has highlighted the importance of oral health by explaining certain practices like *Dantadhavana* (brushing), *Jihvanirlekhana* (tongue cleaning), *Kavala*, *Gandusha* to be followed as a daily routine under the heading of *Dinacharya* (daily regimen). We also get detail references regarding diseases of oral cavity and their treatment in the classics.

Mucormycosis is not a new disease; however the sudden rise in these cases has been seen during COVID-19 time. *Mucormycosis* is usually rare, affecting fewer than 2 people per million people each year in San Francisco, but is now 80 times more common in India. People of any age may be affected, including premature infants. The disease has been reported in natural disasters; 2004 Indian Ocean tsunami and the 2011 Missouri tornado. During the COVID-19 pandemic, an association between *Mucormycosis* and COVID-19 has been reported. This association is thought to relate to reduced immune function during the course of the illness and may also be related to glucocorticoid therapy for COVID-19.^[2] A rise in cases was particularly noted in India.

The incidence rate of *Mucormycosis* globally varies from 0.005 to 1.7 per million population. In India, prevalence of *Mucormycosis* is estimated as 140 per million population, which is about 80 times higher than the prevalence in developed countries.^[3,4]

Mucormycosis is not a new disease as it is known to occur in patients with low immunity such as in cases of organ

transplant, some cancer patients, uncontrolled diabetes etc. It is a rare but serious complication of COVID-19. This infection can cause loss of eye vision and can be life-threatening as well. *Mucormycosis* is not a communicable disease which means that it does not spread from one person to another. Mortality rate due to secondary infections in covid-19 patients with uncontrolled diabetics and who are on steroid therapy can soon reach 100% if diagnosis and treatment doesn't happen on timely basis.^[5]

In Ayurveda, dental health (*DantaSwasthya*) is held to be very individualistic, varying with each person's constitution (*Prakriti*), and climatic changes resulting from solar, lunar and planetary influences (*Kala-Parinama*). The body constitution is classified based on the predominance of one or more of the three *Doshas*, *Vata*, *Pitta* and *Kapha*. The dominance *Dosha* in both the individual and nature determines health care in Ayurveda, including dental health.^[6]

Gandusha is the procedure of holding any liquid in the mouth to its full capacity without any movement inside. *Gandusha* acts as preventative as well as curative. The exciting aspect of this healing method is its simplicity. *Gandusha* is a powerful detoxifying Ayurvedic technique that has recently become very popular as a CAM remedy (complementary and alternative medicine) for many different health ailments.

AIMS & OBJECTIVES

- To analyze the efficacy of *Gandusha* as a preventive measure in *Mucormycosis*.

MATERIALS & METHODS:

Relevant literature is referred from the *Samhitas*, *Sangraha Granthas* and contemporary literature along with personal experience.

MUCORMYCOSIS:^[7]

Mucormycosis (*Zygomycosis*, *phycomycosis*) is an acute opportunistic infection caused by a *saprophytic* fungus that belongs to the class of *Phycomycetes*. *Rhizopus arrhizus* is the most common etiological agent of *Mucormycosis* in India, and globally but other variants are also found as *Rhizopus microsporus*, *Rhizopus homothallicus*, and *Apophysomyces*.

Pathophysiology:

Infection of *Mucormycosis* is marked by extensive angio-invasion. For that, subsequent tissue necrosis, vessel thrombosis takes place. Ischemic necrosis hinders delivery of leukocytes and antifungal agents to the foci of affected area.

High risk patients

- COVID recovered
- COVID recovering
- COVID in diabetic patient
- Patients undergoing dialysis
- Patients taking chemotherapy
- Patients who underwent organ transplant taking immunosuppressive drugs

Clinical features

Mucormycosis can be divided into at least 6 clinical syndromes. They are

1. Rhino-orbital-cerebral disease: It continues to be the most common form of the disease. Most cases occur in patients with diabetes, although such cases are increasingly being described in the transplantation

setting, often along with glucocorticoid-induced diabetes. The initial symptoms are non specific and include eye or facial pain, headache, blurry vision, One-sided facial swelling, nasal or sinus congestion, black lesions on nasal bridge or upper inside of mouth that quickly become more severe and fever. If untreated infection usually spreads from ethmoid sinus to the orbit, resulting in compromise of extra ocular muscle function and proptosis, typically with chemosis. From the orbit, spread often takes place via hematogenous or contiguous dissemination to the frontal lobe of the brain and /or via venous drainage to the cavernous sinus.

- 2. Pulmonary disease:** It is the second most common manifestation. Symptoms include fever, *dyspnea*, cough, and chest pain. Angio-invasion results in necrosis, cavitations and/ or *hemoptysis*. Lobar consolidation, isolated mass, nodular disease, cavities or wedge-shaped infarcts may be seen on chest radiography. High resolution chest CT is the best method for determining the extent and may demonstrate evidence of infarction before it is seen on chest x-ray.
- 3. Cutaneous disease:** It may result from external implantation of the fungus or from *hematogenous* dissemination. It can be highly invasive, penetrating muscle, fascia and even bone. It can look like blisters or ulcers, and the infected area may turn black. Other symptoms include pain, warmth, excessive redness, or swelling around a wound. Necrotic cutaneous lesion

in the setting of hematogenous disseminations also associated with an extremely high mortality rate.

4. **Gastrointestinal disease:** It has been reported as a nosocomial process following administration of medications mixed with contaminated wooden applicator sticks. Nonspecific abdominal pain and distention associated with nausea and vomiting are the most common symptoms. Gastrointestinal bleeding is common, and fungating masses may be seen in the stomach endoscopy. The disease may progress to visceral perforation, with extremely high mortality rates.

5. **Disseminated and Miscellaneous forms of disease:** It may originate from primary site of infection. The most common site of dissemination is the brain, but metastatic lesions may also be found in any other organ. Miscellaneous forms may affect any body site, including bones, *mediastinum*, trachea, kidney and peritoneum; even isolated infection of teeth has been reported. Patients with disseminated infection in the brain can develop mental status changes or coma.

Diagnosis:^[3]

- Early recognition, diagnosis and prompt administration of appropriate antifungal treatment and surgical debridement (as needed) are important for improving outcomes for patients with *Mucormycosis*.
- Diagnostic methods include biopsy and fungal staining (KOH

mount), which remains the mainstay of laboratory diagnosis. Facilities where fungal culture and susceptibility testing are available can help to confirm the species of *Mucormycosis*. Treatment initiation, however, should not wait for fungal culture results.

- Imaging tests such as a CT scan of lungs, sinuses, or other parts of body, depending on the location of the suspected infection, may also be used to support the diagnosis.

GANDUSHA:

The word *Gandusha* is formed by *Gadi* + *Gandescha* which mean *MukhaPurnam* i.e. filling the mouth. *Gandusha* is the procedure of holding any liquid in the mouth completely to its full capacity without any movement inside, held for about 3-5 minutes, and then released. It is usually done with *Drava* (liquid) types based on *Doshagnata and Karmukata*. It has been recommended as one of the practices to help improve oral health.^[8]

Gandusha is classified mainly into four types. They are^[9,10,11]

1. *Snaihika Gandusha* (lubricating) – indicated in diseases of *Vata*
2. *ShamanaGandusha* (matigating) – indicated in diseases of *Pitta*
3. *ShodhanaGandusha* (purificatory) – indicated in diseases of *Kapha*
4. *RopanaGandusha* (healing) – indicated in ulcerations of *Mukha*

Table No. 1: Types of *Gandusha* with details.^[11,12,13]

Sr. No.	Type of <i>Gandusha</i>	<i>Dravya</i>	<i>Dosha</i>
1.	<i>Snaihika/SnigdhaGandusha</i>	<i>Madhura, Amla&Lavana Rasa &UshnaVirya</i>	<i>Vataja</i> diseases
2.	<i>ShamanaGandusha</i>	<i>Tikta, Kashaya and Madhura rasa &ShitaVirya</i>	<i>Pittaja</i> diseases
3.	<i>ShodhanaGandusha</i>	<i>Katu, Amla And LavanaRasatmaka&UshnaVirya</i>	<i>Kaphaja</i> diseases
4.	<i>RopanaGandusha</i>	<i>Kashaya and Madhura Rasa &ShitaVirya</i>	Useful in healing of mouth ulcers

1. SNAIHIKA GANDUSHA: It is oleating type of *Gandusha*. It is made from the decoction of drugs which are *Madhura, Amla* and *Lavanarasa* and *UshnaVirya* or mixed with *SnehaLikeGrita or Taila* or only with warm *Sneha* or with *MamsaRasa* (meat-soup) or water mixed with *Tila Kalka* or with *Kshira*. It is useful in *Vataja* diseases of the mouth i.e. diseases associated with dryness and roughness in the mouth. For *Snaihika Gandusha* a paste of *Tila* with water, milk or oil is ideal.^[13]

2. SHAMANA OR PRASADANA GANDUSHA:

It is soothing type of *Gandūsha*. It is made from the decoction of drugs which are *Tikta, Kashaya and Madhura rasa, ShitaVirya* such as *Patola, Arista, Jambu, Amra*, tender leaves of *Malati* flower, *Utpala, MadhukaKwatha* or *Sitodaka* or *Madhu* or *Dugdha* or *Ikshu rasa* or *Ghrta* etc. It is useful in *Pittaja* diseases of the mouth i.e. diseases associated with burning sensation in the mouth.^[13]

3. SHODHANA GANDUSHA:

It is made from the decoction of drugs which are *Katu,*

AmlaAndLavanaRasatmaka, Ushna Virya like drugs of *ShirovirechanaGana* or with *Shukta, Madhya, Dhanyamla*, Urine of animals mixed with pastes of drugs. It is useful in *Kaphaja* diseases of the mouth i.e. diseases associated with excessive salivation and stickiness in the mouth".^[13]

4. ROPANA GANDUSHA:

It is healing type of *Gandusha*. Here, the decoction of drugs is prepared from the drugs which are having the taste (*Rasa*) like astringent (*Kashaya*), bitter (*Tikta*) and sweet (*Madhura*) and cool potency (*ShitaVirya*). Since the drugs are used here are capable of healing ulcers (*Vrunas*) and hence the name *Ropana Gandūsha*. It promotes healing of mouth ulcers (*MukhaVranās*).^[13]

Gandusha Procedure:^[14,15,16,17,18,19]

Pradhana Karma:

One should sit in a chair comfortably in *NirvataSthana* (devoid of breeze), but having sunlight, with *EkagraMana* (concentrated mind). One should be asked to hold the lukewarm medicated liquid in his mouth to its full capacity without doing any movement inside. Patient was advised to tilt his head

slightly upwards and hold liquid in mouth till the *Kapola* becomes full of *Kapha*, (oro-pharyngeal secretions) and watery discharge (*Jalasrava*) starts in *Nasa* (nose) and *Netra* (eyes). Once these features appeared, the patient was asked to spit out the liquid.

Paschat Karma:

After completion of procedure, patient was asked to wash his mouth with *SukoshnaJala*. *Lakshanas* of *Samyaka-Hina* and *Atiyoga* were observed. Then patient was advised to avoid *Vayu* and *AtapaSevana*.

Precautions:

- It is best done early morning before eating or drinking anything.
- The procedure is ideally done on a warm and hot day and inside a room that is not exposed to wind.
- Once you are finished spit out the oil. It is very important to spit the oil out and not swallow it.
- Rinse the mouth with warm water. You can then brush your teeth, floss, and use a tongue cleaner as usual.

Dosage:^[13]

The quantity or dosage for *Gandusha* differs as individuals oral cavity capacity differs. Hence it is difficult to fix the exact dose. According to Sharangadhara, a mouth full of liquid is dose of *Gandusha*. And further, he states that one kola (6gm) by measure is the dose of either a liquid (decoction) or a powder for *Gandusha*. Vagbhata states that a liquid is filled the mouth about ½ of capacity of the oral cavity (is *pravaramatra*), or 1/3rd of capacity of oral the cavity (is *madhyamamatra*) or ¼ of capacity of the oral cavity (is *avaramatra*). Among the

above said dosages, Sharangdhara's dosage holds good as per the definition *Gandusha*.

Duration:^[20,21,22]

The medicated oil has to keep in the mouth till the person develops following symptoms: Once the person develops these symptoms, he can spit out the oil. If required the procedure may be repeated. ♣ Filling the throat by oro-pharyngeal secretions (kaphapurnasyatā) ♣ Watery discharge from the nose (khanthasrāva) ♣ Watering of the eyes (akshisirāva)

Samyak-YogLakshana:-^[13]

Symptoms indicative of proper effect of *Gandusha* are-

- *Vyadherapachayah*: Remission of disease.
- *Tushtih*: Freshness of the mouth.
- *Vaishadyam*: Clarity of oral cavity.
- *Vaktralahavam*: Feeling of lightness of mouth.
- *Indriyaprasada*: Normal functioning of sense organs.

Heenayoga And AtiyogaLakshana:^[13]

Heena Yoga Lakshanas:-

Symptoms indicative of inadequate effect are

- *Jadyata*: Stiffness of mouth.
- *Kaphotklesha*: Excessive salivation.
- *Arasajnana*: Inability of tongue to perceive taste properly.

Ati-YogaLakshanas:- Symptoms indicative of excessive effect are

- *MukhaPaka*: Ulceration of mouth.
- *Shosha*: Dryness of mouth.
- *Trishna*: Feeling thirsty,
- *Aruchi*: Tastelessness.
- *Klama*: Sense of exhaustion.

Chikitsa:^[13]

Yogatiyoga laxanas should be treated appropriately. In case of *shodhanaatiyoga*, *snehana Gandusha* should be done and in *snehanaati yoga*, *shodhana Gandusha* is to be done. *Shamana* and *ropana Gandusha* should be continued until the *roga* is cured.

Anatomy of Mouth:^[23]

A mucosa lined cavity is also called the oral cavity or Buccal (bucca-cheeks) cavity. It is formed by cheeks laterally, soft and hard palate superiorly. Anterior opening is oral orifice & posteriorly it is continuous with the oropharynx.

Gandusha helps to balance the affected *Doshas* by optimizing the sensory and motor nerve conductivity, removal of toxins and stabilizing the digestive function. The *Gandusha* treatment first starts with a neck and shoulder massage to loosen up the area to start the procedure. Then the face is tilted slightly upwards and the prescribed oil solution is poured into the mouth cavity. This oil needs to be kept inside the mouth for quite some time until the eyes start watering and saliva starts to fill the mouth. Be cautious not to swallow the oil. This should be done on an empty stomach.

Probable mode of action:^[13,24,25]

The medicated oil used in *Gandusha* has antibacterial properties thus it helps to kill bacteria in the mouth. It is the bacteria that cause various oral problems. It works just like mouthwash but instead of using chemicals, it uses natural medicated oil. It helps to strengthen the gums. It also helps to remove plaque. *Gandusha* helps to reduce toxins from the mouth. When the toxins are removed, it can cause sweating which proves that the procedure is working well. Regularly doing *Gandusha*

can help in strengthening the facial muscles.

When the medicine is held in the mouth without any movement, it is well absorbed through the mucous membrane. The action of *Gandusha* exerts increased mechanical pressure inside the oral cavity. So this increased pressure stimulates *pressoreceptor* (stretch reflex) that are present in the mouth. Once the *pressoreceptor* is stimulated, they send signals to salivary nuclei in the brain stem (pons and medulla). As a result, Parasympathetic nervous system activity increases and motor fibres in facial (VII) and *glossopharyngeal* (IX) nerve trigger dramatically increasing the output of saliva. Chemical constituent present in the drug also stimulate *chemoreceptors* present in the mouth, which in turn increases salivary secretions. An enzyme called lysozyme present in saliva is *bacteriostatic* in action. It prevents the growth of pathogenic microorganisms in the oral cavity. Antibody IgA present in saliva also provide protection against microorganisms. Thus *Gandusha* increases local defense mechanism and promotes oral hygiene.

Mucosal layer inferior to the tongue (sublingual) is thin and highly vascular enough to permit the rapid absorption of the lipid soluble drugs into systemic circulation. Some of the drugs irritates the oral mucosa (by their chemical nature) and increases vascular permeability. Thus an active principle of *Dravya* is absorbed into systemic circulation. Most of the *Dravyas* given for *Gandusha* are *Sukhoshna* (warm) so raised temperature causes the increased vascular permeability there by enhancing systemic absorption of drugs.

DISCUSSION:

The overall literary review of *Mucormycosis* symptomology, *GandushaPrayoga* as a part of daily routine as mentioned by different acharyas also can play a great role in preventing various oro-pharyngeal disorders and also in maintaining oral cavity normal and healthy. *Gandusha* (Oil pulling) consists of medicated oil and fluid which are proven to protect the oral cavity from infection and inflammation by their antioxidant properties. Research has shown that oral mucosa does not act as a semi-permeable membrane to allow toxins to pass through.^[26]

On the other hand if we take *Mucormycosis* the symptomology it presents itching, sinusitis, discharge which are mainly kaphvridhila kshanas, and also the sight where it shows its effects mainly are eyes, oral cavity etc which are all above clavicle region. In Ayurveda above clavicle region is mainly said to be kaph predominant and hence all the procedures which suppresses kaph dosha will be beneficial. Hence So its way of administration and its types and ways have to be made clear to the people and to Ayurveda fraternity is well.

Further observational evidence based studies and clinical trials are recommended to evaluate the effectiveness of Ayurvedic medicine and therapy against *Mucormycosis*.

RESULTS:

Oral hygiene is a key to oral health and is equally important in maintenance of general health. Ayurveda has given equal importance to oral hygiene and health. There are references

regarding measures to be followed as a routine for maintenance of oral hygiene.

Gandusha which is explained as both preventive and curative measures in oral diseases can be practiced daily to prevent *Mucormycosis*. It cleanses the whole oral cavity by collecting the debris from interdental spaces, gingival and gingival margins. Hence by accessing the above discussion and literature it can be said that *Gandusha* can be given as a prophylactic measure for *Mucormycosis*.

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