

A CLINICAL STUDY ON THE EFFICACY OF VARTAKA DHOOMA IN OTOMYCOSIS

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ABSTRACT

Otomycosis, a fungal infection of the ear canal often due to *Candida* and *Aspergillus* is a very common disease, especially in tropical and subtropical areas. Even though it is a rare possibility that otomycosis can lead to as severe complication as deafness, the symptoms of the disease like itching, discharge and pain makes the patient quite irritated and hence the quality of life is at stake. There can be lack of concentration due to these symptoms which may result into 'loss of work hours'. Also the disease exhibits peculiar nature of recurrence, which extends the period of suffering in the patient. Hence it is the need of the society that medical science contributes, through research, to the treatment of otomycosis which will be cost effective and efficient enough to prevent recurrence. In Ayurveda, various stages of

the disease can be correlated to different diseases mentioned by our pioneer scholars under *Karnarogas*. Out of various procedures told in Ayurvedic classical texts which are highly effective in treatment of various *karnarogas*, *Karnadhoopana* is best suited to otomycosis. Amongst many medicated Dhooma, *Vartaka dhooma* is a yoga indicated for *karnadhoopana* by Acharya Susruta. This particular study was undertaken in order to find out the efficacy of *Vartaka dhooma* in otomycosis.

KEYWORDS: Otomycosis, Vatraka dhooma, Karnadhoopana, Karnakandu.

INTRODUCTION

The importance of Ayurveda in global scenario is because of its holistic approach towards positive life style. It deals with both the preventive and curative aspects of diseases in a most

comprehensive way.^[1] But research is needed for establishment of the applied aspect of Ayurveda in modern era.

It has been estimated that cases of otitis externa make up between 5 and 20% of all otological consultations; the etiology of the majority is bacterial, only 15-20% are attributed to fungi. Mixed infections are generally scarce as fungal flora tends to inhibit the bacterial kind. The fungi that produce otomycosis are generally saprophytic fungi species that abound in nature and that form a part of the commensal flora of healthy EAC. These fungi are commonly *Aspergillus* and *Candida*. *Aspergillus niger* is usually the predominant agent although *A. flavus*, *A. fumigatus*, *A. terreus* (filamentous fungi), *Candida albicans* and *C. parapsilosis* (yeast-like fungi) are also common. Otomycosis is sometimes difficult to manage due to different factors related to the microorganism and to the local and general characteristics of the patient. In the last few years the participation of fungi in external otitis has increased, mainly because of the use of broad-spectrum antibiotics for the treatment of bacterial otitis and to factors relating to changes in immunity. This commensal flora is not pathogenic as long as the balance between bacteria and fungi is maintained. The depth of the EAC cul de sac possesses many of the requirements necessary for fungal growth: humidity, temperature, substrate (proteins and carbohydrates) and pH 5-7.

Otomycosis denotes diffuse otitis externa due to fungal infections. The fungal agents responsible for this clinical entity are found as saprobes in the environment. The fungi are usually secondary invaders of the tissue rendered susceptible by bacterial infection, physical injury or excessive accumulation of cerumen in the external auditory canal. Its prevalence is greatest in hot, humid & dusty areas of the tropics. It is common in India with a prevalence of 5.2% in the general population (Journals.combridge.org/production/ation/cjo).

Approximately 5-25% of the total cases of Otitis externa are due to otomycosis in India (*In a research paper in Otolaryngology dept. of JMU Medial college Aligarh- yr 2005*) and 9% according to American academy of Otolaryngology – Head & neck Surgery foundation - 2006.

Considering these points, there is a need of search for a safe remedy. Otomycosis cannot be directly correlated with a particular disease mentioned in Ayurvedic classics. Rather different stages of this disease depict different diseases from the texts. On the basis of clinical features

different stages of otomycosis can be included under Karnakandu, Kaphaja Karnashoola, Karnasrava and Krimikarna.

Acharya Susruta gives a generalized treatment protocol for Karnasrava, Putikarna and Krimikarna. Sirovirecana, Karna-Dhoopana, Karnapurana, Karna-Pramarjana, Karna-Dhavana, and Karna- Prakshalana are the therapeutic procedures to be adopted according to different stages of these conditions.^[2] According to Acharya Charaka, Dhoopana relieves Ruja (pain), Srava (discharge), Durgandha (foul odour) and Vranajakrimi.^[3] Dhoopana also facilitates the process of healing of ulcer. According to Acharya Susruta Vranadhoopana imparts Vedanaupasamam, Vranavaisadyam and Sravaupasamam.^[4] Acharya recommends incorporation of the management of Dushtavrana in Putikarna^[5] the features of which can be seen in later stages of otomycosis.

In Shalakyatantra, along with systemic treatment local therapeutic procedures are also given equal emphasis. It is evident clinically also that local therapeutic procedures like dhoopana gain much importance in otomycosis. Dhoopana with drugs like surasa, haridra, nimba etc which have krimihara properties are found effective in otomycosis. Vartaka dhooma is mentioned in Susruta samhita, Chakra dutta, Yogratnakara, Bhavaprakash & Bhaishajya ratanavali for dhoopana in Krimi Karna.^[6] Being inspired by encouraging results of dhoopana obtained in our department for different karnarogas, it is planned to observe the effect of Vartaka dhoopana in otomycosis.

Otomycosis cannot be directly correlated with any one particular disease mentioned in ayurvedic classics. Rather different stages of this disease depict different diseases from the text. Initially in otomycosis patients are usually asymptomatic wherein implantation and growth of causative organism occurs. As there are no symptoms these stages reflect the part of samprapti before formation and manifestation of the disease- that is the stages before 'sthanasamshraya'. The entity called 'disease' or 'roga' will always have one or more 'rupas'. In next stage of otomycosis patient experiences itching and mild discomfort in the ear. This stage can be compared with 'karnakandu' (described by both acharya Susruta & Vagbhata). As the disease progresses to last stage, the next symptom to appear is pain and discharge from the ear. This is because of exfoliation of epithelium & denudation. This stage can be compared to karnashoola' (kaphaja) and 'karnasrava' (kaphaja) as described by acharya Susruta. If the pathogenesis is not checked at this stage, it may take a dangerous turn and can lead to superficial ulceration and eczematoïd dermatitis. This suggests vitiation of all

three doshas and involvement of deeper dhatus as described in the disease 'krimikarna'. If the damage caused is grave, it can also lead to deafness.

Samprapti

Even though all three doshas are continuously circulating all over the body certain organs or certain parts of body are dominated by certain doshas, these organs or parts of body which show dominance of specific doshas are called 'seats' of that particular dosha. Like wise karna is one of the seats of vata dosha. If we have a look at karna roga nidanas told by acharya it's very clear that most of them are kapha vardhaka hetus like avashyaya, jalakrida etc. There are many other aharaja viharaja hetus which can lead to kapha vridhi like dadhi sevana, divaswapna, excess intake of madhura, guru, snigdha etc. But kapha increased by such hetus will produce karnaroga only if there is prior weakening of karna srotas i.e. karnasroto dusti. It's important to note that the manifestation of this disease fulfill both needs of samprapti i.e. kapha vridhi and karna sroto dusti. So whenever persons indulge in excessive intake of such kapha vardhaka nidanas abnormally increased kapha is likely to produce avarana of vata in karna srotas to produce these diseases. Symptoms like soola and gaurava are indicative of kaphavrita vata also.^[7] As far as otomycosis is considered role of pitta and rakta cannot be neglected in samprapti. Symptoms like purulent discharge, ulcer of EAC are only possible due to pitta and rakta. If pitta and rakta are not taken care of immediately they can lead the condition to dushta vrana and nadi vrana.

CHIKITSA

The pathogenesis of otomycosis points to the role of krimi and bhoota according to ayurvedic view. Evaluating the features of infestation of these two, dhoopana gains a critical role in otomycosis. According to principles of ayurveda, apakarshana, prakriti vighata and nidana parivarjana are meant for krimi chikitsa.^[8] In otomycosis apakarshana is brought about by karnapramarjana (moping), prakriti vighata means eliminating the root cause of the disease. It is also considered as samana by certain acharya. Local therapeutic procedures and internal medication come under this group. Dhoopana is such a procedure effective in controlling otomycosis and reducing its recurrence. Nidana parivarjana as for all pathological conditions is inevitable in otomycosis. All the aharaja and viharaja nidanas should be avoided and pathyakrama should be followed to enhance one's resistance towards this infection.

DHOOPANA

In our samhithas, acharayas mentions the treatment modalities as topical (bahi-parimarjana),

systemic (anta-parimarjana) or by surgical intervention (sastra-pranidhaana). Among these three, bahi-parimarjana– topical oriented therapy is gaining more importance because of its manifold merits which play pivotal role both in health care and disease cure. The concept of bahi-parimarjanas is described in all the three major texts of ayurveda but the description is more vivid in Charaka samhita and Ashtanga sangraha. According to them, bahi-parimarjana Chikitsa is the topical application of drugs such as abhyanga, sweda, parisheka, pradeha and unmardana. The acharyas uses ‘aadi’ (etc.) to this giving room for the inclusion of other topical procedure like kavala, gandoosha, netratarpana, karnapoorana, dhoopana and yoni pichu. In all these topical procedures the effect of medication or therapy is more local than systemic.^[9]

Fumigation (dhoopana) has been told as a treatment in all the classics of ayurveda but detail description is available only in Kasyapa samhita in a chapter named ‘Dhoopakalpa’.^[10]

Karnadhoopana

Karnadhoopana is also one among the topical (bahi-parimarjana) type of treatment .This type of treatment is available in ancient ayurveda samhita. It is one of the treatments procedures wherever a disease is related to the bahyakrimi. In karnaroga acharya opted dhoopana as one of the treatments in karnasrava, putikarna, karnakandu and krimikarna.

METHODOLOGY OF THE CLINICAL TRIAL

An open clinical trial was carried out on 30 selected cases of Otomycosis to find out the efficacy of *Vartaka dhooma* in otomycosis in following manner.

AIMS&OBJECTIVES

1. To assess the efficacy of ‘Vartaka dhooma’ in otomycosis.
2. To study otomycosis in detail along with its Ayurvedic equivalents.

MATERIALS AND METHODS

For this clinical study, 30 patients attending the OPD of Salakyatantra department, Govt. Ayurveda College, Tripunithura and willing to participate in the study had been selected on the basis of subjective and objective criteria for diagnosis of otomycosis (considering the inclusion and exclusion criteria). Necessary investigations were carried out and their details were recorded in a special proforma.

INCLUSION CRITERIA

- The selection of patients which are based on clinical feature of otomycosis like Itching, pain in the ear and discharge were selected.
- Patients between the age limit of 10-70 years were selected irrespective of gender, caste, religion, food habits and socioeconomic status.

EXCLUSION CRITERIA

- Patients below 10 years and above 70 years.
- Known cases of Tuberculosis, AIDS.
- Patient with CSOM, ASOM, perforation of tympanic membrane etc were excluded from the study.

DRUG & POSOLOGY

Dhooma.(Fumes) of Vartaka (*Solanum melongena*) was introduced with Vartaka dhooma varti twice a day, (morning and evening) for 5 min in affected ear of the 30 patients for 15 days after proper Karna Pramajana.

INTERVENTION

Base line clinical data of each patient was collected .The patients were advised to avoid head bath, day sleep, usage of cold water etc. Before karna dhoopana ear was examined under proper illumination. For better visualization otoscope was also used. In all patients before karna dhoopana, karna pramajana was done and in case of excess accumulation of debris karna dhawana with sterile water was done followed by karna pramajana. The place where procedure was carried out was kept clean and devoid of dust, hot sunlight and breeze. Patient was made to sit on comfortable chair. It was observed that patient is mentally and physically relaxed. Patient was advised to concentrate on the procedure and avoid other thoughts during procedure. Vartaka varti was ignited and allowed to burn till it produces sufficient dhooma. Head of the patient was tilted towards the shoulder of the affected ear so that dhooma can be properly directed to EAC. A hard paper was made into cone shape with a small opening at its tip. Varthi was placed in cone in such a way that dhooma will come out through the tip of the cone. As the tip of the cone has very small opening (0.5cm diameter), intensity of the dhooma is maintained. Paper cone was brought close to the EAC of the affected ear and dhooma was allowed to enter the EAC. Procedure was continued for about 5 min. Procedure was repeated

twice daily. Preferably 8.30 am & 4.30 pm. Patient was observed for 15 min after procedure. Patient was advised to close the eyes during dhoopana procedure.

ASSESSMENT

A detailed proforma was prepared for the assessment of subjective and objective parameters. The data obtained was analyzed statistically. Itching, pain, discharge from the ear, presence of fungus in EAM on otoscopic examination.

INVESTIGATION

Routine examination of blood and urine was done.

Culture test of swab or KOH mount preparation test.

GRADING OF SYMPTOMS

Table 1: Grading of symptoms

SYMPTOMS	GRADE 0	GRADE 1	GRADE 2	GRADE 3
ITCHING	Nil	Occasional	Often itching throughout the day	Itching throughout the day and disturb sleep
DISCHARGE	Nil	Occasional	Continuous discharge in ear with short history or first time history	Continuous discharge in ear with long history or history of recurrence
PAIN*	Nil	Mild- 1- 4	Moderate- 5-7	Severe- 8-10
Presence of fungus in EAM on Otoscopic examination	Nil	50% of acoustic canal is affected	75% of acoustic canal affected	Total length of acoustic canal and tympanic membrane

* PAIN: - Pain was assessed by Numeric Rating scale (NRS) 0-10 Patients relate their pain intensity to a rating number between pain free (0) and worst pain (10)

EFFECT OF THERAPY

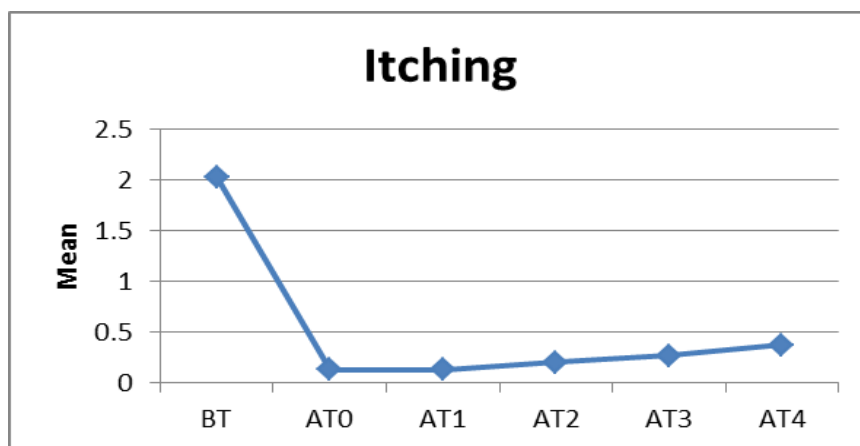
The present trial was highly significant with respect to all the signs and symptoms along with fungus-status as depicted in following self-explanatory tables and charts.

ANALYSIS OF EFFECT OF TREATMENT ON SIGNS, SYMPTOMS AND FUNGUS POSITIVE TESTS IN OTOSCOPIC EXAMINATION

1. Itching

Table 2: Analysis of effect of treatment on itching in the ears

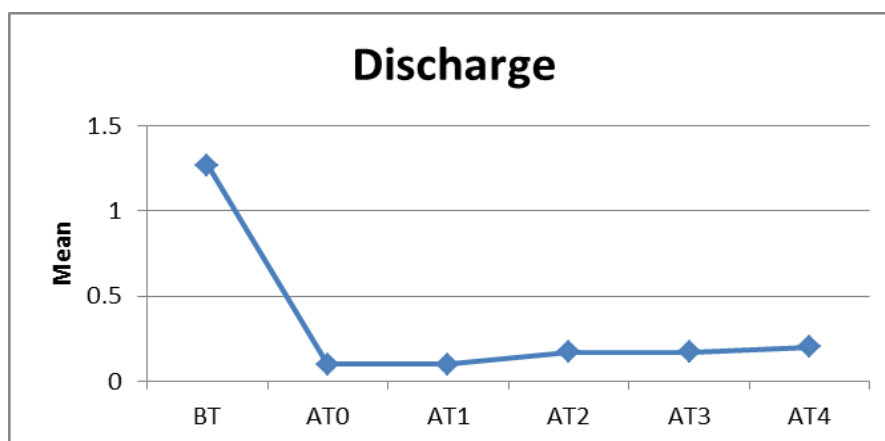
Itching of ears	N	Mean	sd	Paired Differences			Paired T	P
				Pair	Mean	Sd		
BT	30	2.03	0.32					
AT ₀	30	0.13	0.35	BT- AT ₀	1.90	0.074	25.85	<0.001
AT ₁	30	0.13	0.35	BT- AT ₁	1.90	0.074	25.85	<0.001
AT ₂	30	0.20	0.41	BT- AT ₂	1.83	0.084	21.77	<0.001
AT ₃	30	0.27	0.45	BT- AT ₃	1.77	0.092	19.19	<0.001
AT ₄	30	0.37	0.56	BT- AT ₄	1.67	0.111	15.05	<0.001

**Graph1: Analysis of effect of treatment on itching in the ears**

2. Discharge

Table 3: Analysis of effect of treatment on discharge in the ears

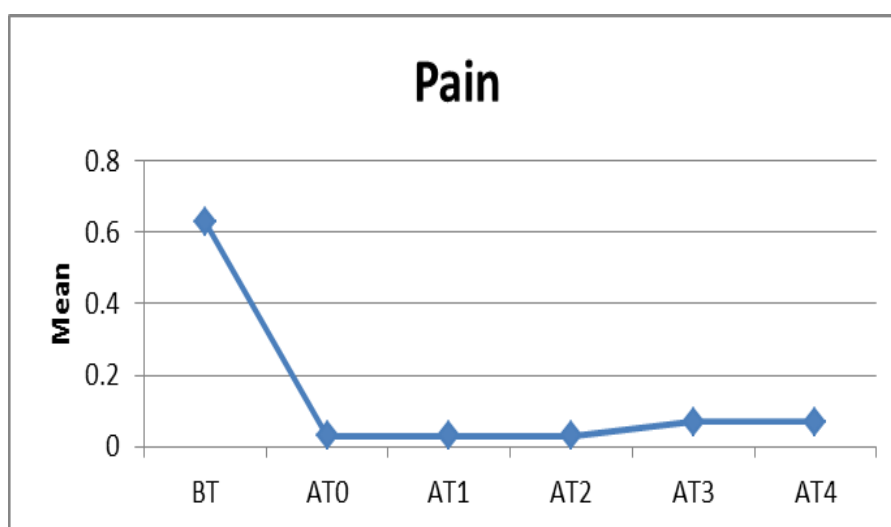
Discharge of ears	N	Mean	SD	Paired Differences			Paired T	P
				Pair	Mean	Sd		
BT	30	1.27	0.94					
AT ₀	30	0.10	0.31	BT- AT ₀	1.17	0.145	8.0736	<0.001
AT ₁	30	0.10	0.31	BT- AT ₁	1.17	0.145	8.0736	<0.001
AT ₂	30	0.17	0.46	BT- AT ₂	1.10	0.147	7.5029	<0.001
AT ₃	30	0.17	0.46	BT- AT ₃	1.10	0.147	7.5029	<0.001
AT ₄	30	0.20	0.48	BT- AT ₄	1.07	0.143	7.4433	<0.001

**Graph2: Analysis of effect of treatment on discharge in the ears**

3. Pain

Table 4: Analysis of effect of treatment on pain of ears

Pain of ears	N	Mean	sd	Paired Differences			Paired T	P
				Pair	Mean	Sd		
BT	30	0.63	0.56					
AT ₀	30	0.03	0.18	BT- AT ₀	0.60	0.091	6.5955	<0.001
AT ₁	30	0.03	0.18	BT- AT ₀	0.60	0.091	6.5955	<0.001
AT ₂	30	0.03	0.18	BT- AT ₂	0.60	0.091	5.4613	<0.001
AT ₃	30	0.07	0.25	BT- AT ₂	0.57	0.104	5.4613	<0.001
AT ₄	30	0.07	0.25	BT- AT ₂	0.57	0.104	5.4613	<0.001

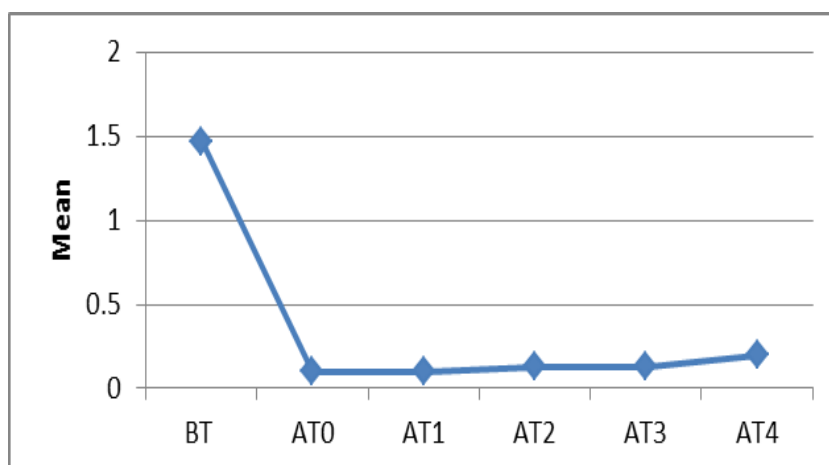


Graph3: Analysis of effect of treatment on pain of ears

4. Presence of fungi in EAM on Otoloscopic examination

Table 5: Analysis of effect of treatment on disease through otoscopic examination in the ears

Otosopic exam. of ears	N	Mean	sd	Paired Differences			Paired t	P
				Pair	Mean	sd		
BT	30	1.47	0.51					
AT ₀	30	0.10	0.31	BT- AT ₀	1.37	0.089	15.2725	<0.001
AT ₁	30	0.10	0.31	BT- AT ₀	1.37	0.089	15.2725	<0.001
AT ₂	30	0.13	0.35	BT- AT ₂	1.33	0.088	15.2315	<0.001
AT ₃	30	0.13	0.35	BT- AT ₂	1.33	0.088	15.2315	<0.001
AT ₄	30	0.20	0.48	BT- AT ₃	1.27	0.095	13.3207	<0.001



Graph 4: Analysis of effect of treatment on disease through otoscopic exam in the ear

DISCUSSION

Otomycosis is the infection produced by fungi in the external auditory canal. This disease cannot be directly correlated with any particular disease mentioned in ayurvedic classics. Rather different stages of this disease depict different diseases from the text. On the basis of clinical features there are four diseases can be included under otomycosis. They are karnakandu, karnashoola, karnasrava and mainly later stage krimikarna. After nidana sevana doshas specifically kapha gets vitiated. But kapha increased by such hetus will produce karnaroga only if there is prior weakening of karnasrotas i.e. karnasroto dusti. It's important to note that the manifestation of disease fulfill both needs of samprapti i.e. kapha vridhi and karnasroto dusti. So whenever persons indulge in excessive intake of such kapha vardhaka nidanas, abnormally increased kapha is likely to produce avarana of vata in karnasrotas to produce these diseases. If we note the major symptoms of otomycosis, here pain is due to vata prakopa because of obstruction by kapha vridhi. Discharge and itching is due to kleda vridhi caused by strotorodha. All are similar to that of symptoms produced by kaphavrita vata.

As far as otomycosis is considered role of pitta and rakta cannot be neglected in samprapti. Symptoms like purulent discharge, ulcer of EAC are only possible due to pitta and rakta. Itching, pain, blocking sensation, otorrhoea are the chief symptoms of this disease. Though it is simple disease if not treated properly can perforate the tympanic membrane. Once the tympanic membrane is perforated due to a little exposure to cold or entry of water into the ear canal patients will present with karnasrava, pratisyaya etc. Acharya told that due to mithya ahara and vihara more vitiation of doshas occurs, which leads to formation of vidradhi and it

gets converted into prapakavastha which is the sannipathika stage of disease. It also hampers the hearing mechanism.

Discussion on the probable mode of action of Vartaka dhoopana

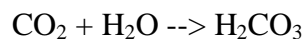
The clinical study revealed that Vartaka dhoopan is effective in otomycosis. Results obtained are due to pharmacological properties of vartaka dhooma. Vartaka being katu tikta in rasa, it has got its action by decreasing guru, sheeta, snigdha and jaliya guna of kapha. Ushna virya of this drug, not only decreases snigdha, jaliya guna but also reduces sheeta guna of vata and kapha. Thus, above parameters reduce kapha, subsequently kleda and thus removes obstruction from the path pacifying vata too. **Dhoopana karma:** Dhoopana is ruksha, ushna in nature, its ushna guna reduces sheeta guna of vata and kapha. Its ruksha guna also decreases snigdha guna of kapha predominantly, reducing kleda or moisture which is favourable for fungal growth. Thus, fungal growth is prevented or inhibited by dhoopana. At the same time reduction of kapha avarana pacifies vata. Shoshana of kleda is done by ushna virya of vartaka and laghu, ruksha, tikshna guna of dhoopana karma. Dhooma itself is kaphahara and ropana. The procedure dhoopana can be pithakara and hence if used in excess or with pithakara drugs it may lead to some complications like paka and vrana. Since the drug used here is Pithasamana, none of the cases worsened into a vrana. The result obtained was maintained throughout the follow up period indicating the long term effect of Vartaka dhoopana with no recurrence. Vartaka has got analgesic, antipyretic and antifungal action

Humidity greater than 70% - 100% is favourable for fungal growth. So, in order to maintain and to prevent humidity, dhoopana is very helpful. Fungi have varied temperature preferences. Usually optimal temperature ranges between 35⁰ C- 45⁰C. Therefore fungi growth can be inhibited at low and high temperature. The temperature of dhooma was kept just above body temperature which helped to kill and prevent fungal growth. Fungus grows rapidly in pH of 5-7. Normally the pH of the skin of EAC is acidic in nature. Humidity, sweating or entry of water turns this pH to alkaline and thus makes favorable for microbes to grow. Vartaka dhooma helped in keeping the EAC dry with normal pH. Carbon dioxide is one of the most abundant gases in the fumes. Carbon dioxide plays an important part in vital plant and animal process, such as photosynthesis and respiration. Mainly in otomycosis fungi are having aerobic respiration and alkaline pH is favorable for growth. Vartaka breakdown products have potential as biodegradable and safe insect fumigants. They may act on the

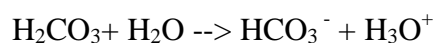
insect respiratory system in their mode of action. *Effect on carbon dioxide emission of insects (Rong Tsa , Chris J Peterson and Joel R Coats)*

<http://www.biomedcentral.com/1472-6785/2/5>

Carbon dioxide can decrease the pH of EAM by reacting with water of discharge. Carbon dioxide dissolves slightly in water to form a weak acid called carbonic acid, H_2CO_3 , according to the following reaction.



After that, carbonic acid reacts slightly and reversibly in water to form a hydronium cation, H_3O^+ , and the bicarbonate ion, HCO_3^- , according to the following reaction.



This chemical behavior explains why water, which normally has a neutral pH of 7, has an acidic pH of approximately 5.5 when it has been exposed to CO_2 . This acidic pH is not favorable for growth for fungus and also this carbonic acid react immediately with alkalis.

CO_2 is better than strong acids for controlling pH because CO_2 in the absence of water is inert and non-corrosive and also it forms a mild but highly reactive acid which minimizes risks of over acidification. (http://www.ilpi.com/msds/ref/carbon_dioxide.html) *Living in the Environment, a book by G. Tyler Miller.*

The modern as well as ayurvedic explanations on the action of vartaka dhoopana support its strong effect in otomycosis during the study and follow up period.

CONCLUSION

- Most of the nidanas of karnarogas explained in ayurvedic classics in karnarogas are acting as precipitating or triggering factors for otomycosis.
- Incidence of the disease is more among rural populations, illiterates, manual labourers, diabetics and those who are in lower and middle classes.
- Persons of Vatakapha prakrithi are seen to be more affected by otomycosis.
- Proper administration of dhoopana is a simple, painless and harmless procedure which can be practiced even in OPD levels. It is cost effective also.
- Administration of samana aushadhas prior to dhoopana is necessary when there is notable vitiation of pitta and rakta.

- Within a short span of 15 days significant reduction was seen in most of the symptoms.
- The effect of Vartaka dhooma was stable throughout follow up period.
- None of the cases worsened during the study.
- No adverse effect of the therapy was observed during the study period.

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