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Ayurvedic approach to the management of *Karnasrava* w.s.r. to Chronic Suppurative Otitis Media - Critical Review

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ABSTRACT

Chronic suppurative otitis media is common infectious ailment affecting mostly children all over globe. It is one of the commonest causes of preventable deafness. It can result in long term ill effects on growing children ranging from recurrent illness, poor school performance to language development and associated psychological and cognitive development. The management strategies are limited in conventional system of medicine, aural toileting remaining one of the basic and safe measure to achieve dry ear. Medicinal and surgical options are not free from side effects and many a time may not be beneficial. Ayurveda describe a similar condition *Karnasrava* which have similar etiology and clinical manifestations. Ayurveda stipulate a multimodal approach to this problem with use of various local procedures and use of oral medications as well. These treatment strategies are compiled in this article with recent studies in management of this disease.

Key words: *CSOM, Karnasrava, Antibacterial, Karnapoorana.*

INTRODUCTION

Children Chronic suppurative otitis media (CSOM) is common infectious disease worldwide and one of the major cause of preventable hearing impairment, mainly in children in developing nations. The illness and its related problems comprise a hidden disability, resulting children at risk of delayed language and speech development, poor cognition and poor school performance.[1] It may have long-term effects on early communication, language development, auditory processing, psychosocial and cognitive development, and educational progress and achievement.[2]

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Chronic suppurative otitis media defined as persistent discharge through a perforated tympanic membrane for more than two weeks, is a resultant of recurrent infection of middle ear after an initial episode of acute otitis media (AOM), but risk factors for its occurrence are not very clear. Poor socioeconomic status resulting in poor nutrition, overcrowding and poor hygiene in association with recurrent upper respiratory tract infections are often related with the development of CSOM.[3] Unlike otitis media with effusion which is more frequent in the Western countries, 6-8 chronic discharging ears are common in the tropical countries including South Asia. The prevalence of CSOM varies globally, but it rates between 1%- 46%. The World Health Organization (WHO) have anticipated that 65-330 million individuals have discharging ears, 60% of whom suffer from significant hearing impairment. According to the WHO, Western Pacific countries have the highest prevalence (2.5% to 43%), followed by South East Asia (0.9% to 7.8%), Africa (0.4% to 4.2%), South and Central America (3%), the Eastern Mediterranean (1.4%) and finally Europe (average prevalence of 0.4%).

ISSN: 2456-3110 REVIEW ARTICLE July-Aug 2017

As for etiological aspect CSOM is mostly caused by bacterial infections of middle ear which may sometime have fungal overgrowth as well. Various studies indicated that common pathogens causing discharging middle ear are Pseudomonas, Staphylococcus aureus , E. coli, proteus, klebseilla and candida albicans.[4],[5] The management strategies are limited, aural toileting remaining one of the basic and safe measure to achieve dry ear. Medical and surgical options are not free from side effects and risks, and sometimes are not even successful in eradicating disease. Topical antibiotics are the first-line therapy of choice, but only those can be used which are not potentially ototoxic. Moreover, surgery carries the risks of deteriorating hearing, as well as the possible damage to the facial nerve limiting its use.[6]

This all presents a genuine search for management strategies remote to conventional therapies. Ayurveda, the science of life described a condition *Karnasrava* having manifestations of discharge from ear, similar to the condition CSOM. Various classical Ayurveda texts described *Karnasrava* as separate disease entity. Causes and clinical picture of *Karnasrava* corresponds to that of CSOM. Even management strategies are similar, with use of multiple local procedures to keep ear dry and infection free. In this article various classical texts are searched for the best management of *Karnasrava.* Also various drugs described in Ayurveda are searched for their antibacterial potential against common causative agents of CSOM.

Materials and Methods

Classical Ayurvedic texts were reviewed for the references of *Karnasrava* and its management. Various procedures and drugs (single as well as compound formulations), used in the management of *Karnasrava* were compiled. Various search engines like Pub med Medline, Scopus, Google scholar, Science direct and Google were searched for recent clinical trials (studies after 2000 A.D.) on *Ayurvedic* management valuable in *Karnasrava*. Search engine were also searched for antibacterial and antifungal activity of Ayurvedic herbs against potential pathogens. The key word used were *Karnasrava*, CSOM, Ayurvedic drugs, antibacterial and antifungal herbs. Various review articles, clinical trials and in vitro studies found on search engines as whole or abstract were critically reviewed for their contents and study parameters and included in this article on the worth of positive results.

Results

Classical Ayurvedic texts describe common treatment principal for three ear diseases namely *Karnasrava, Putikarna* and *Krimikarna*.[7] In all three diseases there is infective condition of ear where there is discharge from ear. *Acharya Charaka* postulates that the treatment of *Karnasrava* should be done on the line of *Vrana* (wound).[8] *Acharya Sushruta* described few procedures for cleaning the ear and maintaining it discharge free. These procedures are *Shirovirechana, Dhoopana, Poorana, Pramarjana* and *Dhawana/ Prakshalana*.

Procedures for the management of *Karnasrava*

Shirovirechana

Shirovirechana is type of *Nasya* where in drug is administered through nasal cavity. This procedure is done following proper procedure. Procedure includes massage with oil followed with local sudation and then desired drug is administered into nostrils. This procedure is mainly done for various diseases in head and neck region. *Acharya Sharngadhara* has described two types of *Shirovirechana, Nasya - Pradhaman* and *Avapeedana*. These both type of nasal drug administration is useful in various diseases of eye, ear, head and nose. *Shunthi with Juggery* and *Pippali* with *Saindhav Lavana* are most valuable *Aviapeedana Nasya* for this purpose.[9]

Dhoopana

It is type of fumigation with smoke of drugs inside and outside of auditory canal. *Guggulu* is described as best drug for *Karnadhoopana*.[10]

Poorana

Here *Poorana* means *Karnapoorana*. Feeling of the ear with various drugs usually in liquid form, carried

ISSN: 2456-3110 REVIEW ARTICLE July-Aug 2017

out with proper procedure for a stipulated time period is known as *Karnapoorana*. In the procedure patient is made to lie on one side and his affected ear is given sudation for few minutes then the drug is poured into the ear. The medicine is retained in the ear for 100, 500 or 1000 *Matra* time.[11]

Table 1: Showing various drug formulations described for *Karnapoorana*[12],[13]

SN	Name of drug / formulation	Form of formulation	Main contents
1	*Lakshadi Churna*	*Churna*	*Laksha, Rasanjana, Sarja*
2	*Panchkashaya*	Decoction	*Tinduka, Abhya, Lodhra, Samnga, Amalaki*
3	*Amaradi Swarasa*	Juice	*Amara, Kapitha, Madhook, Sal, Dhava*
4	*Prinyavadi Taila*	Oil	*Priyangu, Madhuka, Patha, Dhataki, Manhashila, Shalparni, Manjishtha, Lodhra, Laksha, Kapitha, Tila Taila*
5	*Rasnajana + Stanya*	liquid	*Rasnajana with Human Milk*
6	*Hartal + Gomutra*	Liquid	*Hartal mixed with Cow's Urine*
7	*Gandhaka Taila*	Oil	*Haridra, Gandhaka, Sarshpa Tail, Dhatura Swarsa*
8	*Kushthadya Taila*	Oil	*Kushtha, Hingu, Vacha, Devadru, Saunf, Sunthi, Sainthava, Tila Taila* and *Goat's urine*
9	*Madhukadi Taila*	Oil	*Madhuka, Dashmoola, Daruharidra, Kadali, Kushtha, Shigru, Vacha, Devadru, Saunf, Rasanjana, Sainthava,Vida Lavana, Sarjikshara, Tila Taila*
10	*Putpakva Gondaka Swarsa Siddha Taila*	Oil	*Chhatarak, Saindhava Lavana, Tila Taila*

Pramarjana

Karna Pramarjana is procedure of cleaning ear with the help of cotton or gauze piece soaked in oil or other antiseptic decoction of drugs. Various oil used for *Karnapoorana* can also be used for cleaning ear in the form of *Pramarjana*.

Prakshalana

It is a type of ear toileting with various liquid drugs like decoction, fresh juices and oil. Decoction of *Sursadi Gana* and *Rajvrikashadi Gana* drugs is known as best for cleansing ear.

Decoction of *Panchkashaya drugs i.e. Haritaki, Amalaki, Manjishtha, Laodhra* and *Tinduka* are also useful for cleaning ears in conditions like *Karnasrava.*

Oral drugs are also described for the general treatment of various ear diseases. Some of the drugs are described here.

Table 2: Oral Ayurvedic drugs described in the management of *Karnasrava*[14],[15]

SN	Name	Contents
1.	*Rasnadi Guggulu*	*Rasna, Amrita, Eranda, Devdaru, Saunth, Guggulu*
2.	*Sarivadi Vati*	*Sariva Madhuka, Kushtha, Chaturjata, Priyangu, Nilotpala, Guduchi, Lavanga, Triphala, Lauha Bhasma, Abhraka Bhasma* and *Swarasa* of *Bhringraj, Kakmachi, Gunja , Decoction* of *Arjuna.*

Antimicrobial Herbs for CSOM

Recent invitro studies show high potential of herbs acting as antibacterial and antifungal agents. Here Ayurvedic herbs which possess antimicrobial properties against main causative bacteria and fungi are compiled.

Table 3: Showing Ayurvedic herbs with their antimicrobial properties.

S N	Name of Drug	Parts used	Antimicrobial activity	Study design	Researchers
1	*Triphala*	Masi aqueous & alcoholic	E. coli, S. aureus	agargel diffusion method	Biradar YS et. al.[16]

ISSN: 2456-3110 REVIEW ARTICLE July-Aug 2017

		extract			
2	*Tulsi*	Essential oil	Staphylococcus aureus (including MRSA), Escherichia coli, Pseudomonas aeruginosa.	In vitro	Yamani HA et.al. [17]
3	*Laghu Panchmoola*	50% ethanolic extract	Staphylococcus aureus Pseudomonas aeruginosa	Invivo & in vitro	Ghildiyal S et.al. [18]
4	*Guduchi*	ethanolic stem extracts	Proteus vulgaris, Escherichia coli, Staphylococcus aureus	disc diffusion method	Jeyachandran R et.al.[19]
5	*Babul*	Methanol extract	E.coli, S.aureus, K.pneumoniae	Agar gel diffusion	Tambekar et.al. [20]
6	*Mustaka*	Acetone extract	Proteus vulgaris	Agar gel diffusion	Tambekar et.al. [20]
7	*Ashwagandha*	Flavanoids extract	*C. albicans, S. aureus, P. mirabilis, E. coli* and *P. aeruginosa*.	disc diffusion assay	Singh G et.al. [21]
8	*Tumburu*	Essential oil	Staphylococcus aureus, Escherichia coli	Broth Dilution Technique	Guleria S et.al. [22]
9	*Mazuphal & Gangeruki*	Methanol extract	Escherchia coli, Klebsiella, Staphylococcus aureus	disc diffusion method	Priya PS et.al. [23]
10	*Bilwa*	Dried fruit extract	P. aeruginosa, E. coli, S. epidermidis, S. aureus	disc diffusion method	Supria et.al. [24]
11	*Gokshura*	Ethanol extract of fruit	*S. aureus, E. coli, P. vulgaris, C. albicans*	broth microdilution method	Al-Bayati FA et.al.[25]
12	*Haridra*	oil	*S. aureus, E. coli, P. aeruginosa*	pour plate method	Negi PS et.al. [26]
13	*Aragvadha*	Fruit pulp extract	*S. aureus, E. coli, P. aeruginosa, C. albicans*	disc diffusion method	Bhalodia NR et.al.[27]
14	*Shatpushpa*	Crude extract	*S. aureus, E. coli, P. aeruginosa, P. vulgaris*	disc diffusion method	Al Akeel R et.al.[28]
15	*Lahsuna*	Essential oil	*S. aureus, E. coli, P. aeruginosa*	disc diffusion method	Casella S et.al.[29]
16	*Ela*	Crude extract	*S. aureus, E. coli*	disc diffusion method	Kaushik P et.al.[30]
17	*Nishotha & Sarala*	resin rich methanolic extracts	*S. aureus, E. coli, P. aeruginosa*	Agar gel diffusion	Shuaib M et.al.[31]

Clinical Studies

Madhukadi Taila

In a clinical study Gupta et.al. registered 40 patients of CSOM and randomly divided them into two groups. One group was treated *with Madhukadi Taila Karna Pichu* while other group received in addition to *Madhukadi Taila Karnapichu*, oral *Rasanadi Guggulu* 2 tabs twice daily for one month. The treatment duration was one month. The assessment was done on clinical parameters like *Karnasraava,* amount of *Karnasraava, Karnashula, Karnakandu, Karna Baadhirya, Karnanaad.* Results show statistically significant overall improvement in both groups with

ISSN: 2456-3110 REVIEW ARTICLE July-Aug 2017

slightly higher improvement in *Rasnadi Guggulu* group.[32]

Karna Poorana

Karna Poorana is a local procedure done in the ear where ear cavity is filled with lukewarm liquid dosage form of drugs (oil, cow's urine and juices) for a stipulated period. The procedure is usually done after local *Snehana* (oil massage) and *Swedana* (sudation) around the ear which increases the local circulation hence better absorption of the drug.

Gandhaka Taila

In a clinical study *Gandhaka Taila* is evaluated in 23 cases of CSOM. *Gandhaka Taila* is herbo-mineral preparation, a type of medicated oil prepared from *Katu Taila* (mustard oil) by oil preparation method. Here *Haridra, Sudha Manhashila, Sudha Gandhaka* is taken as *Kalka Dravya* (paste form of drug) while *Dhatura Swarasa* (juice from *Datura* metal leaves) is taken as *Drava Dravya* (liquid drug). Two drops of oil is poured into affected ear after proper cleaning for 7 days in night time only. Assessment was done on the various clinical parameters. Results show statistically significant improvement in all subjective and objective parameters like ear discharge, earache, perforation of tympanic membrane, tinnitus, deafness etc.[33]

Arka Taila

In a clinical study on *Karnasrava* Palmer et. al. treated 28 patients, who were grouped into two with 14 patients in each group. Group-A was treated with *Arka Taila*, a type of medicated oil prepared from *Katu Taila* (mustard oil) by oil preparation method by using paste of *Haridra* and *Arka Patra* and Group-B with Clotrimazole ear drops (standard control). Ark *Taila* was given as *Karnapurana* in the dose of 10-15 drops for 100 matra (time taken for eye blinking) for 15 days at an interval of 5 days while clotrimazole was given as 2 drops thrice daily for15 days. The signs and symptoms were studied before and after treatment. Result of the study indicates that *Arka Taila* and Clotrimazole are equally effective in all the signs and symptoms of *Karnasrava* .[34]

Panchkashaya Kalpa

In a clinical study 23 patients of *Karnasrava* were treated with a herbal medicine *Panchkashaya Kalpa* containing *Kalka* of *Tinduk, Lodhra, Manjishtha*, *Haritaki, Amalaki, Madhu* and *Kapittha Swarasa*. The dosage was *Karnapurana* with 2 drops of luke warm drug thrice daily after cleaning ear for 10 days. Follow up were made on 20th day and 30th day. Patients were assessed on clinical parameters. Results show statistically highly significant improvement in ear discharge.[35]

Mixed Treatment Protocols

Karnapurna and *Nasya*

In a clinical study on CSOM Prakashbhai et. al. treated 28 patients in two group of 14 patients each. One group was given *Nasya* (nasal administration of drugs with special technique) with *Shadbindu Taila* in dose of 6 drops in each nostrils for 5 days prior to treatment, followed by *Karnapurna* with *Gandhakadi Taila* 1 ml in ear once daily in evening and 1 gm *Saptanga Guggulu* thrice daily, both for one 45 days. Other group was given same treatment except *Nasya* with *Shadbindu Taila*. Patients were followed up for one month at 15 days interval. Assessment was done on various clinical parameters. Both the group showed almost equal results in different symptoms. But objectively both group showed insignificant results.[36]

Karna Pichu and *Dhoopana*

In a clinical study 40 patients having *Karnasrava* were selected and randomly divided into 2 groups with 20 patients each. Group A was treated with *Vachalashunadi Taila Karnapichu* and Group B was treated with *Nimbapatradi Karnadhoopana. Vach lashunadi Taila* contains *Vacha* (*Acorus calamus* Linn), *Lashuna* (*Allium Sativum*), *Haridra* (*Curcuma longa*) and *Bilwapatra* (*Aegle marmelos*) *Swarasa,* while *Nimba Patradi Karnadhoopana* is fumigation of ear with the smoke of drugs namely *Nimbapatra (Azadirachta indica), Vacha (Acorus calamus Linn), Hingu (Ferula northax Bioss), Sarpi (Butyrum deparatu), Lavana (Sodium Chloride)* and *Sarshapa*

ISSN: 2456-3110 REVIEW ARTICLE July-Aug 2017

(Brassica campestris). The assessment was done on subjective parameter hearing loss and objective parameters ear discharge, perforation of tympanic membrane and pure tone audiometry. The results of the study show an improvement of 38.6% in Group A (*Taila* group) and that of Group B (*Dhoopana*)was 30.5%, with the percentage difference of 8.1% . Group A showed better results when compared to Group B.[37]

Discussion

There are three diseases described in Ayurvedic classical texts with similar mode of management. As CSOM is having an infective etiology as its core pathology, Ayurveda procure the management which can counter this very aspect. Acharya Charaka had clearly mentioned the treatment should be on the line of wound management. As wound is treated with cleaning and preventing infections and protecting them from external factors so that healthy healing can happen, CSOM also need this type of management to keep ear infection free and dry. *Acharya Shushruta* had described first *Shirovirechana* procedure in the management of *Karnasrava*. As the middle ear is connected to nasopharynx through Eustachian tube and infection often travel from nasal cavity to middle ear. Thus Ayurveda also have approach to treat *Karnasrava* and other ear infections by treating nasal cavity and maintaining patency of eustachian tube. Other procedures like *Karnapoorana*, *Dhoopan, Prakshalana* etc. are mainly concerned with aural toileting, cleansing and keep it free from infective pathogens. Also these procedures may help in healing of perforated tympanic membrane to some extent. This approach is very similar to conventional system where aural toileting and topical antibacterial drops are main stay of management. The various herbs used are possessing property of pacifying all three *Doshas* mainly *Vata,* which is main causative factor for *Karnasrava.*

Moreover different drugs described are proven to have antimicrobial activity specifically against pathogens which are more often isolated from ear discharge in the patients of CSOM. By their antimicrobial activity they prevent growth of these pathogens in middle ear and maintain its infection free and dry.

Conclusion

In conclusion, we can confirm that Ayurveda possess a useful approach, quality procedures and abundant reserve of herbal drugs which can be employed in the management of CSOM and can curtail necessity of various surgical procedures. Efficacy and safety of Ayurvedic approach is once again revalidated by various recent in vitro and clinical studies. However most of the work done is either in vitro studies or clinical trials with limited sample size. These shortcomings may be corrected in future research studies, so that revalidation process may become watertight.

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ISSN: 2456-3110 **REVIEW ARTICLE** July-Aug 2017

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