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Review Article

# CRITICAL ANALYSIS OF *KARNAKSHWEDA* WITH ITS MODERN ASPECT

**Pragati Pandole[1]*, Ch. Ramadevi[2], K. Anasuya[3]**

*[1]PG Scholar, [2]Professor & HOD, Dept of Shalakya Tantra, [3]Principal, Dr. B.R.K.R. Govt. Ayurveda College and Hospital, Hyderabad, Telangana, India.

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## ABSTRACT

*Shalakyatantra,* one of the eight branches of Ayurveda deals with diseases above the level of the clavicle, i.e., *Urdhwajatru*. In that, there are twenty-eight *Karnarogas* as described by *Acharya Sushruta, Yogratnakara,* and *Bhavprakasha. Karnaksweda* is one of the *Karnaroga* that resembles *Karnanada*, but there is vitiation of *Pittadi doshas* with a predominance of *Vata* in the channels of *Karna,* leading to the generation of *Venughoshavata*, i.e., flute-like sound, because of different etiological factors like *Dhatu Kshayaa, Ruksha Bhojana*, etc.

In modern science, tinnitus is described as an unwanted auditory perception of internal origin, usually localised, and rarely heard by others. It can be subjective, when experience is of the individual alone, or, less commonly, objective. It, moreover, acts as a symptom rather than a disease with multifactorial etiology. *Karnakshweda* can be specifically correlated with cochlear synaptic tinnitus, i.e., tinnitus due to inner ear causes. The majority of cases of tinnitus are subjective; objective tinnitus is far less common. Treatment for *Karnaksweda* is described as the same as for *Karnanada,* which includes *Vatahar Chikitsa, Snehana, Dhoomapana, Karnapoorana,* etc., but there is no specific treatment for Tinnitus in modern science because of idiopathic etiopathogenesis. Ayurveda is a more effective science for the management of diseases like tinnitus.

## INTRODUCTION

Ayurveda is a natural science, based on the concepts of *Dosha, Dhatu,* and *Mala*. Any disturbance in the equilibrium of the above three criteria will lead to the causation of disease in the body. According to *Acharya Sushruta*, there are 28 types of *Karnaroga*[1], and *Karnakshweda* is one of them in which there is vitiation of *Pittadi Dosha* because of different etiological factors that lead to the perception of flute-like sound without any external stimulus.

In the present scenario, we may relate *Karnakshweda* to tinnitus, and more specifically, tinnitus due to inner ear pathology or cochlear synaptic tinnitus. One of the causative factors for *Karnakshweda* is *Dhatu Kshaya,* which is nothing but degenerative changes in body tissues. We may see in some inner ear pathology, conditions like degeneration of hair cells.

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Taking that fact and another factor, here we are co-relating the disease with cochlear synaptic Tinnitus.

While describing symptoms of *Pandu* in *Chikitsa sthana* Acharya Charaka described *Karnakshweda* as *Lakshana* of *Pandu Rog*[2] and *Karnaswanah Lakshana* in *Vataja Grahani*,[3] although he didn't describe *Karnakshweda* as a disease. *Acharya Sushruta* also described *Karnakshweda* as *Purvarupa* of *Grahani Roga.*[4] On this basis, we can consider that *Karnakshweda* is caused not only by inner ear pathology but may also occur due to systemic diseases like *Pandu* or others like *Grahani Roga.* This has proven years ago, in the Ayurveda classics, *Acharya* already described the fact that tinnitus is not just a disease but a symptomatic factor in other diseases too. We should be very attentive to the history of the patient and thoroughly take it into account so that we can treat the disease accordingly. In the present scenario, we may correlate *Karnakshweda* with Tinnitus due to inner ear pathology or cochlear synaptic tinnitus.

In modern science, the word tinnitus is derived from the Latin word "tinnire" meaning to ring or "a ringing" which is nothing but a sound that is generated by the body itself rather than by an outside source,

mostly subjective and rarely objective. The prevalence rate of the subjective type of tinnitus is maximum, whereas the objective type is about nil with only a 1–2% rate. The American Tinnitus Association estimates that 10 million people suffer from tinnitus.[5]

In India, according to recent research, the prevalence of tinnitus is 6.7% among the Indian adult population.[6] Treatment for tinnitus in modern science includes cognitive behavioural therapy (CBT), antidepressants, hyperbaric oxygen treatment, gingko biloba, and hearing aids. CBT, which does not purport to cure tinnitus, currently provides the strongest evidence for tinnitus management. Additional evidence exists for various forms of counselling and sound therapy.

As we have thoroughly gone through different research studies, we have concluded that *Karnakshweda* resembles cochlear synaptic tinnitus, which is still a working theory. Above, we discussed the common treatment for tinnitus, in that the use of Gingko biloba and Caroverine therapy had shown results in cochlear synaptic tinnitus upto some extent.

In Ayurveda, Acharya Sushruta described a similar line of treatment for *Karnakshweda*, *Karnanada*, *Badhirya*, and *Karnashoola*, which includes *Vatahara Chikitsa.*[7]

## MATERIALS AND METHODS

### *Karnakshweda*

**Definition:** Acharya Madhava stated that there is a *Venughoshvata* sound perception in the ear of an individual, i.e., flute-like sound; it is considered Karnaksweda,[8] but Acharya Sushruta didn't mention sound type (*Avyakta Shabda*).

### *Nidana of Karnakshweda*[9]

According to *Acharya Sushruta*, an etiological factor that causes *Karnakshweda* is as follows:

***Shrama* (exertion):** Excess of physical or mental stress/excretion in the body ultimately increases *Vata dosha* in the body, leading to the production of the disease *Karnakshweda.*

***Kshaya*:** Here *Kshaya*, or *Dhatu-kshaya*, refers to the loss or depletion of body tissues. According to Ayurveda, the body's tissue systems are made up of seven types of fundamental tissues called *Sapta Dhatus* and the correct functioning of the organism is dependent on them.

Both the excess and depletion of *Dhatus* result in physiological activity being out of equilibrium. Each *Dhatu* has its own system (*Shrotas*). The vitiation of *Dosha* affects these *Shrotas*, which results in illnesses.

***Ruksha Kashaya Bhojana*:** *Ahara* is the best of all medicines and is considered one of the three sub-pillars of Ayurveda *(Thrayo-Upasthamba). Ruksha* is the *Guna* of *Vata*, the functional property of *Ruksa* is dryness. The property of *Ruksa Guna* is to increase the properties of *Vata,* normalize the properties of *Kapha,* and also decrease *Bala.* Having *Ruksha Ahara* results in aggravation of *Vata dosha* in the body and *Dhatu Kshaya* hence, causes disease. *Kashaya* is one of the *shadrasa*, which is mainly *Stambhana karaka* and increases *Vata dosha*.

*Karna* is the seat of *Vata, Ruksha*, and *Sheeta Aahar* and also increases *Vata* in the body, hence eventually becoming one of the causative factors to cause *Karnakshweda*.

**Intake of the cold item after *Nasya*:** Taking cold food item after *Nasya karma* may result in *Sroto Avrodh* and may not allow the given drug in *Nasya karma* to reach their associated channels, as *Sheeta* is the *Guna* of *Vata*, causing blockage of channels (*Sanga*) or deviating the channels (*Vimargamana*) and also *Sthambhaka* in nature; hence, aggravation of *Vata* as well as *Shrotovrodha* leads to vitiation of other *Dosha*, resulting in the development of more other diseases.

### *Lakshana* of *Karnakshweda*

Different *Acharyas* have mentioned different *Lakshanas* of *Karnakshweda*; according to *Acharya Vangsen*, *Madhava*, and *Gadanigraha*, *Venughosha* seems to be the "*Pratyatma Lakshana* of *Karnakshweda*.

***Venughosha*:** A flute-like sound in the ear without any external stimulus.

As per *Acharya Harita*, if a flute sound is heard by a patient, then *Pitta Dosha* is predominant, but with that, he also mentioned that if there is a vitiation of *Kapha Dosha*, then the patient will have a *Murcha* and will hear thundering-like sounds.[10]

### *Samprapti* of *Karnakshweda*

In *Karnakshweda*, etiological factors like excessive exertion, *Dhatu Kshaya*, intake of an unctuous and astringent diet, and adoption of the cold item after *Shiro virechana* causes vitiated *Vata* to reach the channels carrying sound and settle there with other *Doshas* like *Kapha-pitta* and sometimes *Rakta*, causing *Venughoshvata* sound in ears.

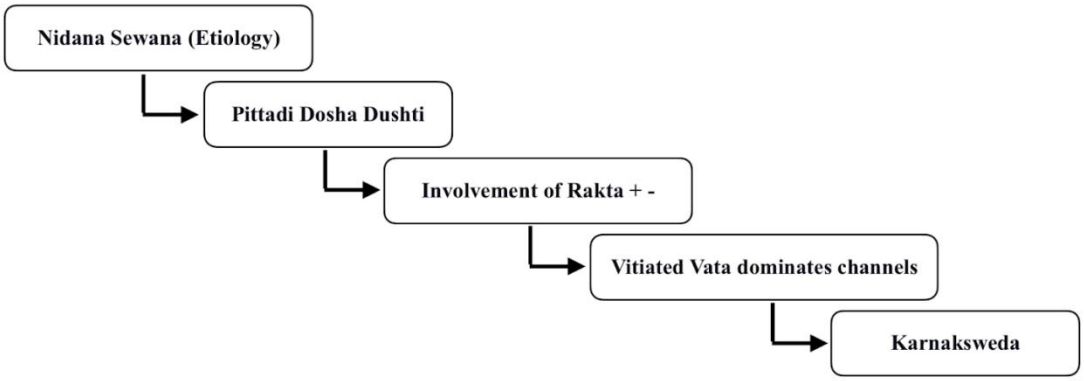


**Fig. 1: Flowchart of *Samprapti* of *Karnakshweda***

***Sapeksha Nidana* of *Karnakshweda*:** the differential diagnosis for *Karnakshweda* is *Karnanada*, which is mentioned in the table given below.

**Table 1: The differential diagnosis for *Karnakshweda* and *Karnanada***

| | ***Karnakshweda*** | ***Karnanada*** |
|---|---|---|
| 1. | Hearing a flute-like sound without any external stimulus is known as *Karnakshweda* | Hearing sound like drum, counch, *Mridanga*, frog, crow, *Bheri* etc. Without any external stimulus is considered *Karnanada* |
| 2. | Vitiated *Vayu Dosha* as well as associated *Pitta-Kapha* and *Rakta Doshas* are responsible for the causation of the disease | Only vitiated *Vata Dosha* situated in *Karna Shrota* is known to cause the disease |
| 3. | Hypothetically, occurs due to generalised pathology of the external or middle ear | Hypothetically, occurs due to inner ear pathology (cochlear synaptic tinnitus) |
| 4. | *Pitta* and *Kapha Hara* therapies are also necessary | Alleviate by *Vatahara* therapies |

***Chikitsa* for *Karnakshweda***

According to Aacharya Sushruta, treatment for *Karnashula, Karnanada, Karnakshweda*, and *Badhirya* should be the same because if we notice the above diseases, there is a predominance of *Vata* in all. Maybe that is a reason for the same line of treatment to be followed as per Acharya Sushruta.

***Vatahara Chikitsa:*** The basic treatment of the above-mentioned diseases is *Vatahara Chikitsa* because there is mainly *Vata dosha* vitiation in those diseases; there is only *Sansarga* of other *Doshas* but a predominance of *Vata*, so treatment should be done accordingly.

***Karnapoorana:*** *Karnapoorana* is the procedure of pouring medicated oil into the external ear canal. Acharya Sushruta mentioned *Sarshapa taila* for *Karnapoorana* in *Karnakshweda.*. Other than this, *Kshara Taila*, N*irgundi Taila*, *Apamarga Taila*, and *Bilwa taila* can be used.

***Nasya Karma*:** *Nasya karma* with *Anu tailam* can be given before *Karnapoorana*, and as *Anu taila* does *Shorotoshodhana* as well, it will pacify elevated *Vata*. Other than this, other *Snehika Nasya* or *Brumhanan Nasya* can be given.

***Vamana karma*:** *Acharya Vagbhata* in *Chikitsa* of *Karnashool* mentioned *Vamana karma*; if there is an association of Kapha with the disease, the same should be applied to *Karnakshweda* also; afterwards, *Tikshna Dhoompana* should be given.[11]

***Rasayana Sevana:*** As previously described in the *Nidana* of *Karnakshweda*, *Dhatushaya* is one of the causative factors for the disease, so *Bhrumhana*n or *Rasayana Chikitsa* will act in a good way to alleviate the disease as *Rasayana sevana* is also indicated in *Samanya Chikitsa* of *Karnaroga. Ashwagandha Churna, Shatawari Churna, Sarivadi Vati*, and *Indu Vati* can be given.

***Snehavirachana:*** As per the common treatment told for above mentioned diseases, *Snehavirachana* can be given with firstly *Snehapana* and *Abhyanga* with *Vatahara Dravyas* then using *Eranda taila* etc for *Virechana*, it will help in reducing alleviated associated *Pitta dosha*.

***Ghritapana:*** It is described in common treatment of *Karnaroga* by *Acharya Sushruta*, *Ghrita*, one of the four *Sneha* is also the considered as best *Sneha*, useful in alleviating *Vata Dosha* and act as *Brumhanan Dravya* in the disease. According to pathophysiology of cochlear synaptic tinnitus also, there is disruption of hair cells, so *Ghritapana* will give nourishment to the organ, hence helpful for alleviating the disease.

*Ghrita* that can be used for *Pana* are cow's ghee, *Ashwagandha Ghrita*, *Brahmi Ghrita*, *Jeevantyadi Ghrita* etc.

**Modern correlation of *Karnakshweda***

In modern aspect, *Karnakshweda* can be correlated to tinnitus. Here, tinnitus is not only a disease but also plays the role of symptom in other diseases like tinnitus due to anaemia and hypertension, as we have seen that *Karnakshweda* is also not only described as a disease but also described in *Lakshana* of other diseases.

We can consider *Karnanada* and *Karnakshweda* both as tinnitus, which has had different causative factors, so as different pathologies. That's why Acharya didn't mention much different treatment protocols for *Karnakshweda*, even though they said that the same treatment can be applied for *Karnakshweda* as it applies to *Karnanada*, *Karnashoola*, and *Badhirya*. More specifically, we can correlate *Karnakshweda* with cochlear synaptic tinnitus, as it resembles more of the disease.

Cochlear synaptic tinnitus is synonymized with signal transfer tinnitus, is a Sensorineural Tinnitus type III, and is used to describe disorders arising during the signal transfer from the IHCs and along the afferent nerve fibers.[12]

**Systematic Tinnitus Classification**

Objective tinnitus
Subjective tinnitus
Conductive tinnitus*
Sensorineural tinnitus*
Type I (Motor tinnitus)
Type II (Transduction tinnitus)
Type III (Transformation tinnitus)
Type IV (Extrasensory tinnitus)
Central tinnitus
Primary central tinnitus
Secondary central (centralized) tinnitus

*Conductive tinnitus and sensorineural tinnitus form the peripheral tinnitus[13].

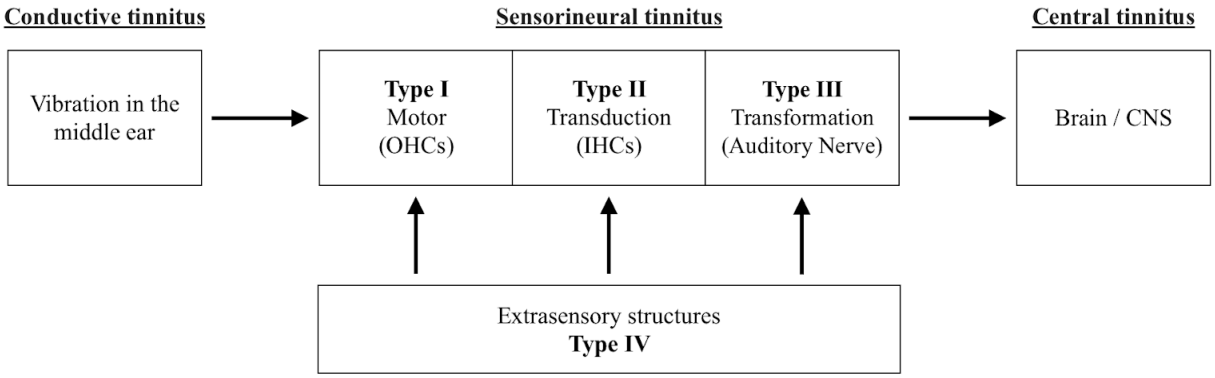


**Fig. 2: Systematic Tinnitus Classification[13]**

**Cochlear Synaptopathy**

Describes the loss of synapses, important neural junctions that connect cochlear inner hair cells to the auditory nerve. Like many sensorineural hearing pathologies, synaptopathy is caused by noise exposure, ageing, and toxic drugs.

**Pathophysiology of Cochlear Synaptic Tinnitus[13]**

Two main cochlear pathologies could be at the origin of tinnitus: malfunction of the glutamatergic synapse between the inner hair cell and the auditory nerve, and disruption of the outer hair cells' active mechanisms.

Spontaneous activation of the outer hair cells (OHCs), producing active mechanisms without acoustic stimulation, could be followed by physiological effects, i.e., the activation of the inner hair cells and auditory nerve fibers. The signal that would be sent in this case would be as real as a natural sound, and the subject would hear a whistling noise with a frequency corresponding to the frequency range of the damaged OHCs. Some researchers have suggested a role for the different systems in the generation of spontaneous OHC activation and, therefore, tinnitus. However, such activation can rarely be characterized as spontaneous otoacoustic emissions corresponding to the frequency of the subject's tinnitus.

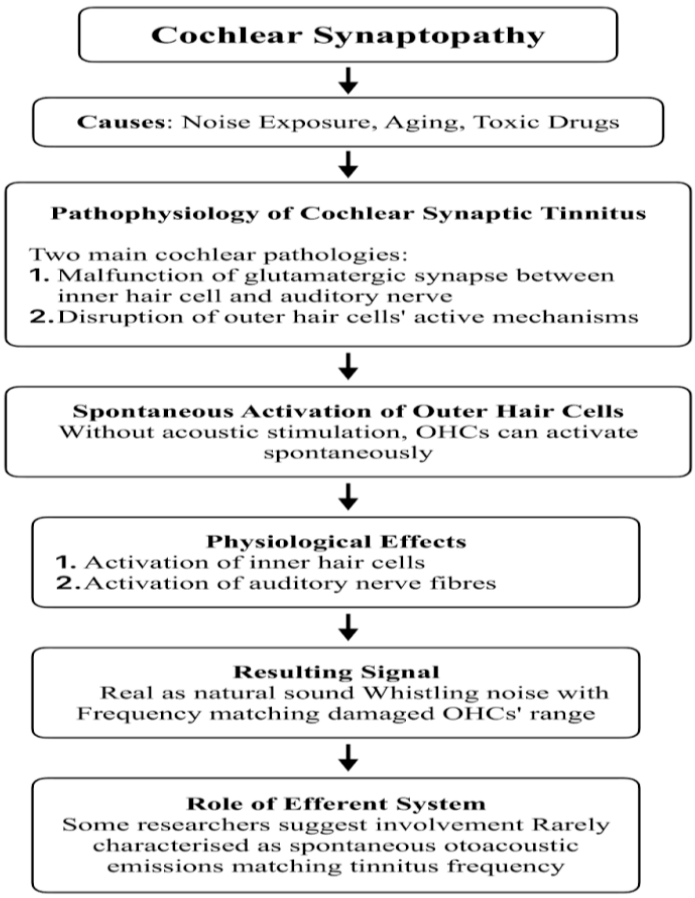


**Fig. 3: Flowchart for Cochlear Synaptopathy**

**Diagnostic tests for Cochlear Synaptic Tinnitus[14]**

**Table 2: Different Diagnostic tests for Cochlear Synaptic Tinnitus**

| S.No. | Diagnostic Tests | Functions |
|---|---|---|
| 1. | Audiometry (0–16,000 Hz) | Detects high-frequency and sensorineural hearing loss, confirming cochlear synaptic tinnitus |
| 2. | Impedance Audiometry | Normal range confirms absence of middle ear issues |
| 3. | Eustachian Tube function test | Normal range indicates proper function |
| 4. | Acoustic Reflex | In cochlear synaptic tinnitus, reflexes occur at lower sound levels due to loudness recruitment |
| 5. | Clinching Reflex Test | Differentiates middle ear tinnitus from myoclonus tinnitus based on reflex behaviour |
| 6. | Reflex Decay | Identifies retrocochlear pathology through abnormal acoustic reflex decay |
| 7. | Tinnitus Matching and Grading | Offer prognostic insights |
| 8. | S.I.S.I. (Short Increment Sensitivity Index) Scores | 80-100% suggests cochlear pathology |
| 9. | BERA (Brainstem evoked Response Audiometry) | Determines the nature of pathology (conductive, cochlear, retrocochlear) |

**Treatment for Cochlear Synaptic Tinnitus**

There are some experimental research papers on cochlear synaptic tinnitus that give justification for some medications and therapies that can have significant effects on the alleviation of the disease.

**Caroverine**

The pathophysiology of inner ear tinnitus (cochlear-synaptic tinnitus), a form of tinnitus, occurs when the physiological activity of the NMDA and AMPA receptors at the subsynaptic membranes of inner hair cell afferents is disturbed. Caroverine, an N-methyl-D-aspartate and alpha-amino-3-hydroxy-5-methyl-4-

isoxazolepropionic acid receptor antagonist, has been shown to protect the inner ear from excitotoxicity and to be effective in the treatment of cochlear synaptic tinnitus.[15]

It is suggested that Caroverine 160mg/8ml in 100ml of physiological saline as an intravenous infusion be given in severe cases of tinnitus to reduce its severity immediately. We found that a single-dose infusion of caroverine is effective in reducing the severity of cochlear synaptic tinnitus, but it cannot abolish the tinnitus, and its effect wears off with time in 25% of responders.[16]

**Ginkgo Biloba:** Ginkgo biloba, a herb with compounds like flavonoids and terpenoids, has shown promise in treating tinnitus by addressing glutamate-induced neurotoxicity. Its flavonoids, particularly myricetin and quercetin, and terpenoids like ginkgolide and bilobalide act as monoamine-oxidase inhibitors, improving ischemia-related tinnitus. Ginkgo biloba enhances blood flow and regulates vascular tone, potentially alleviating tinnitus stemming from cochlear nerve cortex issues due to cardiovascular problems. It offers antioxidant effects, scavenges free radicals, and protects nerve cells in brain regions associated with hearing. This herbal medicine's flavonoids exhibit antioxidant and vasodilator actions, while terpene lactones act as antiplatelet agents, collectively contributing to its efficacy against tinnitus.[17]

## DISCUSSION

The association of *Karnakshweda* with tinnitus spans beyond inner ear pathology, encompassing systemic ailments like *Pandu* and *Grahani Roga*. Recognizing tinnitus as a symptom within various systemic disorders highlights the importance of thorough patient histories, guiding accurate treatment paths tailored to the underlying condition.

Ayurveda's approach to *Karnakshweda* encapsulates a holistic understanding of auditory disorders, emphasizing *Vata* imbalance and its interplay with other *Doshas*. The absence of a specific etiology in modern medicine limits targeted treatments for tinnitus. However, advancements suggest potential correlations between *Karnakshweda* and cochlear synaptic tinnitus, exploring inner ear pathology and neural signal disruptions.

Diagnostic methods in modern medicine, such as audiometry and tinnitus matching, aid in identifying tinnitus types. Experimental therapies like caroverine and ginkgo biloba exhibit promise in managing specific types of tinnitus associated with synaptic disruptions and vascular irregularities upto some extent only.

The overlap between Ayurvedic principles and modern findings presents an opportunity for integrated approaches to managing auditory conditions. Therapies like *Vatahara Chikitsa*, *Ghritapana*, *Snigdhavirechana* in *Karnakshweda* acts very efficiently in treating the disease

Ayurveda's approach to treating *Karnakshweda*, resembling *Karnanada*, involves a range of therapies rooted in *Vatahar Chikitsa*, *Snehana*, *Dhoomapana*, *Karnapoorana*, and more. Conversely, modern science grapples with tinnitus due to its elusive causes, often labelled as idiopathic. Ayurveda, particularly *Shalakyatantra*, adeptly tackles *Karnakshweda*, a condition linked to auditory disturbances above the clavicle. This condition shares parallels with cochlear synaptic tinnitus, pointing towards *Pitta* disturbance influenced by *Vata*, causing internal sound perception. While modern science lacks direct tinnitus treatments, Ayurveda emerges as a more effective approach for managing such conditions.

*Karnaksweda's* etiology involves factors such as exertion, tissue depletion, dry dietary habits, and channel blockages. Ayurvedic remedies predominantly aim at appeasing *Vata* through practices like *Karnapoorana* and *Nasya Karma*. This approach emphasizes *Vata* reduction while considering the potential involvement of *Kapha* and *Pitta*, if present in the condition. Ayurvedic texts link *Karnakshweda* not only to inner ear pathology but also to systemic disorders like *Pandu* and *Grahani Roga*, positioning tinnitus as a symptom across broader systemic conditions. Recognizing this correlation underscores the necessity for comprehensive patient histories to tailor treatments that transcend a mere singular disease focus on tinnitus.

## CONCLUSION

Cochlear synaptic tinnitus is a hypothetical research study that has potential treatment results through biloba and carovarine theory but doesn't give satisfactory results. *Karnakshweda*, which has a resemblance to the cochlear synaptic type of tinnitus, gives better results.

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***Address for correspondence**
**Dr. Pragati Pandole**
PG Scholar
Dept of Shalakya Tantra
Dr.B.R.K.R. Govt. Ayurveda College, Hyderabad, Telangana.
Email: pandole.pragati29@gmail.com
Contact no. 8962450711