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### Review Article

## EFFECT OF *KARNAPOORAN* IN PREVENTION OF NIHL (NOISE INDUCED HEARING LOSS) – A CONCEPTUAL STUDY

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### ABSTRACT

Noise-induced hearing loss substantially reduces one's capacity to communicate by limiting one's capacity to hear high-frequency sounds and comprehend speech. The consequences of hearing loss can be severe since it can make one difficult to participate in things you find enjoyable, such as playing with your kids or grandchildren or interacting with friends. It can also result in social and psychological isolation due to damage to hair cells due from high-frequency sounds. *Karnapoorana* rectifies the pathway as well as reduces the frequency of sound, and ultimately protects the auditory nerve from NIHL which is a cause for hearing loss and is one of the best therapies for preventing noise-induced hearing loss is *Karnapoorana* (NIHL).

**KEYWORDS:** NIHL, *Karnapoorana*, Prevention.

### INTRODUCTION: -

NIHL causes damage to the sensory functions of hearing which renders a person to hear improperly. One of the *Gyanendriya* which functions through the ears is *Shravanendriya* (sensory capacity of hearing) which is formed from *Aakasha Mahabhuta* and *Vayu Mahabhuta* and is in charge of maintaining direction and perceiving sound energy<sup>1</sup>. Millions of individuals throughout the world are exposed to dangerous levels of

sound each year leading to NIHL which causes physical and mental stress, decreased productivity, obstruct communication and focus, and increase the risk of workplace accidents and injuries by making it harder to notice warning signals. High workplace noise levels have been linked to 16% of permanent hearing loss and 7 to 21% in different sub regions<sup>ii</sup>. A condition that is fore seeable and curable, NIHL has an epidemiologically significant prevalence in urban areas. It is also known as occupational hearing loss, professional deafness, or hearing loss due to loud noise. It starts and predominates at 3, 4, and 6 kHz, moving on to 8, 2, 1, 0.5, and 0.25 kHz later on.

Yet, it's important to keep in mind that noise exposure can coincide with other causative factors that could interact with the noise and strengthen its effects on hearing when looking at occupational hearing loss. They consist of being exposed to specific chemicals, vibrations, taking specific medications, and personal susceptibility<sup>iii</sup>. High noise levels can also permanently damage the hearing. This kind of hearing loss cannot be improved with surgery or a hearing device. A temporary change in hearing causes ringing in ears and can also result in short-term exposure to loud noise (tinnitus) and frequent exposure to loud noise can cause tinnitus and hearing loss that lasts a lifetime.

#### **AIMS AND OBJECTIVES:**

- This article focuses on the action of *Karnapoorana* on NIHL through various aspects.
- To focus on the Preventive strategies in NIHL.

#### **ANATOMY AND PHYSIOLOGY OF HEARING:**

The process by which sound waves in the air form electrical signals and send nerve impulses to the brain, where they are translated into sound, is known as hearing. The outer, middle, and inner ear are the three primary components of the ear. The ear drum vibrates as sound waves arrive through the outer ear and travel to the middle ear. Three microscopic bones in the middle ear known as the ossicles are responsible for transmitting the vibrations. The malleus, incus, and stapes are the names of these three bones (and are also known as the hammer, anvil and stirrup). The vibrations are amplified by the ear drum and ossicles and then carried to the inner ear. Through the oblong window and into the inner ear fluid, the stirrup sends the magnified vibrations. The snail-shaped cochlea, which houses the hair cells in the inner ear, is where the vibrations travel through fluid. The movement of the hair bundle, the upper portion of the hair cells, caused by the fluid in the cochlea starts the processes that result in the generation of the nerve impulses. When these nerve impulses reach the brain, the brain interprets them as sound. The population of hair cells responds to noises in varied ways, allowing the brain to discern between various sounds, such as different vowel and consonant sounds<sup>iv</sup>.

#### **Noise Trauma**

Sensory Neural hearing loss is caused by excessive noise is divided into groups - Acoustic Trauma and Noise Induced hearing loss (NIHL). Noise trauma, an occupational hazard is well known in boiler makers, iron and coppersmith and artillery men. The compensation asked for and the responsibilities thrust upon the employer and the employees are well known.

Noise Induced hearing loss (NIHL) is a major cause of preventable SNHL. SNHL may follow chronic exposure of noisy occupations, which are less intense sound than the acoustic trauma. There are two types of Thresholds shift Temporary and Permanent, Temporary recovers after an interval but in permanent hearing loss it does not revert back.

### **Factors Affecting Noise Trauma**

**Frequency** – Noise between 2-3k Hz causes SNHL then the frequencies which are lower or higher than these.

#### **Intensity and duration –**

Intensity and duration: As the intensity of noise increases, the permissible time for exposure is reduced. Table 2 shows the permissible limits of time for various intensities of noises. The "5 dB rule of time-intensity" maintains that any rise of 5 dB noise level will reduce the permitted noise exposure time to half.

### **Noise Levels in Factories**

A noise level of 90 dB (A) SPL, 8 hours a day for 5 days per week is the highest safe limit in the factories.

The exposure of more than 115 dB (A) is not permitted. The impulse noise, which is greater than 140 dB (A), is not permitted.

**Continuous interrupted:** The continuous noise is more harmful than the interrupted one.

**Susceptibility:** Some persons are genetically susceptible to noise trauma.

**Pre-existing ear disease:** They can affect the impact of noise on the inner ear.

### **Preventive Aspects of Noise Pollution**

Noise abatement measures are the first line of defense against excessive noise pollution. The use of these controls should be aimed at reducing hazardous exposure to the point where risk of hearing is eliminated or minimized.

- Technical measures to reduce noise exposure levels are available and technically feasible for most noise sources. Engineering controls include modifying or replacing equipment or making appropriate physical changes along the noise source or transmission path to reduce noise level exposure of workers.
- Choose quiet tools and machines (e.g. buy a Quiet Roadmap (NASA)).

- Maintain and lubricate machines and systems (such as oil bearings).
- Place barriers between noise sources and employees (such as baffles or curtains).
- Contain or isolate the source of the noise.
- **Administrative controls** are changes in the workplace that reduce or eliminate the worker from exposure to noise. Examples include:
  - Operating noisy machines during shifts when fewer people are exposed.
  - Limiting the amount of time, a person spends at a noise source.
  - Providing quiet areas where workers can gain relief from hazardous noise sources (e.g., construct a sound proof room where workers' hearing can recover – depending upon their individual noise level and duration of exposure, and time spent in the quiet area).
  - Restricting worker presence to a suitable distance away from noisy equipment.

### **Measures where engineering and administrative controls are Insufficient**

Choosing and utilizing hearing protection properly, using protective device if alternative control measures to lower noise levels are ineffective or cannot be employed to reduce noise levels below OSHA's permissible exposure limits (PELs) (29CFR 1926.52). Earmuffs and plugs are examples of hearing protection devices (HPDs), which are generally used while engineering or administrative controls are being implemented, when those controls are not practical, or when worker hearing tests reveal significant hearing damage. HPDs are generally used during these periods.

### **HAZARDS OF Hearing protection devices(HPDs)**

Although earplugs are designed to block out noise, they won't totally shield you from loud noises. The earwax that our bodies normally manufacture to self-clean the ears is blocked by earplugs. Foam plugs are frequently inserted too deeply, which can compress wax against the eardrum and deep inside the ear canal causing get chronic pain, hearing loss, or tinnitus. Another reason for infection is using foam earplugs from the store that don't fit the ears completely<sup>v</sup>.

### **KARNAPOORANA: -**

The literal meaning of *Karnapoorana* is filling of ear with luke warm *Taila*, *Swarasa* or *Gaumutra* etc. *Karnapoorana* comes under the external type of *Snehana*<sup>vi</sup>. Acharya Charaka and Acharya Sushruta has not described in detail about the procedure. But *Acharya* Yogaratnakar & Sharangadhara have described the procedure of *Karnapoorana*. Acharya Charaka and Acharya Vagbhata advocate that *Karnapoorana*<sup>vii</sup> should be done daily to avoid the diseases of the ear. Acharya Sushruta has also mentioned *Karna Poorana* in *Swasthavritiya Adhyaya*. *Karnapoorana* is a complete solution for any kind of ear problems and it's really a unique treatment of *Ayurveda*.

- **Types:** There are based on following factors,
  - According to use: -
    - A. As a daily procedure (*Dincharya*)
    - B. In pathological conditions
  - According to *Dravya* used: -
    - A. Done with *Taila* or *Ghrita*.
    - B. Done with *Swarasa*
  - Indications: - *Manyagraha, Hanugraha, Hanushula, Manyashula, Shirahshula, Karna Shula, Badhirya, Karna Nada, KarnaSrava, Pooti Karna* etc.
  - *Matra* (Quantity of *Dravya*):-

Not mentioned specifically. But it should be the quantity which fills the EAC without overflowing.

- **Duration for procedure according to disease<sup>viii</sup>:**

In *Karna Roga* –100 *Matra*

In *Kantha Roga* –500 *Matra*

In *Shiro Roga* – 1000 *Matra*

In painful condition - Till pain relives.

- ***Dharana Samaya*<sup>ix</sup> :**

- *Rasadi Dravya* – Before meal
- *Tailadi Dravya* – After sunset

- In *Swastha* - Hundred *Matra* (approx. 2 – 3minutes) (A.F.I. PART -I, II Common appendices.)

## **PROCEDURE:**

### ***Purva Karma*<sup>x</sup>:-**

Patient should be made to lie down on lateral side and the hand of that side should be beneath head and other hand should be resting on trunk of that side.

- Gentle massage should be done with luke warm medicated oil around the ear and pinna for a short duration of time (Approx.5-7 mins). Massage should also cover lateral portion of neck inferior to ear.
- After this heat is applied around ear with towel soaked in boiling water by waving, touching and pressing for some time (Approx.7-10 min.).

***Pradhana Karma:***

- The medicated liquid (oil) should be heated in water bath to make it luke warm.
- The external auditory canal should be straightened by pulling the pinna backward, and upwards.
- The liquid (oil) should be poured in drop till the ear canal is filled up to the base of concha.
- The root of ear should be gently massaged in order to potentiate the action of the drug.
- The medicated oil should be retained in same position for prescribed time limit.

***Pashchata Karma:***

- The excess oil should be taken out of the external auditory canal by dry cotton.

After retaining the medicated oil for the prescribed time, the ear should be cleaned with dry cotton by mopping.

In bilateral case, the same Procedure should be repeated in the other ear also.

**DISCUSSION:**

Decibels are used to measure sound pressure (dB). The decibel scale deviates from zero, much like a scale of temperature. The level of rustling leaves at 0 dB is roughly the lowest sound that the average person can hear. Some persons who have excellent hearing may detect sounds at -15 dB. If a sound reaches 85 dB or stronger, it can cause permanent damage to our hearing. Damage happens to the microscopic hair cells found inside the cochlea. The auditory nerve receives an electrical signal from these cells in response to mechanical sound vibrations. Varying frequencies are caused by various groupings of hair cells (rate of vibrations). The range of frequencies that the average human ear can pick up is 20 Hz to 20,000 Hz. The hair-like stereocilia of the hair cell may get harmed or broken over time. Hearing loss happens when enough of them are harmed. Loud noise frequently causes damage to the cochlea's high frequency region.

**EFFECTS OF KARNAPOORANA IN NIHL: -**

- *Abhyanga* and *Swedana* improves blood circulation thereby it can calm the nervous and circulatory system.
- According to *Ayurveda*, *Karna* is a *Vata*-dominant region with *Akash Mahabhoota*. Oil reduces *Vata's rukshata* and creates a medium, which lowers sound frequency.
- By reflecting and refracting the sound, *Karnapoorana* lowers the frequency of the sound. Due to the fact that sound pressure and frequency vary from one medium (air) to another (oil or liquid), and by *Karnapoorana* this reduces the frequency of sound levels.
- *Karnapoorana* additionally smoothens the inner wall which has the effect of directing sound waves in a particular direction.
- It promotes the health of cilia in inner ear cells by protection from loud frequency sounds.
- Thus *Karnapoorana* is conducive to the nutrition of the skin and the softness of the muscles. It

penetrates into the skin quickly and enters the blood stream, through the capillaries & supply nutrition to nerves. It has a unique quality of getting absorbed easily by the pores in the skin and thereby acts as a catalyst.

## CONCLUSION:

According to current research, high noise damages the ability to hear and also results in permanent hearing loss. Certain devices are recommended for preventing NIHL, however they still have risks. *Karnapoorana* is efficient and safer for NIHL, as discussed above. Oleation aids in preventing *Vataja* disorders, which is one of the main causes of NIHL. One of the finest strategies for preventing noise-induced hearing loss is *Karnapoorana* (NIHL) which protects the damage to the cilia and thereby restores their function and also reduces tinnitus and has a positive impact on the health of auditory nerve.

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