

Karnanada And Karna-badhirya Wsr Noise Cancellation Technology

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Abstract:

Ayurveda had given an admirable explanation of *Indriyas* and perception of knowledge through them. According to Ayurveda *Satmya Indriyarth Sannikarsha* (proper convergence of sense organs with their objects) is required for the correct discernment of knowledge. For this it is necessary for *Indriya* (senses), *Indriyarth* (object of senses), *Manas* (mind), *Budhi* (intellect) and *Atma* (soul) to work together in coordination and they should be healthy and intact. Hence, any kind of improper binding with sense and its object badly affects that *Indriya* and cause disease. Today in the modern media headphone industrial sector the development of Noise Cancellation technology (ANC) is in the high demand. Earbuds with noise cancellation are an incredible revolution that has grabbed world-wide attention. Ayurveda is ancient holistic science of life have referred to three dimensions for causation of disease viz. *Atiyoga* (excessive), *Ayoga* (reduced), *Mithya* (improper) *yoga* of *Kala* (time), *Artha* (object) and *Karma* (action), at the same time they also indicate that *Prajnaparadh*, *Asatmyendriyarth Sanyoga* and *Parinama* are also the three reasons which cause generation of various diseases. Out of these *Asatmyendriyarth Sanyoga* denotes to wholesome contact of the senses with their object for that person and it results in an overstimulation or deficit or malfunctioning of sensory activity. The extensive use of noise-cancelling headphones resulting in in *Mithyayoga* and *Atiyoga* of one of the *Indriyas* viz. *Shrotrendriya* that produces irreversible ear diseases like *Karnanada* (tinnitus) and *Karnabadhirya* (deafness). The present article aims to understand connection of *Asatmayindriyarth Prayoga* of Active Noise Cancellation technology earphones with *Karnanada* and *Karna-Badhirya vikara*.

Keywords: Noise cancellation earphones, *Asatmayindriyarth Prayoga*, *Karnanada*, *Karna-Badhirya*, Tinnitus, Deafness.

Introduction

Technology has advanced intensely since the past few years. Noise-cancellation earphones are experiencing rapid advancement in the today's media headphone industries that have bring in popularity and are widely utilized. Numerous ear related difficulties including tinnitus and deafness, have been fetched on by the frequent and intense use of these advanced earbud functions. According to Ayurveda, *Indriyas* (senses) are *Panchabhautika*, in spite of this based on their *Artha* all *Indriyas* have a predominance of a specific *Mahabhoota*⁽¹⁾. In human biology, the empty space in the body or cavity correspond to *Akash mahabhoota*. *Akasha* is one of the five fundamental constituent of the universe. *Shrotrendriya* (organ of hearing) originates from *Akasha Mahabhoota*. *Shabda* (sound) travels through *Vata* while in the presence of *Akash Mahabhoota*. *Karna* (ear) is *Adhishtana* (place) of *Shrotrendriya* and *Shrotrobuddhi* performs the act of interpretation. *Dukha* (disease) is mostly caused by *Heenayoga*, *Atiyoga* and *Mithyayoga* of *Indriyas*⁽²⁾. Comprehensive use of active noise-cancelling headphones in the form of *Mithyayoga* and *Atiyoga* increased popularity of *Karnanada* and *Karna-Badhirya Vikara*.

Concept of *Karnanada*, *Karna-Badhirya* and Noise Cancellation Technique:

Shabda (sound), *Sparsha* (touch), *Rupa* (form), *Rasa* (taste) and *Gandha* (smell) are perceived by the *Indriyas*; hence they are also called as *Buddhi Indriyas*^(3,4). Among the *Indriyarth*, *Shabda*, which is perceived by *Shravanendriya* and is predominately *Akashamahabhuta*, is considered first among *Indriyas*. *Karna* is the *Adhishtana* of *Shravanendriya*. The *Heenayoga*, *Mithyayoga*, and *Atiyoga* of *Shravanendriya* are the main cause of the *Karna Roga*. Acharya *Sushruta*, *Vagbhata*, and *Charaka* have mentioned different types of *Karna Roga* which include *Karnanada* and *Karna-Badhirya*. *Karnanada* is a *Vyadhi* composed of the terms "*Karna*" and "*Nada*," where "*Nada*" stands for "sound" or "ringing in the ears"⁽⁵⁾. *Karna-Badhirya* is a *Vikara* where the word "*Badhirya*" denotes obstruction. According to *Acharya Sushruta*, vitiated *Vata* and *Kapha Dosha*, when residing in *Shabdavaha Sira*, cause *Badhirya*⁽⁶⁾. However, according to *Vagbhata*, *Badhirya* is caused by *Vata* or *Kapha Anubandha Vata*, which obstructs *Shabdavaha strotas* or by failing to treat *Karna Nada*⁽⁷⁾. The specific *Nidana* of each *Karnaroga* are not mentioned in Ayurvedic classics but *Samanya Nidana* have been explained by *Acharya*

Yogaratanakara⁽⁸⁾ such as *Avashyaya* (excessive exposure to the mist and snow), *Jalakrida* (includes underwater swimming, diving, bathing in river, sea, and fountain or sprinkling water), *Karna kanduyana* (itching in the ear), etc. The *Mithyayoga* in *shabdashya* and *Atiyoga* of *Shabda* is the most frequently seen among them. The wrong and excessive utilization of *Uccha Shabda* is an aetiological component of the cause of *Karnanada* and *Badhirya*. It is believed to be the lodgment of vitiated *Vayu* in *Shabdavaha Srotas* by *Sevana* of *Vata Prakopaka Nidana*. As a result, proper perception or the transporting of sound waves inside *Shabdavaha Srotas*, is stuck, making it unable to sense sound waves and resulting in *Karnanada* and *Badhirya*. In rare circumstances, vitiated *Kapha* obstructs the route of *Vata Dosha*, causing *Vata* to be unable to conduct sound waves⁽⁸⁾.

One of the remarkable developments that is used widely nowadays in the media sector is Noise-Cancellation Technology.

There are primarily two forms of Noise-Cancellation Technology:

1. Passive Noise Cancellation (PNC) Technology: The PNC technology is a technique which work by blocking unwanted sound waves physically by isolating ears with items like earbuds or headphones. It is simple and effective way to reduce noise without demanding complex technology or battery power. However, experts have accredited that PNC technology has considerable limits due to its massive weight and lack of flexibility in compared to small devices. This brings up the contrary.

2. Active Noise Cancellation (ANC) Technology: It uses an electro-acoustic technology to quiet the noise. By introducing a noise-reduction signal with the same anti-phase and amplitude, it achieves it. The Least Mean Square (LMS) method and the Normalized Least Mean Square (NLMS) algorithm are the two main algorithms used in noise cancellation⁽⁹⁾.

PNC headphones, especially the circumaural or over-ear kind, function by physically soundproofing the ears with a set of materials. PNC headphones include ear cups that form an airtight seal over the ear, prohibiting sound from escaping or entering, and memory foam, a high-density material, further muffles outside noise. With ANC, the ambient noise in your surroundings is first sampled using a tiny microphone. The battery-operated noise-cancelling device in the headphones is then fed the sampled audio via the microphone. Following that, the system reverses it, creating a signal that is exactly the opposite of the original. Finally, this opposing signal is played back by the headphone's speakers. Destructive interference takes place when two frequencies or signals are completely at odds with one another.

Relation of noise cancellation and *Karnanada* and *Karna-Badhirya*:

Long-time exposure to sound with these varieties of noise cancellation technology has been reported to cause many ear problems. WHO has listed the grading of hearing loss⁽¹⁰⁾ from which we can conclude that when there is excessive use of sound i.e. more than 41db-81db for a longer period of time using headphones or earbuds has leads to ear problems such as tinnitus and deafness. It occurs due to working principle of this technology as it terminates spaces in the auditory canal and creates a pressure which leads to tinnitus and overtime leads to deafness. This indicates that when there is *Mithyayoga* or *Atiyoga* of *Shabdha* is either lead to *Upaghata* or *Upatapa* causing *Indriya Pradoshaja Vikara*, a concept has been explained in *Sutrasthana* by *Acharya Charaka*. *Nidana* of the *Karnanada* and *Karna-Badhirya* is due to *Mithya* and *Atiyoga* of *Shravendriya*. Thus, exposure to earbuds with excessive noise and longer duration can cause *Upaghata* and *Upatapa* in the form of ear deafness and tinnitus.

Discussion:

The use of Noise Cancellation headphones has risen among people. Devices are not only used for long period of time, but also at higher sound levels. Noise Induced Hearing Loss (NIHL) is caused due to over stimulation of auditory system produced by recurrent exposure to sounds over the prolonged period of time. The temporary or permanent hearing loss is reported due to long term exposure to the sound level.

Out of three *doshas*, *vata dosha* get affected more. The normal functioning of *Indriyas* are controlled by *vata*. *Vata* governs the *Shrotrendriya* and also responsible for hearing. In *Ayurvedic* text *Acharyas* mentioned number of causes of ear diseases, among them most of the causes firstly affect the *Indriya Adhithana* which is *Karna* and then affects the *Shrotrendriya* means of hearing capacity. *Atiyoga*, *Hinayoga* and *Mithyayoga* of *Shabda* Considered as *Asatmendriyarthasanyoga* of *Shrotrendriya* resulting in vitiation of *vata dosha* and harms its function of hearing. Exposure to abnormal sound or *Shabda* directly disturbed the *Pranavayu* associate with the auditory organ (*shrotrendriya*) and leads to the harmful effects on the vital function of the *Shabdavahisiras* (sound carrying channels).

Conclusion:

Innovations in the modern day, like noise-cancelling headphones, have both benefits and drawbacks for society. These incredible new developments in the media headphone market have gained widespread use and are becoming more and more popular. However, the frequent and heavy use of these advanced earbud features is causing several health

risks, including tinnitus and deafness. As a result, both *Mityayoga* and *Atiyoga* practices constantly expose our *Indriya* (sensory organs), which over time leads to a myriad of diseases linked with them. So that, one must thing is to avoid its *Nidana* (reason), including the moderate use of contemporary technology like noise-cancelling earbuds, to sidestep diseases like *Karnanada* and *Karna-Badhirya*.

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