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Research in ShabdaGrahan, A conceptual Study in Ayurveda

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Aim To understand Ayurveda Philosophy of ShabdaGrahan.
Objectives- To understand hearing mechanism with respect to Ayurveda

- To understand speech mechanism.
- To study etiology of delayed hearing and speech (prenatal, natal, post-natal)
- To find treatment for Hearing impairment in Ayurveda.

Introduction

Shabda 5 basic sense of human being Sparsh, Shabd, Rup, Ras, Gandh.
Without Shabdgrahan*shabdacheaaklan* is not possible. Historical background of Karna Rogas.

Vedic Period: Vedas are the oldest documented source of infinite knowledge on this earth and Ayurveda is the branch or "Upveda" of Atharvaveda.[1] Description pertaining to the Urdhvajatrugata (Supraclavicular) area of body and diseases are there in Vedas along with Mantras (rhymes having imperical effect) to be recited for their treatment. [2,3]
Ayurveda fundamentals are given in nutshell in Vedas.[4]Karnendriya (word used is "Shruti") has been referred in Rugveda and Yajurveda along with many other organs.[5] In Atharva veda, the description of Indriyas like two Netra, two Karna, two Nasika vivar and Jihwa is found.

Sushruta Samhita: Acharya Sushruta has mentioned twenty-eight types of Karnarog .[10] In Karna vyadhi bandhavidhi, he has given description of Karnapaaligata roga which occur due to complication of Karnapaali Sandhana (auroplasty).[11]

Ashtanga Hridaya and **Ashtanga Sangraha:** Twenty-five types of Karnarogas have been explained by Acharya Vagbhata.[12,13] Among twenty five types, fifteen disorders belong of (External and Internal Auditory canal) Karnashrota, seven disorders belong to Karnapaali and three disorders belong to (pinna) Karnashashkuli
Until speech sound Acquisition is not done(speech development),speech perception(understanding)speech discrimination and speech expression(actual speaking in verbal/Written language) will not happen.
Need for Normal Hearing and Speech
1:Normal Ear anatomy [Ext.Mid.Ent.]

Etymology of Karna:

The word/shabd "Karna" is derived from the root "KrinaViksyapa" (कृणविक्षेपे) by the principle of "Na" (नन्) and with the addition of suffix **"Unadirna"** which means hear.[22]
Definition: Karna is defined as that which helps in hearing/listening or that which helps in the perception of sound.[23]
Synonyms: Karna, Shabdagrahyam, Shrotra, Shruti, Shravana, Vakraguhaa, Dhwani Grahyam, Shravanopayaha, Shravanendriya.[24]

Karna Sharira: Karna Sharira (Anatomy and Phisiology) has been mentioned in Sharirasthana of Sushruta Samhita and Ashtanga Hridaya, although description is very premature. Acharya Sushruta

has given second most importance to Karnendriya after Chk shu. Karna is the end organ of Shravanendriya (organ of corti), the function of which is hearing (also center of hearing in the brain).

Garbha Karna Sharira: According to Acharya Sushruta, Garbha means combination of Atma, Prakruti, Vikara along with Shukra and Aartava. In the Garbha, all the processes of division is brought about by Vayu mahabhoot. All catabolic and anabolic process by Teja mahabhoot. Hardness and structure is formed about by Prithvi Mahabhoota. Fluid in the chochlea by Jala Mahabhoota and all the hollow structures by Akasha Mahabhoota.[25] During third month of intra uterine life, various Pratyanga body parts like Karna, Nasa, Netra etc. develops and are found in primitive (Avyakta) form and gradually become evident (Vyakta) after few months. In fourth month of intrauterine life, Garbha Hridaya or foetal heart is formed and sensory perception starts Fetal heart beats. In the so formed Hridaya, the Chetana Dhatu gets lodged facilitating the existence thus various Indriyartha like Shabda, Sparsha, Rupa, Rasa and Gandha are perceived. During seventh month of intra uterine life.All Indriyas are Anumanagamya. They are made up of Panchamahabhoota and each Indriyahas got predominance adhikya of one Mahabhoota.
The hearing sense organ which perceives Shabda is called as Shrotrendriya.[26]Shravanendriya is one among five Gyanendriya, is predominant with "Aakasha Mahabhoota"[27] and its Indriya Karma is Shabda Grahana. Karna is Adhishtana of shravanendriya.

Srotas: According to Acharya Sushruta and Vagbhata, Indriyas are formed of Atmaja Bhavas.[28] In Sharirasthana, various factors related to Matruja, Pitruja, Satmyaja, Satvaja, Rasaja and Atmaja are present. Most of the Srotas are formed of Matruja Bhavas. The concept of Srotas/marg is special and unique feature of Ayurveda. Even though there are no direct references of Shabdavaha Srotas in the particular topic of Srotas, we get the reference of the disorders related with ShabdavahaSrotas (Deafmutism). Acharya Sushruta has mentioned in Uttartantra that disorders of Karna are related with Shabdavaha Srotas, Sira,[29] Nadi[30] and Patha[31].
According to Acharya Sushruta the Srotas are of two types: Bahirmukha Srotas and Antarmukha Srotas. Among them Karna has been mentioned under (external Auditory canal orifice)

ShabdavahaNadi / Dhamani: - This most probably refers to the Vestibulocochlear nerve

Physiology (Kriyasharira): Hearing (Shravana Kriyaa) is the chief function of Karna. Maharshi Charaka has narrated that the knowledge perceived through the confluence (Sannikarsha) of four factors viz. Atma, Mana, Indriya and its Vishaya (Artha)[74].

आत्मेन्द्रियमनोर्थानां सन्निकर्षात् प्रवर्तते

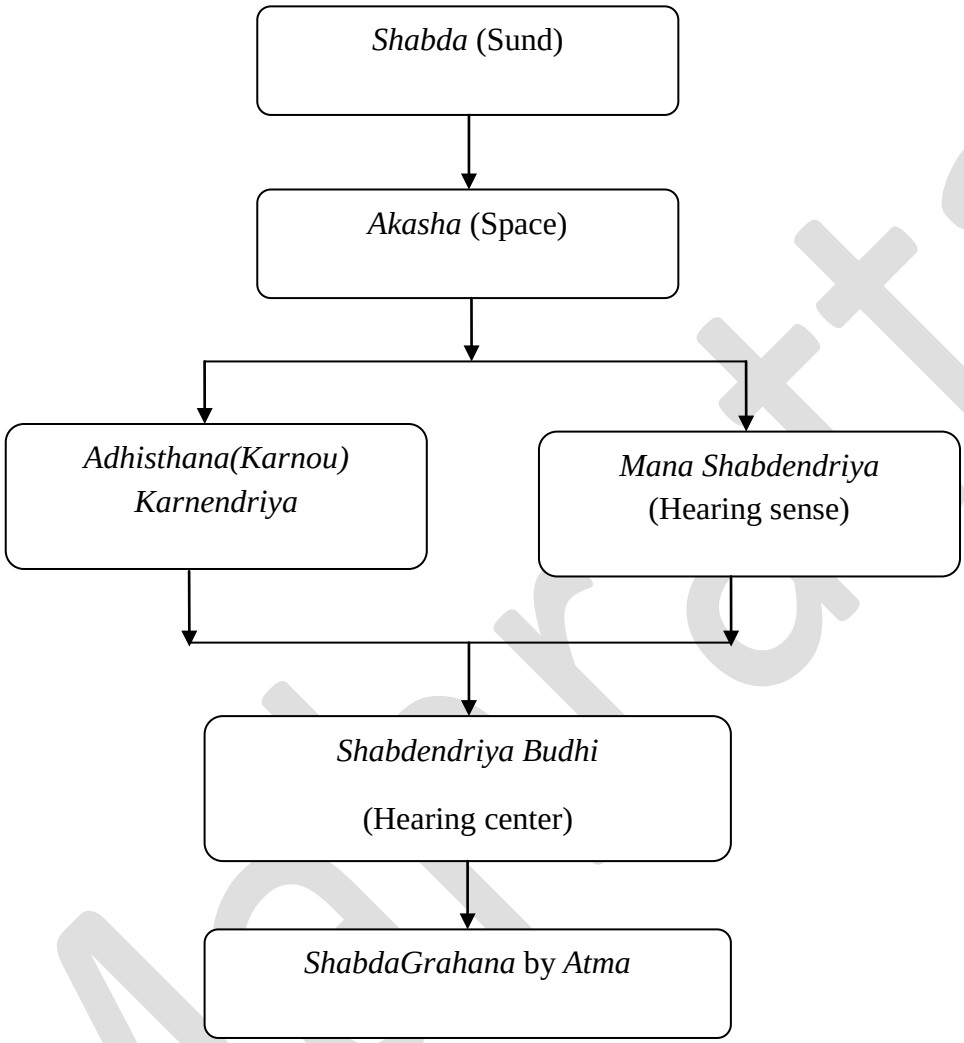
व्यक्तातदात्वेयाबुध्दिःप्रत्यक्षंसानिरुच्यते ॥ (च.सु.११/२०)

Shabdendriya Kriya Sharia (Concept of sound perception in Ayurveda):
This process needs, five elements of each Indriya (specialized sense organs), then this process of perception is achived. IndriyaVishaya (object), IndriyaDravya (media), Indriya Adhisthana (organ of reception), Indriya(sense), Indriya Budhi (specialized sense center for hearing), act in co-ordination with subtle and amphibious sense i.e. Mana to finish or round off the process of perception by senses.[75]So, in the process of hearing, combination of Shabda(sound), Akasha (Space), Karna (ear), Shravanendriya (sensory part of internal ear or cochlea) Shravana Buddhi (hearing centre) and Mana (psyche) is essential. Here, sound is Vishaya, space is Dravya, ear is Adhishthaana, cochlea is Indriya, and hearing centre is Shravana Buddhi. Sound travelling through space when comes in contact with external ear and transmitted to internal ear (cochlea) is perceived and further transmitted to the hearing centre where after its interpretation it is heard by an individual. Psyche (mana); by its uniqueness and its sense of quality work, it acts as a co-ordinator.

The sense organ which perceives Shabda is called as Shrotendriya.

"श्रोत्रेशब्दज्ञानसाधनेइन्द्रियभेदेतदाधारे ॥" (Vachaspathyam, pg 5157)

In case of Shabdendriya Kriya or perception of sound, this phenomenon can be presented as under.



Shabdaendriya Kriya Sharira

The explanation regarding Shabda Grahana as elucidated in Shabda Stoma Mahanidhi.The sound waves come in contact with the ear, stimulates Karnendriya, it perceives sound with the help of Dika/disha or direction. Vaisheshika Darshana defines Shrota as, a space in ShravanaVivara intended for Prapaana or transmission of Shabdas, Nimitta Upabhoga is experience caused by the sound waves.

Badhirya or deafness is results from its Upanibhandaka"s Vaikalya. (pathology in transmitting media)

"श्रोत्रंपुनः श्रवन, विवरसंज्नकनासोदेशःशब्दनिमित्तोपभोगप्रपानधर्मोपनिबन्द्ध

तस्यचनित्यत्वेसतिउपनिबन्धकवैकल्यात्बाधिर्यमिति ॥"

Each ear is a receptor concerned with:

- Sangraha (Collection)
- Samvahana (Conduction)
- Parivartana (Modification)
- Vistarana (Amplification)
- ParimanugamanaVivechana (Analysis)

Nature of Shabda: Shabda or sound is the quality of Aakasha, it is perceived by Shrotra, and it is transient or shanika. Shabda is not present in Karna (source) i.e at the site of hearing (Shrotra) but it is to be created,conducted and perceived.

Kinds of Shabda:

"शब्दस्त्रिविधःसंयोगजविभागजःशब्दश्चेति" ॥ (तर्कसग्रह)

Three types of Shabda[76] are:

Samyogaja: Sound caused by the contact between one or more substances as seen in sound by Bheri (trumpet), Mridanga etc.

Vibhagaja: Sound caused by separation of article such as venuVidarana (separation of bamboo stick into two pieces).

Shabdaja: Alaphabets and other broken words and sentences.

"श्रोत्रग्राह्यो गुणःशब्दः । आकाशमात्रवृत्तिः, स द्विविधः ध्वन्यात्मकःवर्णात्मकश्च ।
ध्वन्यात्मकःभेर्यादौ । वर्णात्मकःसंस्कृतभाषादिरूपः ॥" (तर्कसग्रह)

"शब्दोध्वनिश्चवर्णश्चमृदंगादिभवोध्वनिः । कंठसंयोगादिजन्योवर्णास्तेकादयोमताः।

सर्वःशब्दोनभोवृत्तिः श्रोत्रोत्पन्नस्तु गृह्यते॥" (तर्कसग्रह)

Production of Varnatmaka Shabda is dealt within the chapter of Vagindriya Varnanam. As per above Shloka quoted by Aacharya Panini– Dwanyatmaka Shabda is produced by Aakasha Samyoga in case of Dhwani. This means disturbance caused in space resulting in mutual contact (Samyoga) or separation (Vibhaga) of the medium producing sound. These vibrations travel just like water or wind. Shabda according to its nature is of two types:

Varna Lakshanas – Alphabetical sounds consisting of language.

Dhwani Lakshanas – (Created sounds) just as screaming, humming etc.[77]

Shabda is both Samana Jaatiya Karana and Asamana Jaatiya Karana. Sound is produced in solid, liquid or air is invariably essential for the conduction of vibration of sound waves, space between the first and the next atom of medium through which the sound waves pass on, is also consistently essential. In other words, the sound can be defined as, an effect of the disturbance in the particles or a medium either by Samyoga or by Vibhaga.

Shabdotpatti:

"वीचितरंगन्यायेनकदम्बमुकुलन्यायेनवाशब्दात्

शब्दान्तरोत्पत्तिक्रमेण श्रोत्रदेशेजातस्य श्रोत्रसंबंधात्प्रत्यक्षत्वसंभवात् ॥" (तर्कसग्रह)

"आत्मबुद्ध्यासमेत्यर्थान्मनोयुक्तेविवक्षया । मनःक्रायाग्निमाहन्तिसप्रेरयतिमारुतम् ॥

मारुतस्तूरसिचरन्मंदंजनयतिस्वरम् । सोदीर्णोमूर्ध्न्यभिहतोवक्त्रमापाध्यमारुतः॥

वर्णाञ्जनयते;" (पाणिनीयशीक्षा ६–३)

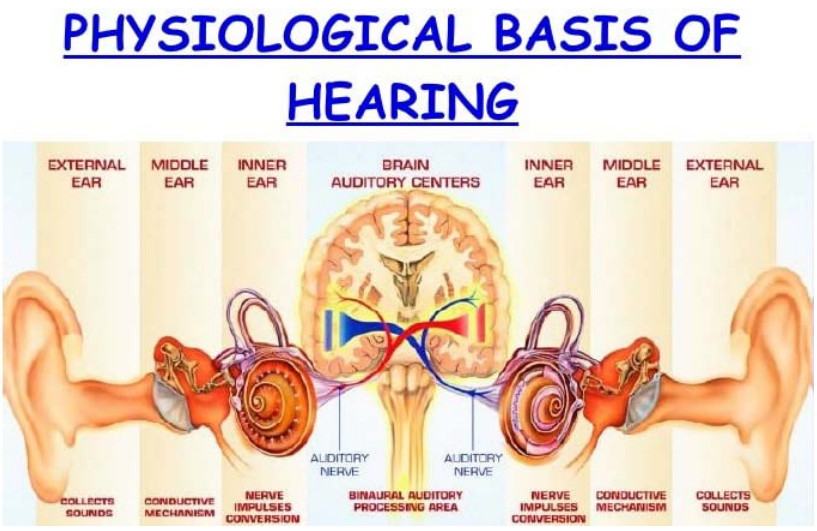
Shabda Grahana takes place through "Veechee Taranga Nyaya". [78] According to this process when we throw a stone/object on the still waters of the lake a circle of waves starts first from the centre. It expands to the periphery. Fllowed by another circular wave, like this, many such waves being generated, expanded and disappeared subsiquently. The Grahana of these waves is completed by Dhamani which carries out the function of Shabdavahana and is processed by the Manasa.
Similarly the sound waves disturbs the molecules of the medium through which they travel and propagate to unimaginable long distances from the place of their origin. These waves are collected, conducted, magnified, amplified and finally analysed isometrically by the organ of hearing.
Like Veechee Taranga they reach the Shrotra. Further, the sound waves after reaching the external ear will vibrate, and then sound waves are analyzed, interpreted and perceived by the preview of Atma and Manasa Samyoga as explained above

Physiology of Hearing

Any vibrating object causes waves of compression and rarefaction and is capable of producing sound.

Mechanism of hearing:

A sound signal in the environment is collected by the pinna, passes through external auditory canal and strikes the tympanic membrane. Vibrations of the tympanic membrane are transmitted to stapes footplate through a chain of ossicles coupled to the tympanic membrane. Movements of the stapes footplate causes pressure changes in the labyrinthine fluid which move the basilar membrane. This stimulates the hair cells of the organ of corti. It is these hair cells which act as transducers and convert the mechanical energy into electrical impulses which travel along the auditory nerve.



The mechanism of hearing can be broadly divided into:
Mechanical conduction of sound (conductive apparatus)
Transduction of mechanical energy into electrical impulses (sensory system of cochlea)
Conduction of the electrical impulses to the brain (neural pathways)

Conduction of sound: A person under water cannot hear any sound made in the air because 99.9% of the sound energy is reflected away from the surface of water because of the impedance offered by it. A similar situation exists in the ear when the air – conducted sound has to travel to cochlear fluids.
Diagnosis of deafenss;
Patient experiences with hearing: asking people to repeat what they said, it hard to understand people on the telephone, when patient miss the doorbell when it rings,he need concentrate while chating face-to-face,people around notice you have hearing loss issue,he need to make TV or radio louder than other family members,hear male sound easily than female sound,misunderstanding people .
General screening test
The patient is ask to cover one ear and describe how well they hear words spoken at different volumes, as well as checking sensitivity to other sounds.

A tuning fork test
This is also known as the Rinne test. A tuning fork having Frequencies like 512,1024 is a metal instrument with two prongs that produces a sound when it is struck. Simple tuning fork tests may help to detect whether there is any hearing loss, and where the problem is.

Test	Normal	Conductive Hearing Loss	Sensorineural Hearing Loss
Rinne's	AC > BC (Rinne's Positive)	BC > AC (Rinne's Negative)	AC > BC * (Rinne's Positive)
Weber's	Sound heard in midline	Sound Heard in affected ear	Sound head in good year

Modern concept of shabd production-
2: Normal Articulatory System(lip,Teeth, Gums,Palate, Uvula,Tongue,Mandible, Pharynx, larynx)
3: Normal Phonatory System(Laryngeal)
4:Normal Respiratory System(Lungs , lower respiratory tract, Intercostal muscles)
5:Normal ResonatorySystem(all sinuses)
6:Normal Central nervousSystem (hearing center is in brain like Broca's center in temporal lobe and Wernicke's center in frontal lobe)
7: Normal Cognitive skill Development (Budhi)
..If we relate all these systems are in relation with Akash and Vayu mahabhut adhikya Vayu Tantra Yantra Dhara!

Vayumahabhut is responsible for speech production with help of articulatory system. Like lip, Teeth, Palate, Tongue, Uvula, Glottis,Mandible are involved in the formation of shabd (speech sound). So speech is ***overlaid*** function of all these organs means above all other functions,That is functions like Taste , swallowing theses organs also helps in speech production.
Which is again supportedby Akashmahabhute inresonatory system while producing sound passing from different sinuses and cavities.
Also remaining threemahabhut are equally needed in the formation and functioning of speech and hearing(Prithvi,Aap,Agni)
Means in patients with normal anatomy but abnormality in speech development due to less hearing or residual hearing at childhood or in adulthoodneeds treatment on *Vaatdosh* that will improve the quality of speech sound Perception,Aquistion and Expression . Expression with sign language.

Sign language and lip-reading

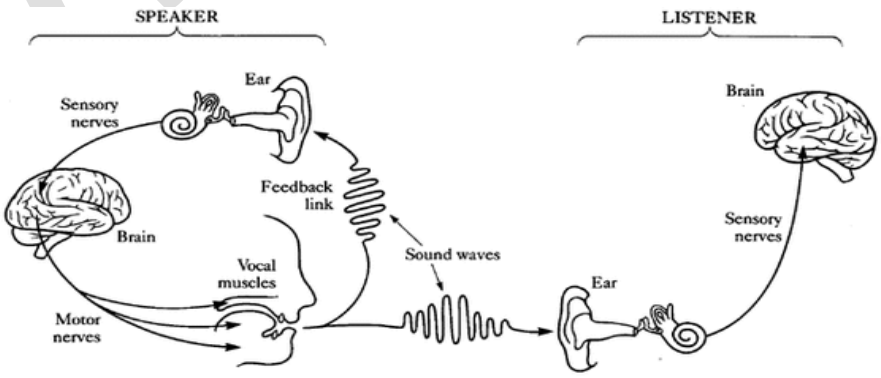
Sign language can help communication between people who are no longer able to hear.
Some people with hearing impairment may have speech problems, as well as difficulties in understanding speech from other people.
A high percentage of people with hearing impairment can learn other ways of communicating.
Lip reading and sign language can replace or complement oral communication.
There is a range of sign languages that are, in some cases, wildly different to one another.

Lip reading

Also known as speechreading, lip reading is a method for understanding spoken language by watching the speaker's lip, facial and tongue movements, as well as extrapolating from the data provided by the context and any residual hearing the patient might have.
People who became hearing impaired after they learned to speak can pick up lip reading rapidly; this is not the case for those who are born hearing-impaired.

Sign Language

This is a language that uses signs made with the hands, facial expressions, and body postures, but no sounds. It is used mainly by those who are deaf.
There are several different types of sign languages. British Sign Language (BSL) is very different from American Sign Language (ASL). For instance, BSL uses a two-handed alphabet, whereas American sign language uses a one-handed alphabet.



Speech Chain

Ayurvedic physiology of shabdagrahan-
AtmaSanyujyate Man:
Man Indriyanam:
Indriyaarthen:
Tatodyanam:

Treatment for delayed speech and hearing , hearing Impairment, Deafmutism, Stutturing, Clutturingcan be corrected by Vatanuloman , Shaman ,and BhruhanChikitsa by Panchkarmaalong with speech training to person ,or give Auditory training to ear with Face reading .
Treatment can be tried for speech and hearing impaired person by Nasya treatment withTikshnaPradhamanNasya like Vacha churn ,shodhanNasya ,Anu tail ,Vacha Tail,Panchendriyawardhan Tail for BruhanNasya ,KshirbalaNasya …
As well as Kawal, Gandush to reduce in size and shape ,salivation of tongue in mentally retarded and cerebralpalsy child with Triphala,HaridraKvaath ,Pratisaran with triphalaGhrut,Karnpuransnehanswedanpurvak with Bilva Tail for Vaatshaman to improve hearing as well as we can do BastiChikitsa for Vaatanuloman

Conclusion

By this paper I want to open a unfolded part of Ayurveda ShalakyaTantra for those people(Divyang) give solution through Ayurveda treatment for hearing and speech impaired presently only hearing aid and speech therapy is the option ,no medical treatment than some ear surgery like tympanoplasty and tongue tie release.

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