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Research Article

Management of Tinnitus

A Comprehensive Review of Types, Characteristics, Assessment and Management of Tinnitus

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Abstract: Tinnitus is explained as an apparition of auditory thought. It is a sound perception without acoustic, corresponding, or mechanically associated with the cochlea. Tinnitus showcases one of the most distressing and common otologic problems, and it causes various psychological and somatic disorders that intervene with the life quality. Although tinnitus has become almost a global symptom, the occurrence of tinnitus surges with age. Tinnitus also characterizes a common sign among offspring with hearing loss. Tinnitus is an individual occurrence that is difficult to appraise objectively, with it being quantified, measured, and defined only based on patients' answers. Although tinnitus can have various reasons, it usually results from otologic illnesses, with the most mutual cause believed to be hearing impairment induced by noise. The various healing methods for tinnitus have formed mixed outcomes; thus, it is generally supposed that tinnitus has varied physiological bases. Sometimes, no treatment represents the better alternative, mandating clinicians to placate patients without unnecessary prescriptions. Although treatment does not necessarily relieve tinnitus, accurate diagnosis and treatment are important for reducing the annoyance related to tinnitus and averting additional disability. Furthermore, there also exist placebo effects that have been partially accredited to responses to attention. Nevertheless, therapy signifies an essential part of conduct, irrespective of the organizational method accepted for a patient. An informed explanation of tinnitus, collected with encouragement, recovers the condition of most patients over time. For those with insistent tinnitus, cognitive and interactive therapy, amplified by pharmacologic intervention, might characterize the most promising management regimen. Most prominently, a strong clinician-patient association underpins successful organization and high patient consummation levels.

(Keywords: Tinnitus, Auditory, Somatic, Psychological, Incidence, Otologic, Cognitive, Pharmacologic intervention, Music therapy)

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1. INTRODUCTION

The perception of sound without any external acoustic source is termed 'tinnitus.' Tinnitus can be caused by various etiologies that may or may not be pathological; however, fleeting unconscious tinnitus has become almost a global sensation.[1] The increased noise pollution and other issues, specifically otological conditions, are the pronounced factors associated with increased tinnitus sensations. Consequently, the ringing sensation, whether temporary (lasts for seconds or minutes) or permanent, can affect a person psychologically, hence the quality of life.[1,2]

2. CHARACTERISTICS OF TINNITUS

Numerous properties of tinnitus exist on which it can be explained, defined, understood, and categorized. Tinnitus can range from extremely faint sounds to distracting intense noise that can be intermittent or kept up throughout the day and night. Furthermore, it might be exaggerated by many or some precipitating factors such as exposure to noise, hearing impairment, stress, kinaesthetic movements of the jaw, etc.[1,3,4] Also, the patterned type of sound an individual, usually hears in tinnitus varies greatly. It might also relate to some etiology, such as low-frequency roaring tinnitus in Meniere's disease. Other sounds are usually categorized by individuals, including but not limited to whistling, buzzing, wind, steam, crickets, falling faucet water, machinery or running engine noise, etc.[3-5] Two broad categories of tinnitus are objective and subjective tinnitus. The former is the one that also can be heard by another individual.[1,3,4] The type of tinnitus the individual describes is usually associated with hearing memory via the limbic system. However, the pattern of tinnitus is not unique, like fingerprints, but also not common and specific to pathology. Due to this, it has a low diagnostic value, making it doubtfully worth reporting by clinicians.[4] Many times, however, the roaring low-frequency tinnitus can be speculated in Meniere's disease and unilateral tinnitus in retro-cochlear pathologies.[6-9] Most patients with both hearing loss and tinnitus report that the frequency of the tinnitus correlates with the frequency and severity of characteristics of their hearing loss and that the intensity of the tinnitus is generally less than 10 dB above the patient's hearing verge at that frequency.[4] Some patients with central hearing processing disorders and difficulties comprehending speech in noise report experiencing tinnitus, although their pure-tone audiometric verge is normal.[5,10] Less predominant forms of tinnitus, such as those connecting well-known musical tunes or voices without comprehensive speech, occur among older people with hearing damage and are believed to signify a dominant type of tinnitus concerning reverberatory movement within neural loops at a high level of dispensation in the auditory cortex.[5,11] Somatic tinnitus is a form of independent tinnitus in which the occurrence or intensity is changed by body movements such as clasping the jaw, applying pressure, or turning the eyes to the neck and head.[12] Analysis that tinnitus is louder upon growing suggests the participation of bodily features, such as bruxism. Reports that tinnitus disappears during nap but retracts within a few hours additionally suggest that psychosomatic issues, such as neckline muscle contractions happening in a good place or jaw clenching, play etiological roles.[13] Because objective tinnitus (which is audible to another person) signifies the semantic reverse of subjective tinnitus, a better nosological method might be to use the term somatosound in place of objective tinnitus regardless of whether the noises are perceptible to others, keeping the term tinnitus for the insight of sound in the non-appearance of any acoustic basis. Thus, "tinnitus" would define cases previously recognized as subjective tinnitus.[4] Objective tinnitus might be mechanical or vascular in origin. Objective tinnitus of vascular source could be mentioned as bruit from stenosis in the vertebrobasilar system or carotid. Objective mechanical tinnitus is due to muscular contraction, abnormal in the middle ear or nasopharynx, as can occur in the palatal myoclonus.[14] Pulsatile tinnitus can also manifest subjectively as an increased awareness of blood flow in the ear. Indeed, the cause of somatosensory-pulsatile tinnitus syndrome is not vascular, with the syndrome deriving from cardiac-synchronous somatosensory activation of the central auditory pathway or the failure of somatosensory-auditory central nervous system (CNS) interactions to suppress cardiac somatosounds.[15] Pulsatile tinnitus superimposed on steady tinnitus could be due to the consequence of the pulsation of blow flow with the spiral capillary of the basilar membrane.[16]

3. SYMPTOMS

Common connected signs or particular discomforts include concentration problems, decreased speech discrimination, and insomnia.[17] The infuriation of tinnitus is not connected with acoustic individualities, but there is a significant correlation with psychological symbols.[18] The difference between only perceiving tinnitus and being distressed or annoyed by it depends exclusively on activating the autonomic and limbic nervous systems.[5] Most patients with important tinnitus have trouble falling asleep due to the accompanying nervousness, which also causes problems returning to sleep during stages of wakefulness during nightfall.[5] There is marked neuronal activity in the auditory paths during sleep due to the auditory scheme continuously monitoring the sound situation.[5] Common damaging activities and conditions contain noise exposure, emotional stress, being located in a quiet place, physical exhaustion, and loss of sleep.[19] Annoyance, interference with sleep and depression are more common and the tinnitus is louder in patients with Meniere's disease than in those with tinnitus originating from other etiologies.[19] Furthermore, effectively controlling vertigo in patients with Meniere's disease can lead to them concentrating more on their tinnitus and becoming more upset by this condition.[9] The strong point of the reaction to tinnitus is determined by its consequence and past experience-the. The actual strength and features of the sound are of subordinate position.[20]

4. NATURAL COURSE

Noise-induced tinnitus can be chronic or acute. Severe tinnitus can last a few minutes to weeks after noise coverage.[21] In some cases, tinnitus has a slow onset, and several years can pass before a low-intensity, intermittent tinnitus becomes troublesome. Additional three-quarters of sufferers practice [22] Spontaneous remissions by natural habituation. Habituation happens within the CNS, whereas adaptation involves a peripheral sensory organ.[5] For those whose condition deteriorates, the tinnitus intensity surges over time, but its pitch tends to remain stable.[19] Tinnitus is considered irreversible and intermittent if it persist for more than 2 years.[23] However, chronicity is not related to a favorable response to treatment.[24]

5. CAUSES

Tinnitus does not characterize a disease but is a sign of various underlying illnesses.[25] Otologic conductive causes resulting in unilateral tinnitus include ear wax, perforation of the tympanic membrane, cholesteatoma, etc.; bilateral tinnitus includes otosclerosis and acoustic trauma.[26] Further among middle ear problems, Glomus tympanicum causes synchronous pulse tinnitus (Figure - 1) and non-synchronous tinnitus (which is not synced with heartbeat or breathing) can be due to problems in either eustachian tube or middle ear muscles contraction.[9,27,28] The synchronous tinnitus can also be due to vascular causes that stimulate the cochlear fluids, such as intracranial hypertension, arteriovenous malformations, and aneurysms (Figure - 1).[25,27] The inner ear problems which result in bilateral tinnitus such as noise-induced hearing loss, presbycusis, ototoxicity and unilateral tinnitus from Meniere's disease, sudden deafness, and other causes of hearing loss.[9,29] Neurologic causes include whiplash, multiple sclerosis, head injury, vestibular schwannoma (commonly called an acoustic neuroma), and other cerebellopontine angle tumors.[30] Infectious causes include sequelae and otitis media Lyme disease, syphilis, meningitis, and other infectious or inflammatory methods that affect hearing. Tinnitus is also an unexpected result of some oral medications, such as nonsteroidal anti-inflammatory drugs, salicylates, loop diuretics, aminoglycoside antibiotics, and chemotherapy agents (e.g., platins and vincristine). Temporomandibular joint dysfunction and other dental illnesses can also cause tinnitus. However, in many cases, no underlying physical cause is recognizable.[31] For many years, hearing impairment has been comprehended as the most common cause of tinnitus[32], and population-based data indicate that excessive noise exposure represents the second most common cause of tinnitus. However, many patients cannot identify any cause related to tinnitus onset.[23] Extensive case history and patient symptoms can help determine the most likely causes.

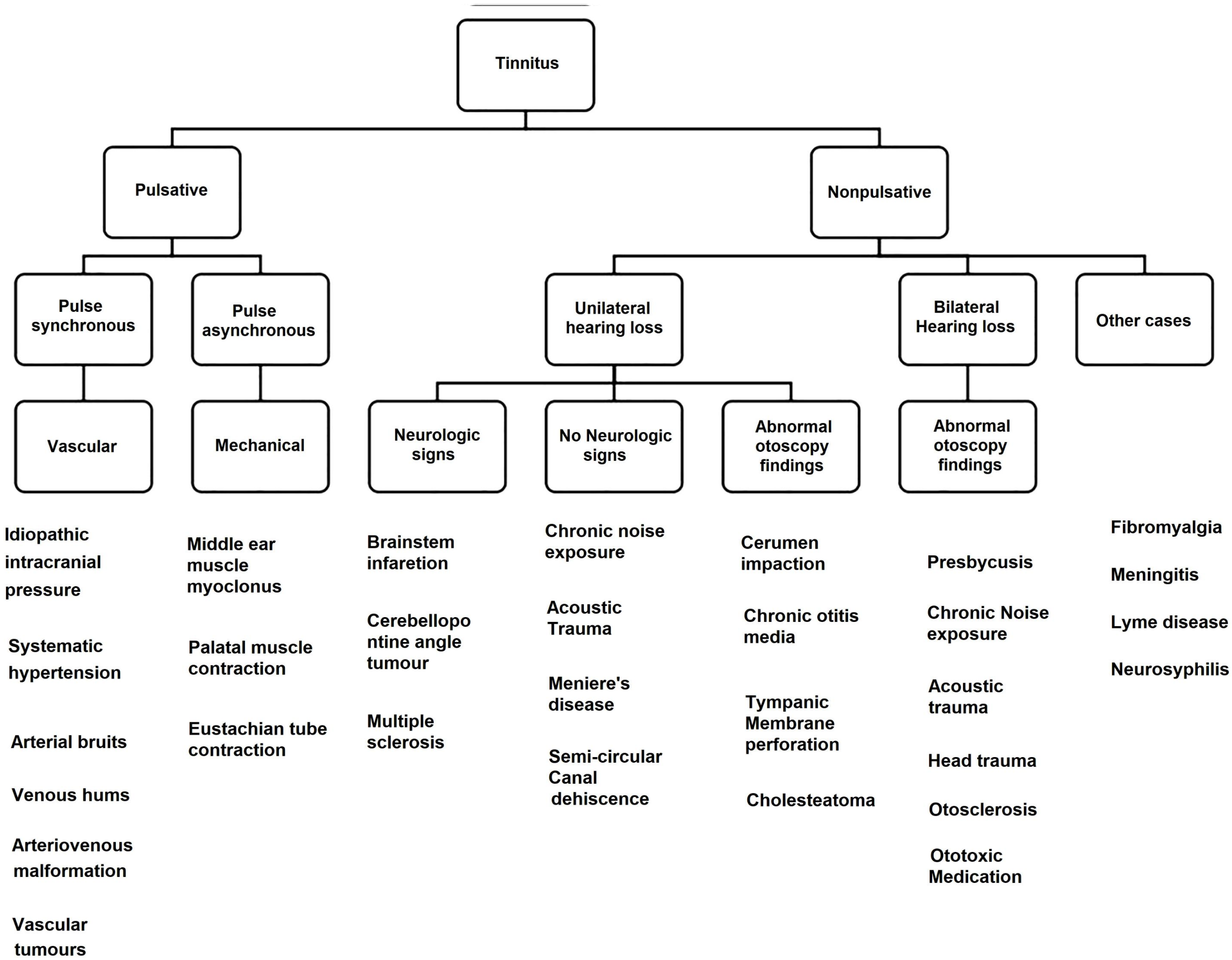

Fig 1: Differential diagnosis of tinnitus[25,27]

Any pathologic cut in the auditory path or decreased auditory nerve function can yield tinnitus.[16] The location of the hearing problem (i.e., in the middle or inner ear) and the otologic disorder causing the hearing loss do not appear to affect the etiologic potential.[4] Interestingly, most patients with tinnitus complain about a sensation of blockage or fullness in the middle ear, signifying a problem with middle ear pressure or augmented impedance of the ossicular chain.[33] One-sided high-frequency hearing damage combined with poor speech discrimination proposes the presence of a tumor, usually a vestibular schwannoma/acoustic neuroma or a meningioma.[31] Bilateral subjective tinnitus requires hearing assessment and can be associated with presbycusis, endolymphatic hydrops, noise-induced hearing loss, and a labyrinthine vascular lesion.[18] However, most one-sided tinnitus cases are unrelated to life-threatening otologic illness.[4] Small momentary changes in the outer hair cells (OHCs) following noise exposure can activate the appearance of tinnitus by aggregating the gain of the central auditory system.[5] In general, tinnitus characterizes a threshold phenomenon for which any one factor, such as chronic progressive hearing loss, is inadequate to elicit its emergence-two or more trigger factors (i.e., psychosocial stress, somatic and noise exposure factors) can act synergistically to produce symptomatic tinnitus.[12] About 75% of new cases are connected to emotional stress as the trigger factor rather than to precipitants, including cochlear lesions.[5]

6. PATHOPHYSIOLOGY

Both the peripheral and central nervous systems involved in the occurrence of tinnitus can be understood with the following:

6.1. Role of Peripheral System

Due to anatomical and physiological differences between outer hair cells (OHCs), inner hair cells (IHCs), and their relative neighborhood structures (tectorial membrane, stereocilia, etc.) and pathologies where there is relatively large damage to OHCs than IHCs, result in disinhibition of auditory neurons.[5,34] Tinnitus is perceived as an increase in spontaneous activity when auditory neurons receive excitation from IHCs but not from the damaged OHCs.[5] Normally, there is a small gap between the top of the IHC cilia and the bottom of the tectorial membrane. Still, in areas where OHCs are affected but IHCs are not, the tectorial membrane may contact the IHC cilia, causing the IHCs to depolarize.[6]

6.2. Role of Central auditory pathway

Due to its propensity to become hyperactive after exposure to tinnitus-causing substances such as loud sound and cisplatin, the Dorsal Cochlear Nucleus (DCN) has been suggested as a potential locus for the creation of tinnitus-related signals.[34] OHC injury causes the DCN to undergo plastic readjustments, which leads to DCN hyperactivity.[21] It is believed that a decrease in auditory nerve input causes the DCN to become less inhibited and the central auditory system to become more active spontaneously, which results in tinnitus.[36] This mechanism might account for the brief ringing that might occur after being exposed to strong noise.[37] Tinnitus with a delayed onset is caused by the slow plastic readjustments in the DCN. The central auditory pathway is more active physiologically when the cochlea is damaged.[38] Tinnitus is the auditory system's equivalent of the sense of a missing limb experienced by amputees, and auditory plasticity develops due to the abnormal route.[39] Tinnitus may be produced in the temporal lobe's inferior colliculus and auditory association cortex.[40,41] The development of abnormal connections between the auditory and sensory-motor systems in these patients' brains is likely the cause of some people's capacity to control tinnitus by executing voluntary somatosensory or motor acts.[42]

6.3. Role of other systems

The stimulated nonauditory structures also impact the DCN's activity. Still, only the somatosensory system appears to be connected to tinnitus like in temporomandibular-joint syndrome).[35,36] Latent-to-somatic interactions may become active and lead to somatic tinnitus.[13] Like otic tinnitus, somatic (craniocervical) tinnitus is brought on by disinhibiting the ipsilateral DCN. It is accomplished through nerve fibers whose cell bodies are located in the ipsilateral medullary somatosensory nuclei. The fasciculus cuneatus, the adjacent spinal trigeminal tract, and the facial, vagal, and glossopharyngeal nerve fibers that supply the middle and external ears with sensory information are among the sources of input for these neurons.[35] The CNS may also interpret pain signals from the cochlea sent by cochlear fibers as tinnitus.[42] Many who hear tinnitus for the first time do not connect the Sound with any negative connotations and go on to spontaneously become accustomed to it. Tinnitus may, however, result in significant degrees of discomfort or worry if the initial experience of it causes strong associations with unpleasant stimuli or times of stress and anxiety. Tinnitus can gradually worsen at the unconscious level without the patient being aware of it, which causes the limbic and autonomic nervous systems to function more actively.[43] Tinnitus becomes a clinically serious issue in such circumstances (Figure – 2).[44,45]

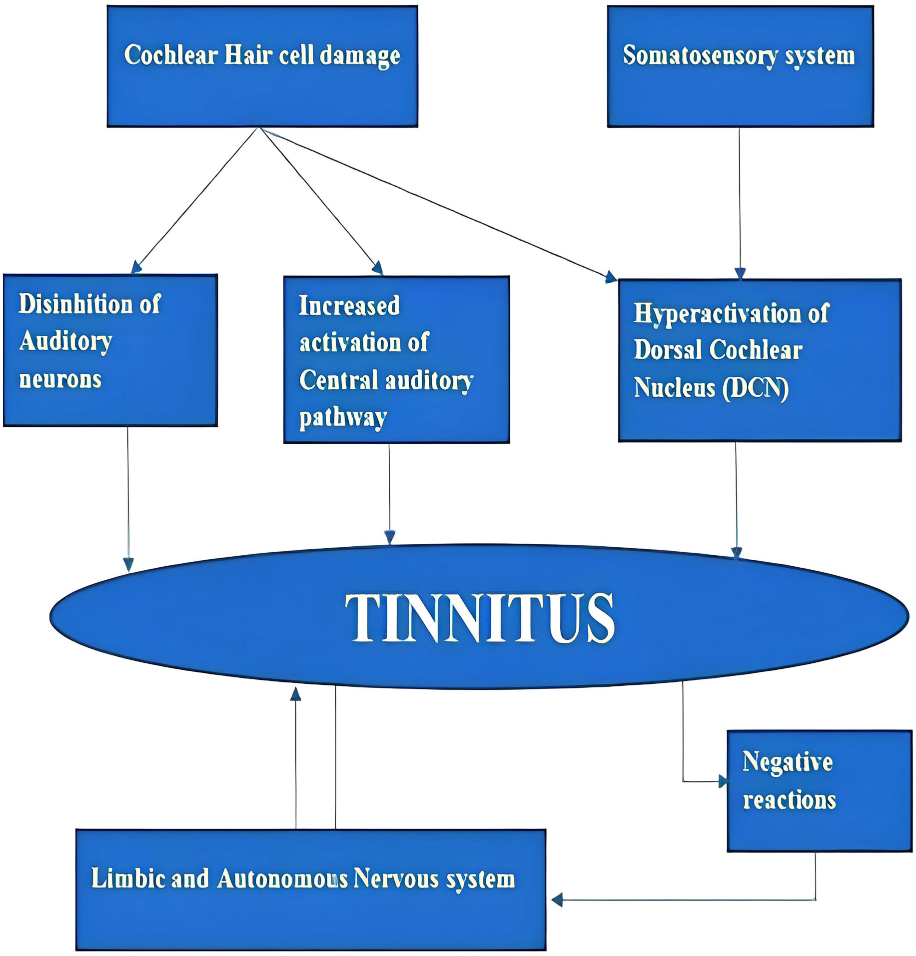

Fig 2: Pathophysiology of tinnitus[44,45]

7. TINNITUS AS A GLOBAL BURDEN

In a comprehensive review and meta-analysis of tinnitus incidence and prevalence, Jarach, Lugo, and Scala et al. '2022 found that more than 740 million people globally experience tinnitus, and more than 120 million people worldwide have a severe form of tinnitus. They also recommended that to advance tinnitus research and enhance the care and quality of life for individuals with tinnitus, health authorities and research organizations, such as the Global Burden of Disease, should consider this prevalence and play a leadership role in funding.[46]

8. TREATMENT

It is imperative to conduct a complete and effective assessment and evaluation of the ringing sensation of the ear(s) to establish a comprehensive and confident approach to managing tinnitus. The complete assessment procedure shall include an in-depth case history examination (which forms the building block of further diagnosis and treatment) through audiological evaluation, tinnitus analysis, and appropriate referrals to facilitate a team approach.[1,4,5,13,43] The tinnitus evaluation shall include tinnitus severity measurement (figure - 3 and Appendix - A), differential diagnosis and identification of etiological factors (figure - 4), and residual inhibition of tinnitus.[45]

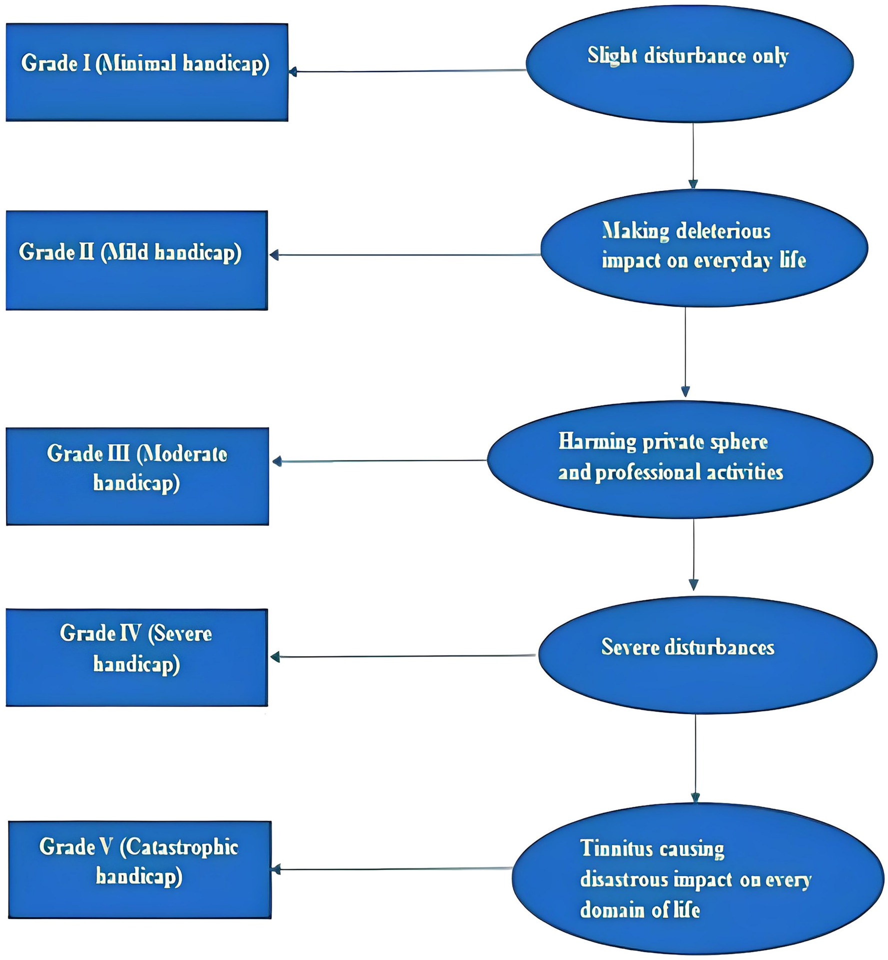

Fig 3: Tinnitus severity measurement[47]

Tinnitus management can be separated into two categories: 1) Those aimed at directly dropping the strength of tinnitus and 2) Those aimed at releasing the annoyance related to tinnitus. The former includes electrical suppression[47], and the latter includes pharmacotherapy, pharmacotherapy, behavioral therapy, habituation therapy[48], hearing aids, massage, and stretching.

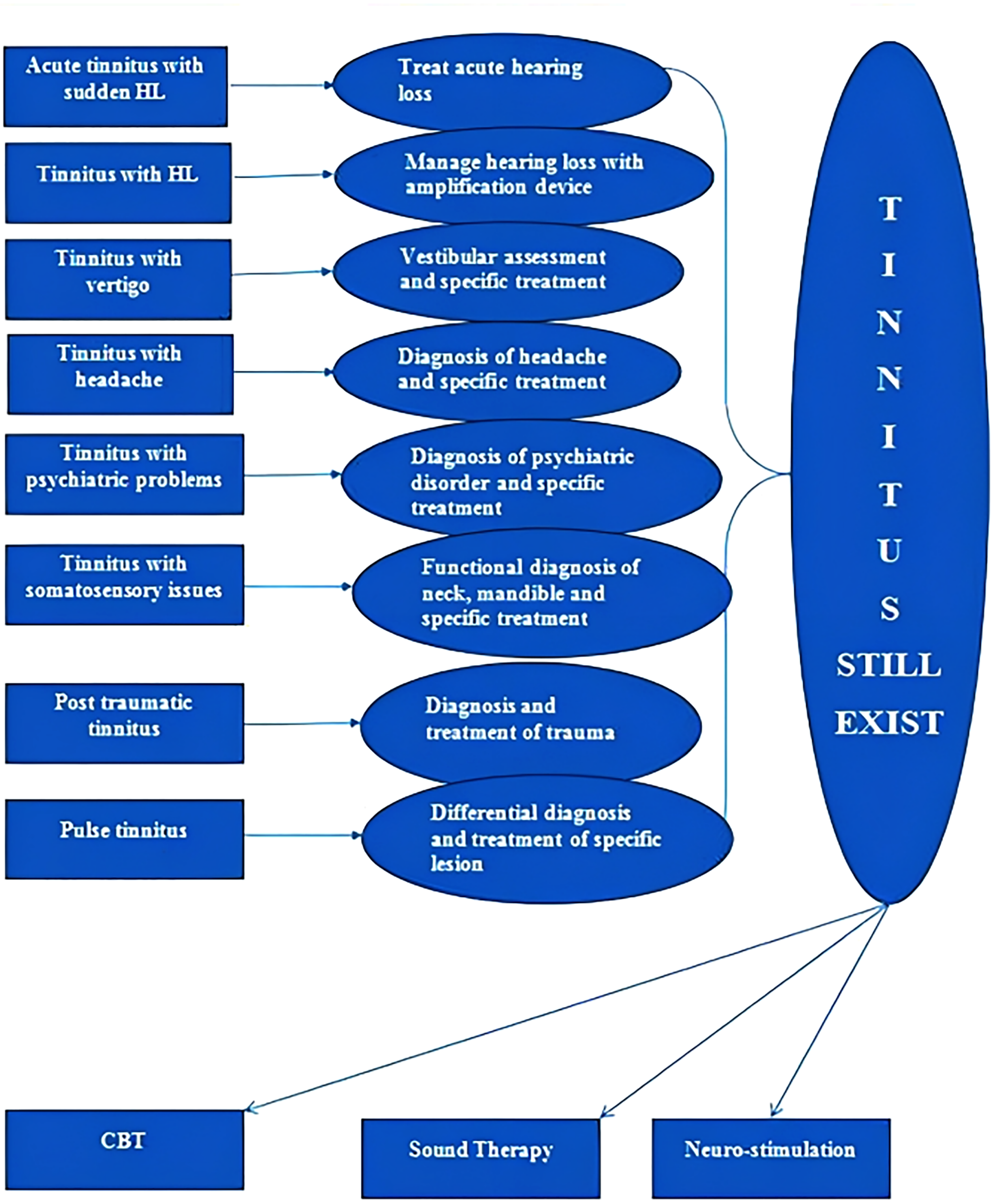

Fig 4: Identification of etiological factors[47]

9. PREVENTION OF TINNITUS

It is always said that prevention is better than cure. Furthermore, due to uncertainty in tinnitus treatment, taking precautionary measures to prevent tinnitus is optimal. These measures should be taken at primary and secondary levels.[25]

9.1. *Primary and secondary prevention*

SNHL typically brings on tinnitus, and due to the irreversible nature of SNHL, primary prevention is essential. Hence, intense music, noise exposure, and long usage of earphones should be avoided.[49] Moreover, the inserted earphones or circum-aural headphones can attenuate the sound exposure.[50] Employers must be aware of occupational exposure limits, use frequent monitoring audiometry examinations and mandate suitable hearing protection in order to prevent noise damage in the workplace. Age-related hearing loss is more likely a result of dietary variables, including hypercholesterolemia and an increased glycemic load. Dietary modifications to lower cholesterol and carbohydrate intake may help to prevent or delay the start of SNHL.[51]

10. CONSERVATIVE MANAGEMENT

To ease symptoms and enhance the quality of life, conservative therapy approaches for persistent and troublesome tinnitus might be considered first. These include modifying one's way of life to enhance sleep, lessen stress, and consume less alcohol and caffeine.[25,52]

10.1. *Pharmacotherapy*

The inner ear contains neurokinin receptors, which could be a therapeutic target for tinnitus. The neurokinin-1 receptor, which typically binds substance P, is antagonistic to the vestipitant. For treating patients with tinnitus, the vestipitant and the combination of paroxetine and vestipitant are currently undergoing clinical trials.[47,53] A nonsterile patch (LidoPAIN TV, EpiCept) has been created for the delivery of lidocaine when applied over preauricular skin. Trials are being conducted to determine its clinical efficacy. Neramexane is an NMDA antagonist that blocks the nicotinic cholinergic receptors found on the inner ear hair cells in a non-competitive, voltage-dependent, nonselective manner. Clinical trials are also being conducted on this medication to evaluate its safety, tolerability, and efficacy.[47,54] Single agent is ineffective in tinnitus treatment. Hence efforts are required to develop a combination of medications that might include anticonvulsants, antianxiety medicines, antidepressants, antihistamines, antiarrhythmic agents, local anesthetics, vasodilators, tranquilizers, vitamin pills, and ginkgo biloba extracts.[55,56] Extensive reviews of randomized clinical trials have revealed that only nortriptyline, oxazepam, alprazolam, and clonazepam are more beneficial than placebo.[57,58] Dobie et al. stated that nortriptyline was statistically greater than placebo, although placebo was also effective.[59] Podoshin et al. reported that amitriptyline was greater than placebo concerning interference and sleep disturbance with activities.[60] Johnson et al. reported that alprazolam was more operative than placebo in dropping tinnitus intensity.[61] Lechtenberg and Shulman pointed out that clonazepam and oxazepam were operative in more than 50% of tinnitus cases.[62] However, when patients halted taking either of these drugs, tinnitus reappeared to its previous level or a worse level.[62] The only medication delivering a reliable reduction of tinnitus is intravenous lidocaine, and there is a close association between the effects of oral carbamazepine and lidocaine. [24] Intravenous lidocaine alters the neural activity in the right temporal lobe in the hearing association cortex.[52] Regrettably, lidocaine cannot be utilized clinically because it must be inserted, its effects are of short duration, and it frequently produces adverse side effects.[58] Tocainide, an oral antiarrhythmic drug closely related to lidocaine, is not beneficial.[63] Tinnitus due to SOAEs can be reduced by aspirin.[64] A recent 3-month randomized clinical trial including 50 patients found that acamprosate, a drug used to treat alcoholism, was more advantageous than a placebo.[65] Flecainide, mexiletine, carbamazepine, betahistine, ginkoba extract, baclofen, amylobarbiturate, zinc, lamotrigine, misoprostol, flunarizine, cinnarizine, caroverine, melatonin, eperisone, are no more beneficial than placebo.[57] Diazepam and flurazepam meaningfully change the tinnitus intensity.[58]

10.2. Cognitive and behavioral therapy

Cognitive therapy concentrates on how one thinks about tinnitus and the evasion of negative ideation, whereas behavioral treatment uses the methodical desensitization approach applicable to many fears.[66] Cognitive therapy includes teaching patients to handle their tinnitus by swapping negative thinking with more positive thinking. Cognitive therapy contains cognitive restructuring and counseling. Counseling should comprise of 1) informing patients that it is unlikely that their annoyance with tinnitus will improve dramatically, 2) notifying patients about the practicality of tinnitus self-help groups, 3) serving patients to curtail the time dedicated to activities and conditions in which the tinnitus intensity is increased and to maximize the time devoted to conditions/ activities in which the tinnitus strength is reduced, and 4) stressing the evasion of noise introduction, since noise-induced hearing impairment and tinnitus are connected.[19] Cognitive restructuring includes changing thoughts related to tinnitus. In this setting, patients are reinvigorated to accept that tinnitus does not deserve all the consideration it gets.[67] Behavioural therapy focuses on positive imagery, control, attention, and relaxation training.[66] Positive imagery includes focusing thoughts on something enjoyable and averting thoughts from tinnitus. Patients begin with agreeable auditory images (e.g., the sound of waves or wind through the leaves) and visual images (e.g., lying on a beach) [66] Attention control includes moving consideration away from the tinnitus when it is troublesome. This process might begin with inserting two pictures next to one another and then bestowing two acoustic stimuli (e.g., a fan noise and conversational speech) emanating from an adjacent room. Next, tinnitus and a picture are paired, followed by the coupling of thought and tinnitus.[66] Relaxation training practices a guided procedure to teach members to apply progressive muscle relaxation, which includes tensing and relaxing the face, arms, neck, abdomen, shoulders, legs, and feet.[66]

10.3. Sound Therapy

Sound therapy utilizes sounds found in natural surroundings, including those associated with waterfalls, streams, rain, and wind, to reduce the strength of the tinnitus-related neuronal movement within the auditory system.[68] To this conclusion, the neuronal background movement in the auditory system is improved by revealing the patient to a continuous, low-level, neutral sound[20] that is not annoying, nonintrusive, and easy to overlook. Such a sound should not be evocative, pleasant, or affecting in a way that attracts consideration, making listening to the radio, television, or music inapt.[5] Neutral sounds should not be overwhelming and be stable; therefore, the sounds of waves are not suggested.[20] Some patients are unfocused by the sounds of crickets, bird calls, or thunderstorms; hence, care is required when applying these sounds.[68] Sound therapy can engage various sound causes, such as compact disc players and tabletop sound machines. The sound concentration should be at or under the level at which the patient can observe the tinnitus and the external sound distinctly.[20] The sound must be applied consensually to evade asymmetrical stimulation of the auditory system because motivating only one side in one-sided tinnitus frequently results in a shift of the apparent location of the tinnitus to the conflicting side due to strong connections within the auditory paths. Occlusion with ear plugs should be diminished by using open-ear molds to allow normal access of environmental sounds to the ear.[5] Proper treatment during the night can support individuals without sleep problems because the auditory paths are fully active up to the level of the mediocre colliculi during sleep.[20] Based on a report that the unceasing sound exposure upsurges blood flow to the inner ear of rats,[69] sound therapy might distress the physiology of the human cochlea.

10.4. Hearing aids

Hearing aids signify another form of Sound therapy that is usually helpful to tinnitus patients with significant hearing impairment.[68] Hearing aids are premeditated to improve speech's loudness and intensify ambient sounds. Intensification of speech diverts attention away from tinnitus, and strengthening of other ambient sounds partially masks tinnitus. Hearing aids are improper for those with hearing loss limited to above 6 kHz because most hearing aids have limited high-frequency augmentation abilities.[70] The use of hearing aids can forever reduce the neural activity responsible for tinnitus perception and generation and usually characterizes the first intervention for patients with hearing damage.[70]

10.5. Music therapy

Music therapy is a desensitization technique that uses music that has been spectrally changed according to the hearing features of each patient to allow the masking of tinnitus and to ease relaxation at a relaxed listening level.[71] Music directly touches the limbic system, avoiding the slower linguistically based dispensation in the auditory cortex.[71] Hearing thresholds decay considerably above 3 kHz among many tinnitus patients, and hence the spectral alteration should include reducing the energy of lower frequency constituents of the music.[71]

10.6. Tinnitus retraining therapy

Tinnitus retraining therapy (TRT) is a familiarisation therapy designed to help tinnitus sufferers. TRT mainly marks nonauditory systems, particularly the autonomic and limbic nervous systems, and is based on the supposition that tinnitus represents a side effect of the usual compensatory mechanisms in the brain. TRT uses occurring mechanisms of plasticity in the brain to achieve familiarisation with the physiological reactions to tinnitus and, then, to achieve habituation to the very observation of tinnitus.[5] Habituation is typically obtained by repeating the sensory stimulus. However, this method cannot be directly applied to tinnitus because it is impossible to eliminate the reactions of the autonomic nervous system that act as a negative strengthening. Therefore, TRT involves decreasing both the reinforcement and the stimulus, even though these remain existing.[5]
TRT contains two components: sound therapy and retraining counseling. Reorientation and counseling aim to assist patients in thinking of their tinnitus as a type of neutral Sound.[5] Neutralizing tinnitus is achieved by screening the patient to ensure tinnitus is not related to threatening pathology.[20] The creation of positive relations with tinnitus represents a supplementary way of counteracting tinnitus. Explanations such as tearing, screeching, and steam jets should be replaced by kind, more peaceful descriptions, such as "music of the brain".[5] Sound therapy aims at easing habituation at an unconscious level by lessening the strength of the signal. The addition of Sound decreases the difference between tinnitus and background sounds.[5] However, TRT requires about 18 months to achieve noticeable stable effects, and this time-consuming behavior only achieves satisfactory results in some patients. TRT requires discipline and patience from both the patient and a well-informed and knowledgeable professional.[31]

10.7. Massage and stretching

Massage and stretching of the masticatory muscles and the neck have been related to significant development in tinnitus.[57] Patients with somatic tinnitus can have indications of cervical spine illnesses, including head, shoulder and neck as well as limitations in sideways rotation and bending. Treating neck and jaw disorders has beneficial effects on tinnitus. Inoculating lidocaine into jaw muscles, such as the side pterygoid, also reduces tinnitus.[72]

10.8. Electrical suppression

The electrical stimulation of the cochlea with trains of beats at 5,000 pulses per second can considerably or completely overpower tinnitus with either no perception or only a transient awareness of the stimulus. Stimulus with electrical beats at such a high rate restores spontaneous-like patterns of spike activity in the auditory nerve, which could explain how it overpowers tinnitus.[73] Transcutaneous electrical nerve stimulus of areas of skin close to the ear upsurges the activation of the DCN via the somatosensory path and could expand the inhibitory role played by this nucleus on the CNS, thereby upgrading tinnitus.[74]

10.9. Magnetic Stimulation

Transcranial magnetic stimulation has been proposed as a novel and non-invasive treatment for persistently bothersome tinnitus; however, it is only currently being tested in research trials. The overstimulation of the subcortical auditory pathway is the basis of the current theory of tinnitus. It has been proposed that low-frequency electromagnetic pulses from transcranial magnetic stimulation can help lower neural activity in the patient's directly stimulated and structurally connected brain regions.[25,75-78]

11. SURGICAL MANAGEMENT

Tinnitus sufferers rarely undergo surgical management, which is only applied when curable underlying causes exist.[25,79] These include endolymphatic sac shunting for Menieres illness, stapedotomy for otosclerosis, and surgical removal of acoustic neuromas and other brainstem or cerebellopontine angle tumors and lesions. Surgery can also treat the tensor tympani and stapedius myoclonus syndromes by sectioning the afflicted muscles.[25,80]

Name ______________________________
Date: ______________________________

Appendix - A: Tinnitus Handicap Inventory (THI)
TINNITUS HANDICAP INVENTORY (THI)

1. Because of your tinnitus, is it difficult to concentrate?	• Yes (4)	• Sometimes (2)	• No (0)
2. Does the loudness of your tinnitus make it difficult for you to hear people?	• Yes (4)	• Sometimes (2)	• No (0)
3. Does your tinnitus make you angry?	• Yes (4)	• Sometimes (2)	• No (0)
4 . Does your tinnitus makes you feel confused?	• Yes (4)	• Sometimes (2)	• No (0)
5. Because of your tinnitus, do you feel desperate?	• Yes (4)	• Sometimes (2)	• No (0)
6. Do you complain a great deal about your tinnitus?	• Yes (4)	• Sometimes (2)	• No (0)
7 . Because of your tinnitus, do you have trouble sleeping at night?	• Yes (4)	• Sometimes (2)	• No (0)
8. Do you feel as though you cannot escape your tinnitus?	• Yes (4)	• Sometimes (2)	• No (0)
9. Does your tinnitus interfere with your ability to enjoy social activities (such as going out to dinner or the movies)?	• Yes (4)	• Sometimes (2)	• No (0)

10 . Because of your tinnitus, do you feel frustrated?	•	Yes (4)	•	Sometimes (2)	•	No (0)
11. Because of your tinnitus, do you feel you have a terrible disease?	•	Yes (4)	•	Sometimes (2)	•	No (0)
12. Does your tinnitus make it difficult for you to enjoy life?	•	Yes (4)	•	Sometimes (2)	•	No (0)
13. Does your tinnitus interfere with your job or household responsibilities?	•	Yes (4)	•	Sometimes (2)	•	No (0)
14. Because of your tinnitus, do you find that you are often irritable?	•	Yes (4)	•	Sometimes (2)	•	No (0)
15. Because of your tinnitus, is reading difficult for you?	•	Yes (4)	•	Sometimes (2)	•	No (0)
16 . Does your tinnitus makes you upset?	•	Yes (4)	•	Sometimes (2)	•	No (0)
17. Do you feel your tinnitus problem has stressed your relationships with family and friends?	•	Yes (4)	•	Sometimes (2)	•	No (0)
18. Do you find it difficult to focus your attention away from your tinnitus and on other things?	•	Yes (4)	•	Sometimes (2)	•	No (0)
19. Do you feel that you have no control over your tinnitus?	•	Yes (4)	•	Sometimes (2)	•	No (0)
20. Because of your tinnitus, do you often feel tired?	•	Yes (4)	•	Sometimes (2)	•	No (0)
21. Because of your tinnitus, do you feel depressed?	•	Yes (4)	•	Sometimes (2)	•	No (0)
22. Does your tinnitus make you feel anxious?	•	Yes (4)	•	Sometimes (2)	•	No (0)
23. Do you feel you can no longer cope with your tinnitus?	•	Yes (4)	•	Sometimes (2)	•	No (0)
24. Does your tinnitus get worse when you are under stress?	•	Yes (4)	•	Sometimes (2)	•	No (0)
25. Does your tinnitus make you feel insecure?	•	Yes (4)	•	Sometimes (2)	•	No (0)

The sum of all responses is your THI Score >>>

- 0-16: Slight or no handicap (Grade 1)
- 18-36: Mild Handicap (Grade 2)
- 38-56: Moderate Handicap (Grade 3)
- 58-76: Severe handicap (Grade 4)
- 78-100: Catastrophic Handicap (Grade 5)

12. CONCLUSION

We all need to know about tinnitus for knowledge and to build cognizance among our budding audiologists and allied health professionals. Tinnitus perilously degrades one's life quality and could have multiple causes. The first task for an audiologist is to identify the symptoms and nature of the course of tinnitus, whether chronic/acute or continuous/intermittent. Here, we also mentioned the Tinnitus handicap inventory (THI). This scale helps measure the severity and deterioration in the quality of life of a person with tinnitus. Discussing the treatment options available, some options are easily available at our home, and a few approaches require the involvement of a healthcare professional. Pharmacotherapy contains the use of drugs that respond to neurokinin receptors that are present in the inner ear and could easily target tinnitus. Hearing aids are other alternatives for tinnitus patients as they can serve as a masker for tinnitus, but they are not an efficient option for higher frequencies. Tinnitus retraining therapy (TRT) focuses on attaining habituation among tinnitus patients. But this approach requires a minimum of 18 months for a noticeable stable effect, occurring together with retraining counseling of the patient. Other therapeutic approaches involve electrical suppression and magnetic stimulation to reduce the effect of tinnitus. Still, both of these methods are under clinical trials for a better non-invasive management option. Sound therapy and music therapy are the most accessible choices available for everyone. Concluding here, this article will create a better comprehension for identifying, evaluating, and serving better interventions for tinnitus, improving one's quality of life.

13. AUTHORS CONTRIBUTION STATEMENT

Dr. Vivek Kumar Jha contributed to this study's design, idea, and implementation. The flow chart was prepared by Mr. Puneet Kapoor and Mr. Yogeshwar Prasad, and Ms. Sheena completed the final manuscript proofreading.

14. CONFLICT OF INTEREST

Conflict of interest declared none.

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