Short Communication

What Clinicians Should Know About Tinnitus: A Brief Review

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Abstract

Tinnitus is the perception of sound without an external source, commonly stated as a “buzzing” or “ringing” in the ears. The causes of tinnitus are hearing loss, somatosensory system dysfunction, and auditory cortex lesions. In most cases, serious underlying pathologies are rare. The most common cause is hearing loss. However, hearing loss does not always lead to tinnitus, and tinnitus patients do not always have hearing loss. The first is explained by the “inhibitory gating mechanism” and the latter that all tinnitus sufferers are assumed to have some degree of hearing impairment which is not sometimes detected by standard audiological examinations. Recent popular treatments are pharmacotherapy, education, counseling, cognitive behavioral therapy, and sound therapy. The treatment goals should be aimed at symptomatic relief or the management of associated distress.

INTRODUCTION

This article provides a brief review of what is presently known about tinnitus, including causes, mechanism, and treatments.

MATERIALS AND METHODS

Recent literatures related to tinnitus were reviewed and summarized.

RESULTS AND DISCUSSION

The causes of tinnitus are hearing loss, somatosensory system dysfunction, and auditory cortex lesions [1-5]. The most common cause of tinnitus is hearing loss, so that mechanism of tinnitus is usually explained by starting from hearing loss.

It is believed that abnormal auditory signals activate neural plasticity within the central auditory structures, and this can be expressed as tinnitus [6]. All tinnitus patients are usually assumed to have some degree of hearing impairment which is not detected by standard audiological examination [2]. Why some people with hearing loss never develop tinnitus can be explained by the “inhibitory gating mechanism” or a “noise cancelation system” [2]. Under normal circumstances, the tinnitus signal is cancelled out at the level of the thalamus by an inhibitory feedback loop originating in paralimbic structures [2]. If this mechanism malfunctions, inhibition is lost and the signal is relayed to the auditory cortex where it is perceived as tinnitus [7]. This dysfunction could be a consequence of an overloading of the paralimbic system [2]. The overload can be caused by triggering factors including negative life events, emotional stress, noise-exposure and somatic factors [6,8-10]. Therefore, cochlear damage alone is not sufficient for understanding tinnitus, but additional factors such as emotion or memory are needed [2,11]. The causes and mechanism are depicted in Figure 1.

Recent popular treatments for tinnitus are pharmacotherapy, education, counseling, cognitive behavioral therapy, and sound therapy. Acamprosate, antidepressants, alprazolam, and clonazepam were, at one time, believed to be effective treatments for tinnitus [12-17]. But the American Academy of Otolaryngology guidelines recommends against the routine use of pharmacotherapy, and, at present, there are no FDA-approved pharmacological treatments for this condition [18]. Education should emphasize that tinnitus itself is a symptom and not a dangerous disease, and a comprehensive assessment can exclude any associated medical conditions that require prompt treatment [18]. Counseling should include information on the association between tinnitus and hearing loss, and should also discuss lifestyle factors that can have positive and negative effects on tinnitus management [18]. The border between ordinary clinical counseling and formal psychotherapy is indistinct [13]. Much of what the clinician says to the patient equates to educational counseling [19]. Cognitive behavioral therapy is a brief psychological treatment that teaches skills to identify negative thoughts that result in distress and restructure them so the thoughts are more accurate or helpful [18,20]. Sound therapy is defined as any use of external sound intended to suppress perception of tinnitus or reaction to tinnitus [18]. The devices used to create external sounds include sound generators, hearing aids, or a combination of these devices (a hearing aid plus a noise generator) [21].

CONCLUSION

In most common cases, serious underlying pathologies are
Figure 1  Causes and mechanism of tinnitus. Causes of tinnitus are hearing loss, somatosensory system dysfunction, and auditory cortex lesions [1]. The most common cause of tinnitus is hearing loss [2]. Somatosensory stimuli disinhibit the ipsilateral cochlear nucleus, producing the excitatory neuronal activity within the auditory pathway that results in tinnitus [3]. Damage to the brain cortex related to auditory perception alone can lead to tinnitus without contribution from peripheral influences such as hearing loss [4]. The “inhibitory gating mechanism” blocks the tinnitus signal at the level of the thalamus [5]. An inhibitory feedback loop originates in paralimbic structures.

rare. Thus, if serious medical disease is excluded, treatment goals should be aimed at symptomatic relief or the management of the associated distress [11].

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REFERENCES