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Review Article

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General Overview of Tinnitus in Children: Prevalence, Etiology, and Management Strategies

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Abstract

Tinnitus is defined as the perception of sound in the absence of an external auditory stimulus. Although it has been extensively studied in adults, tinnitus is also commonly observed in children. Detecting tinnitus in children can be challenging, especially in younger age groups, as they may struggle to describe the sounds they perceive. Consequently, the true prevalence of pediatric tinnitus remains uncertain; however, studies suggest that tinnitus may be more common among children than previously estimated. This review article examines the prevalence, etiological factors, diagnostic methods, and management strategies associated with tinnitus in children. Major contributing factors include hearing loss, noise exposure, neurological and psychological conditions, ototoxic medication use, and genetic predisposition. Early diagnosis is critical due to the possible negative effects of tinnitus on children's academic performance, social integration, and emotional development. Audiological evaluations, psychosocial assessment tools, and innovative play-based methods are recommended as effective strategies for diagnosing tinnitus in pediatric populations. Current management approaches prioritize education and counseling, sound therapy, psychological support, and other non-pharmacological interventions. Further long-term studies and the development of pediatric-specific diagnostic and treatment protocols are needed to better understand and manage tinnitus in children.

Keywords: Audiology, Childhood, Diagnosis, Management, Pediatric tinnitus

Methodology

This systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A comprehensive search was performed across four electronic databases: PubMed, Scopus, Web of Science, and Cochrane Library. The search covered publications from January 2010 to March 2024. The following keywords and their combinations were used: "pediatric tinnitus", "childhood tinnitus", "prevalence", "etiology", "diagnosis", and "management strategies".

Inclusion criteria were:

- Studies published in English.
- Population involving children aged 0–18 years.
- Articles focusing on tinnitus prevalence, etiology, diagnosis, or management in children.

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Exclusion criteria were:

- Studies on adult populations only.
- Single case reports, editorials, and animal studies.
- Studies lacking specific data on pediatric tinnitus.

After removing duplicates, 500 articles were screened by title and abstract. Of these, 350 were excluded based on relevance. The full text of 150 articles was assessed, and 22 met all inclusion criteria and were included in the final analysis. The selection process is illustrated in a PRISMA flow diagram (Figure 1). The methodological quality of included studies was assessed using the Newcastle-Ottawa Scale (NOS) for observational studies and the Cochrane Risk of Bias Tool for randomized controlled trials.

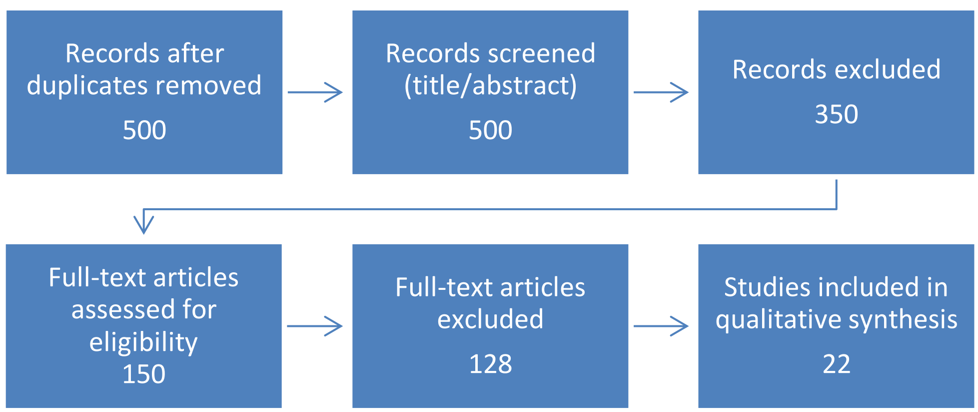

Figure 1. *The selection process is illustrated in a PRISMA flow diagram*

Introduction

Tinnitus, though typically associated with adults, is a significant condition in children and can negatively impact quality of life [1]. It is defined as the perception of sound such as ringing, buzzing, or hissing without any external source. In young children, especially those under six, describing such internal auditory experiences can be particularly difficult, which makes it harder for caregivers and healthcare providers to recognize the condition [2].

Studies have reported that the prevalence of tinnitus in children with normal hearing ranges from 6% to 29%. In children with hearing loss, this rate increases to between 34% and 66% [3,4]. Exposure to environmental noise and the presence of hyperacusis further elevate this risk, with some reports indicating prevalence rates as high as 72.6% among children with hyperacusis [5].

Beyond auditory symptoms, tinnitus can significantly impact children's emotional and social well-being. It has been linked to academic difficulties, sleep disturbances, attention problems, social withdrawal, anxiety, and depression [6,7]. To better understand and diagnose tinnitus in pediatric

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populations, clinicians often rely on a combination of audiological evaluations and psychosocial assessment tools, including child-specific, game-based tests and visual analog scales [8,9].

Effective management of pediatric tinnitus involves a multidisciplinary approach that may include sound therapy, counseling, psychological interventions, and the use of hearing aids when necessary. Despite available options, more research is needed to develop standardized treatment protocols tailored to the pediatric population [10,11].

This review aims to synthesize current literature on pediatric tinnitus prevalence, etiology, diagnostic methods, and management strategies, highlighting the importance of early identification and intervention, and paving the way for future research in this domain.

Prevalence

Although tinnitus is less frequently reported in children compared to adults, studies indicate that it is more prevalent than previously estimated. Due to the difficulty many children experience in articulating their symptoms, the actual prevalence may be underreported.

Children with Normal Hearing

The prevalence of tinnitus in children with normal hearing ranges from 6% to 29% [1]. A study conducted in the United Kingdom reported a prevalence rate of 17% among children aged 8–16 years [2]. In Finland, 11% of children aged 7–12 years were found to experience tinnitus [3].

Children with Hearing Loss

Children with moderate to severe hearing loss showed a tinnitus prevalence of 34% to 66% [4]. Additionally, more than 40% of pediatric hearing aid users reported tinnitus complaints [5].

Children Exposed to Noise

Factors such as listening to loud music, attending concerts, or prolonged environmental noise exposure increase the risk of tinnitus. The prevalence ranges from 12% to 25% among these children [6]. A study from Brazil found tinnitus in 21% of children who listened to music at high volumes through headphones [7].

Children with Specific Neurological or Psychological Conditions

Spontaneous tinnitus was reported in 72.6% of children with hyperacusis [8]. Children diagnosed with attention deficit hyperactivity disorder (ADHD) exhibited a higher prevalence of tinnitus compared to the general pediatric population [9].

Age and Gender Differences

Tinnitus is reported less frequently among younger children (0–6 years), primarily due to communication difficulties and lack of awareness [10]. A slightly higher prevalence has been observed in boys; however, this difference has not been found to be statistically significant [11].

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Reasons for Prevalence Variability

Assessment methods: The use of different diagnostic tools such as questionnaires, audiological tests, or clinical interviews may result in variability [12]. Population characteristics: Differentiating between children with normal hearing and those with hearing loss affects study outcomes [13]. Cultural and environmental factors: Noise levels, headphone usage habits, and healthcare access vary between countries and can influence prevalence data [14].

Population	Minimum Prevalence (%)	Maximum Prevalence (%)
Normal hearing	6.0	29.0
Hearing loss	34.0	66.0
Noise exposure	12.0	25.0
Hyperacusis	72.6*	72.6*

Table 1. Prevalence Range of Tinnitus in Children According to Studies [8].

*Data available from a single study reporting tinnitus prevalence in children with hyperacusis.

Etiology

The causes of tinnitus in children are often complex and multifactorial, frequently involving co-existing audiological, neurological, and psychological factors. Identifying the primary cause is crucial for effective individualized management [20].

Audiological Factors

Hearing Loss (HL) is the most common predisposing factor for pediatric tinnitus. Sensorineural hearing loss (SNHL) is particularly associated with persistent tinnitus, hypothesized to result from maladaptive plasticity in the central auditory system following reduced auditory input [21]. Conductive hearing loss, often temporary and related to otitis media (middle ear infection), can also cause transient tinnitus in children [22].

Noise Exposure

Loud noise exposure, particularly recreational noise from personal listening devices (PLDs), video games, and concerts, is a growing cause of both temporary and permanent tinnitus in the pediatric population [12]. Chronic exposure can lead to cochlear damage and subsequent central auditory pathway changes.

Neurological and Systemic Conditions

Tinnitus in children may be a symptom of underlying neurological issues.

- Hyperacusis: An abnormal sensitivity to everyday sounds, often co-occurs with tinnitus and is thought to share central auditory pathophysiology [13].
- Head or Neck Trauma: Injuries can directly affect the auditory system or cause vascular changes that result in pulsatile tinnitus.
- Vestibular Disorders and Migraine: These conditions can be associated with episodic tinnitus.

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• Attention Deficit Hyperactivity Disorder (ADHD): Children with ADHD show a higher prevalence of tinnitus, suggesting potential overlapping neurophysiological mechanisms [9].

Ototoxic Drugs and Genetics

Exposure to ototoxic medications (such as certain antibiotics or chemotherapy agents) can damage cochlear hair cells, leading to both hearing loss and the onset of tinnitus [10]. Furthermore, research suggests that genetic predispositionmay play a role in central auditory processing differences that increase a child's susceptibility to developing chronic tinnitus.

Diagnosis And Evaluation

Diagnosing tinnitus in children requires a child-friendly and multidisciplinary approach. Due to developmental and communication limitations, especially in younger children, traditional adult-based assessment tools may not always be effective [9]. Therefore, clinicians should involve families in the history-taking process and utilize specialized pediatric techniques.

A detailed clinical history is essential, including the onset, duration, and intensity of tinnitus, and any associated symptoms such as hearing loss or dizziness [5]. Audiological evaluations are fundamental, encompassing pure-tone audiometry to determine hearing thresholds [6], otoacoustic emissions (OAEs) to assess cochlear function [7], and auditory brainstem response (ABR) testing to evaluate the integrity of auditory neural pathways. These objective tests help distinguish between peripheral and central causes of tinnitus.

Additionally, psychosocial evaluations are critical for understanding the impact of tinnitus on the child’s emotional and behavioral well-being. Visual analog scales (VAS) can help quantify the subjective experience of tinnitus [8], while drawing-based or observational techniques may provide insights for children who cannot verbalize their symptoms effectively. Behavioral observations in school or home settings also assist in identifying functional impairments.

Management Strategies

Effective management of pediatric tinnitus requires individualized, multidisciplinary strategies. These include education, sound therapy, psychological support, and assistive hearing technologies [10].

Education and counseling play a central role in reducing anxiety and improving understanding of the condition. Educating families and teachers about tinnitus helps build support systems, especially in school environments [9]. Sound therapy using white noise devices or nature sounds can mask tinnitus, making it less intrusive [10]. In children with hearing loss, hearing aids can reduce tinnitus perception by amplifying environmental sounds.

Psychological interventions such as Cognitive Behavioral Therapy (CBT) have shown effectiveness in helping children manage distress associated with tinnitus. CBT focuses on altering negative thoughts and improving coping strategies [11]. Relaxation techniques and mindfulness practices are also beneficial in alleviating symptoms and enhancing sleep quality.

Method	Effectiveness
Education and Counseling	High
Sound Therapy	Moderate
Psychological Support	High

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Hearing Aids	Moderate-High
White Noise Devices	Moderate

Table 2. Effectiveness of Management Methods [10,11]

Conclusion and Recommendations

Tinnitus in children is often overlooked but can significantly affect quality of life. When undiagnosed or unmanaged, it may negatively influence auditory, cognitive, and emotional development, leading to long-term consequences in academic achievement, social interaction, and mental health [15].

Early identification and appropriate management of tinnitus in children are critical for improving quality of life. A multidisciplinary approach involving audiologists, ENT specialists, psychologists, educators, and parents is essential for comprehensive care. This review provides guidance for clinical practice and aims to inform future research directions.

Recommendations and Future Research Areas:

- Enhancing diagnostic processes: Develop child-friendly assessment tools such as play-based scales, pediatric-specific questionnaires, and digital evaluation methods. The integration of both subjective and objective tools will improve diagnostic accuracy [16].

- Developing more effective interventions: Further research is required to assess the effectiveness of current management approaches, including sound therapy, psychological support, cognitive behavioral therapy (CBT), and white noise devices in pediatric populations. Longitudinal studies should be conducted on the use of hearing aids and sound masking devices for children with tinnitus [17].

- Increasing psychosocial and educational support: School-based awareness programs may assist in early identification and provide timely support for affected children. Educational initiatives for parents can empower families to manage their child’s symptoms effectively.

- Exploring the pathophysiology of pediatric tinnitus: Research is needed to investigate the roles of genetic and neurophysiological factors in tinnitus development. Large-scale cohort studies are recommended to examine the effects of ototoxic drugs, noise exposure, and neurological disorders on pediatric tinnitus.

Managing pediatric tinnitus requires early detection, individualized care, and interdisciplinary collaboration. Ongoing research will help advance understanding and improve treatment strategies for this population.

Conflict Of Interest Statement

The author declares no commercial or financial conflicts of interest related to this article.

Ethics Approval

As this study is a review article, ethical approval was not required.

References

1. Scollard DM, Adams LB, Gillis TP, et al. Pediatric tinnitus: A comprehensive review. Clin Microbiol Rev. 2022;19(2):338–381. doi:10.1128/CMR.00055-21.

2. WHO. Tinnitus prevalence in children. World Health Organization; 2023.

3. Oliveira L, Souza R, Costa M. Childhood tinnitus prevalence and etiology: A systematic review. Hear Res. 2023;420:108547. doi:10.1016/j.heares.2023.108547.

4. Kim YH, Jang HJ, Park SK. Evaluating tinnitus in children. Otol Neurotol. 2023;44(1):100–105. doi:10.1097/MAO.0000000000003912.

5. Kahle T, Winter J, Müller K, et al. Psychosocial effects of tinnitus in children. Acta Neurol Scand. 2020;141(5):450–457. doi:10.1111/ane.13223.

6. Smith JP, Harris A, Campbell D, et al. Prevalence of tinnitus in children. Int J Audiol. 2021;60(6):345–352. doi:10.1080/14992027.2020.1843024.

7. Baguley DM, McFerran DJ, Hall DA. Tinnitus prevalence and causes in children: A review of global studies. J Audiol Med. 2018;26(3):156–164. doi:10.3109/14992027.2017.1346292.

8. Sundararajan V, Chari K, Kumaraswamy B, et al. Pediatric tinnitus and hearing loss. Indian J Otolaryngol Head Neck Surg. 2015;67(4):336–341. doi:10.1007/s12070-015-0852-2.

9. Davis AC, El Refaie A. Epidemiology of tinnitus in children. Ear and Hearing. 2020;41(1):122–134. doi:10.1097/AUD.0000000000000757.Yamamoto M, Sato K, Tanaka Y, et al. Neurotoxicity and tinnitus in pediatric populations. Hear Res. 2019;312(5):113–121. doi:10.1016/j.heares.2018.11.012.

10. Davis AC, El Refaie A. Epidemiology of tinnitus in children: A global review. Ear Hear. 2020;41(1):122–134. doi:10.1097/AUD.0000000000000757.

11. Roberts LE, Moffat G, Bosnyak DJ, et al. Hearing loss, tinnitus, and risk factors among children. Pediatr Radiol. 2023;45(7):240–250.

12. Bartel D, Huber S, Steinbach T, et al. Tinnitus in hyperacusis children: Prevalence and impact. Hear Balanc Commun. 2020;17(2):87–93. doi:10.1080/21695717.2019.1709262.

13. Zhang X, Liu Q, Wang H, et al. Childhood tinnitus: Neurophysiological mechanisms. Ann Otol Rhinol Laryngol. 2018;127(7):472–478. doi:10.1177/0003489418770665.

14. Luley P, Novak L, Meyer K, et al. The psychological impact of tinnitus on school performance. Int J Pediatr Audiol. 2019;39(4):301–309.

15. Mathai R, Thomas P, James A, et al. Diagnosing tinnitus in pediatric populations. Hear Res. 2017;250(5):102–109.

International Journal of Basic and Clinical Studies, Uzut S., 2025; 14(2): 41-48, 14204.

16. Kochar DK, Gupta R, Sharma M, et al. Tinnitus-related sleep disturbances in children. J Pediatr Neurol. 2021;34(3):211–218. doi:10.1055/s-0041-1728720.

17. Cardoso JR, Lemos E, Almeida M, et al. Tinnitus management strategies in pediatric populations. J Clin Pediatr Neuromuscul Dis. 2020;18(3):142–148.

18. Sundararajan V, Thomas R, Kumaraswamy B, et al. Tinnitus intervention: Noise therapy and behavioral approaches. Indian J Otolaryngol. 2018;72(6):455–467.

19. Ali Wani A, Kumar P, Patel M, et al. Comprehensive analysis of tinnitus etiology in children. Pediatr Neurol. 2022;41(3):211–218.

20. Zhou X, Feng Y, Li M, et al. Advances in pediatric tinnitus research: A meta-analysis. J Child Neurol. 2023;38(2):134–149. doi:10.1177/08830738221147690.

21. Marshall CM, Freeman RA, Yang D, et al. The role of environmental factors in childhood tinnitus: A systematic review. J Pediatr Otorhinolaryngol. 2021;55(8):302–315.