

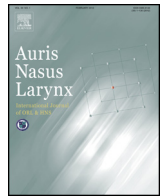


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Management of tinnitus in children: Review of literature and effect of counseling

Doh Young Lee^a, Ji Young Lee^b, Young Ho Kim^{b,*}

^a Department of Otorhinolaryngology — Head and Neck Surgery, Korea University Anam Hospital, Seoul, South Korea

^b Department of Otorhinolaryngology — Head and Neck Surgery, Seoul National University Boramae Medical Center, Seoul National University College of Medicine, Seoul, South Korea

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ABSTRACT

Objective: Tinnitus in children has not been studied sufficiently to date. And, there is no consensus regarding the management of tinnitus in children. Tinnitus counseling can be considered as the most basic tool among therapeutic options of tinnitus in children. In this article, the importance of management in children with tinnitus is highlighted through the review of the literature. Also, we present survey results regarding usefulness and necessity of tinnitus counseling provided from parents of children with tinnitus.

Methods: Studies reporting the management of pediatric tinnitus were reviewed by searching the Pubmed (MEDLINE) databases for studies published from 1980 through 2017. Three articles were eligible for review in terms of quantitative measurement of tinnitus improvement. Survey for eighteen participants were performed who visited our clinic, improvement by counseling and subjective benefit were evaluated by questionnaire. Various demographic and audiologic parameters were subjected into correlation analysis of benefit of counseling.

Results: Three studies which included management of pediatric tinnitus were reviewed. One article reported that children with hearing loss failed to show improvement of tinnitus by hearing aids. However, recent two articles showed that children with or without hearing loss showed fair improvement of tinnitus by tinnitus retraining therapy and noise generator. The survey demonstrated that overall 83.3% showed subjective improvement by tinnitus counseling. Among demographic and audiological parameters, benefit from counseling was significantly associated with age and presence of hearing loss ($p = 0.037$ and $p = 0.005$, respectively).

Conclusions: Pediatric tinnitus is likely to have a higher chance of improvement by counseling alone or combination therapy without medication. Conservative management of tinnitus based on education and counseling instead of medical or surgical treatment should be developed more.

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* Corresponding author at: Department of Otolaryngology — Head and Neck Surgery, Seoul National University Boramae Medical Center, Seoul National University College of Medicine, 5 Gil 20, Boramae-Road, Dongjak-Gu, Seoul 156-707, South Korea. Fax: +82 2 870 3863.

E-mail address: yhkiment@gmail.com (Y.H. Kim).

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1. Introduction

People of different age groups experience tinnitus, and some of them are seeking medical help. Tinnitus is explained as physiological disorder and change of neural activity and synchronization in the auditory and brain systems. However, tinnitus with uncertain cause may induce vague fear to them or frustrate them. Its clinical issue is not a symptom itself but psychological vulnerability caused by tinnitus. Patients with bothersome, persistent tinnitus can have a significant adverse effect on their lives. Unfortunately, there is no definite cure for tinnitus to date.

Pediatric tinnitus is a still challenging disease to all physicians, pediatric patients themselves, and their parents or guardians. Unlike tinnitus in adults, pediatric tinnitus has many troubles such as limitations of diagnostic and therapeutic options, lack of regular observation, and difficulty of clinical research. Recent studies have reported that the incidence of tinnitus in pediatric population was not low [1–5]. There are some problems in the diagnosis and treatment of their tinnitus. Children may consider their tinnitus as trivial because they did not get any information about tinnitus. As a result, they do not report their symptom to their parents leading to delay of the diagnosis and treatment. School-aged children may encounter lots of stressful environments since their entrance into a school. Tinnitus can be one of the results from psycho-emotional problems which they may meet. As described in previous studies, tinnitus sufferers are psychologically susceptible to depression and anxiety which may contribute to tinnitus [6–8]. Their psycho-emotional issues are rising [7], whereas opportunities in the care of experts are not much. Above all things, children complaining tinnitus are not easy to get enough information or guidelines for diagnosis and treatment of their tinnitus. Tinnitus in children needs more thorough history taking, systematic diagnostic evaluation, and careful counseling than in adults.

The purpose of this study was to investigate clinical manifestations and management of pediatric tinnitus through review of current literature and highlight an importance of active management. Also, parents of children with tinnitus were surveyed for its benefit and necessity of tinnitus counseling and possibly related otologic and socio-economic factors.

2. Methods

2.1. Literature review

PubMed (MEDLINE) was searched from the years 1980 to 2017 May with following terms: (“pediatric” OR “child” OR “children” OR “adolescent” OR “young” OR “youth” OR “school”) AND (“tinnitus”). A total of 497 articles were identified. Among them, non-English papers were excluded in this review. Three articles were then selected based on the discussion regarding prevalence and management of tinnitus, and the results were summarized in [Table 1](#).

2.2. Evaluation of tinnitus and survey for tinnitus counseling

Evaluation and counseling of tinnitus in children were composed of items as follows.

- 1) History taking (Features of tinnitus, hearing loss, or dizziness, history of noise exposure, school work distress, social stress, health problems, family problems, impact of tinnitus on daily life)
- 2) Physical examination (Tympanic membrane, nasal cavity, nasopharynx)
- 3) Audiometric evaluation (Pure tone audiometry, tympanometry)
- 4) Tinnitus evaluation (Tinnitogram, tinnitus handicap inventory, visual analogue scale, if possible)
- 5) Education and counseling (separately from children and parents)

Tinnitogram is a test to find pitch and loudness levels of the closest sound to sounds that patients with tinnitus feel. This test was performed using audiometry as follows; (1) Proper frequency of tinnitus was identified by frequency matching. (2) The threshold frequency of tinnitus was assessed by size matching. Tinnitus pitch, or subjective determination by the patient, could be categorized roughly into 4 types; “Woong” (mechanical sound) at low frequency; “Schae” (sound of a cicada) at middle and high frequencies; “Phee” at high frequency; and “Weeing” at full-frequency range. Tinnitus pitch by patients’ subjective expression was determined from the Korean onomatopoeia of tinnitus [9].

Table 1
Summary of patient demographics and managements in pediatric tinnitus (a review of English literature only).

Authors	N	Age range	Hearing status	Prevalence of tinnitus	Management	Result of management
Viani (1989) [10]	102	6–17	All subjects with hearing loss	23 (22.5%)	Hearing aids	Failed to provide tinnitus suppression
Bartnik et al. (2012) [11]	143	≤18	Mixed population of normal hearing and hearing loss	59 (41.3%)	TRT (Noise generators ± hearing aids)	Significant improvement in 81.4%
Bae et al. (2014) [12]	80	5–18	Mixed population of normal hearing and hearing loss	NA	TRT (sound generators ± hearing aids)	Improvement in 61.3%

NA; not applied, TRT; tinnitus retraining therapy.

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