



Awareness and Experience of Tinnitus in Nepalese Young Adult Population

Sajana Aryal¹ Prabuddha Bhatarai¹ Prashant Prabhu¹

¹Department of Audiology, All India Institute of Speech and Hearing, Mysore, Karnataka, India

Ann Otol Neurotol ISO 2022;5:36–43.

Address for correspondence Sajana Aryal, MSc, Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore-570006, Karnataka, India (e-mail: sajanaaryal5566@gmail.com).

Abstract

Introduction The prevalence of tinnitus is increasing in younger adult rapidly. It is increasing mainly because of increased daily noise levels due to the unrestrained usage of recreational devices like mobile phones, MP3s, iPods, and other personal stereos. The aim of this study is to describe awareness and experience of tinnitus among younger adult with respect to the existence, cause, effects, and management.

Methods A descriptive cross-sectional study was conducted in 205 young adult Nepalese population between the age ranges between 20 and 40 years through online survey mode. Statistical analyses were carried out using SPSS 25.0 software. Data were analyzed using the descriptive statistics.

Results Result showed more than half of the participants (59.2%) were aware about the existence of tinnitus; however, only 16.1% of participants were aware about the effect of tinnitus. The incidence of tinnitus was found to be high (11.71%) in Nepalese population.

Conclusion Even though most of the participants were found to be aware about existence of tinnitus, most of them were not aware about the effect of tinnitus and its cause. This result has implications for audiologist who are involved in hearing health care program across the various age groups. As per this study, since most of the participants pointed to the Internet as their source of awareness, that could be further tapped on to provide awareness in these age groups.

Keywords

- awareness
- experience
- tinnitus
- Nepalese population
- cross-sectional

Introduction

Tinnitus is a sound perceived in the ears or head without any external and internal sound source.¹ It is generally manifested as a symptom due to various causes and aggravating factors rather than being a disease. The severity and persistence of tinnitus can vary from a benign, short time to chronic severe and life-threatening conditions. Studies have demonstrated that irritation, stress, and insomnia caused by tinnitus can substantially negatively impact the quality of life and mental health.² Tinnitus interferes with the affected individual's lifestyle, irrespective of age, gender, race, and socioeconomic status.³

Tinnitus is a harmless auditory sensation for up to 21% of the adult population.⁴ However, 3 to 6% of individuals have disturbing tinnitus, which may lead to a severe impact on their daily functioning.⁵ Hence, it can be a vexatious and sometimes a frightening experience to few people. Tinnitus sufferers will be at high risk of developing severe psychological disturbances. Tinnitus might be associated with stress⁶ and other people's attitudes towards tinnitus.⁷

The causes of tinnitus may vary from person to person. It can be caused due to noise exposure, medications, diseases, stress, and head injuries. Tinnitus is common among younger

DOI <https://doi.org/10.1055/s-0043-1764177>
ISSN 2581-9607

© 2023. Indian Society of Otology.

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

Thieme Medical and Scientific Publishers Pvt. Ltd. A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

adults and older adults above the age of 40. However, its prevalence is increasing swiftly among the younger contemporaries because of increased daily noise levels due to the unrestrained usage of recreational devices like mobile phones, MP3s, iPods, and other personal stereos. In the past 20 years, the prevalence of tinnitus in young adults has increased from 6.7 to 18.8%.^{8,9} Therefore, it is crucial to educate young adults and children about the harmful effects of excessive recreational noises, common in nightclubs, raves, and concerts, and the advantages of using hearing protection devices (HPDs).^{10,11} Thus, it may be beneficial to strive to change people's attitudes towards tinnitus.¹⁰

Various methods are available for the management of tinnitus, such as hearing aids, counseling, acoustic therapy, relaxation techniques, pharmacological, and surgical approaches.¹¹ People may not be aware that there are management strategies for tinnitus and may not seek help. As it does not cause any associated pain, tinnitus is not considered a severe health problem by young adults and may not seek help.¹² Hence, it is crucial to educate the public about the causes of tinnitus, the severe distress it may cause to the patient, and its management.

In developing countries like Nepal, tinnitus might be a more common problem but has not been identified because of a lack of awareness among people regarding it. No study has been done to determine the prevalence of tinnitus all over the country. One hospital-based study done in Nepal showed the prevalence of tinnitus to be 1.11%.¹³ Lesser frequency in that study is maybe because that study is a hospital-based study that shows the only tip of the iceberg and since people are not aware of tinnitus and its treatment. So, it is essential to spread awareness among the Nepalese population about tinnitus and its consequences because fewer people seek medical help for tinnitus.

Therefore, the main aim of this study was to describe adult's awareness regarding tinnitus causes, consequences and management options, and their experience of tinnitus. This study also focuses on spreading awareness about tinnitus among the Nepalese adult population.

Materials and Methods

A descriptive cross-sectional study was conducted in the young adult Nepalese population. Data was collected from 205 participants who were literate with minimum qualification of school level education. All participants were between the age range of 20 and 40 years. Participants who were health professionals and who did not have English language proficiency were excluded from the study.

Design of Questionnaire

A survey questionnaire was prepared regarding the awareness and experience of tinnitus in the Nepalese population between the age groups. This questionnaire was adapted from the survey questionnaires used previously by Bagwandin and Joseph in their study in 2017 with modifications accordingly. The survey questionnaire was in English language with different sections in demographic details, knowledge about

tinnitus, causes, preventive measures, and the experience with tinnitus. Five audiologists with more than 5 years of experience in audiology and tinnitus research validated the questions. The necessary corrections suggested by the experienced researcher were incorporated during the finalization of the survey questions. The self-assessment questionnaire consists of 37 questions. Out of 37 questions, five questions were related to demographic details, 9 questions were related to awareness of participants on cause of tinnitus, 4 questions were related to awareness and use of HPDs, 4 questions were related to personal experience of tinnitus, 14 questions were designed for those participants only who have tinnitus and were related to nature, consequence, and treatment they are getting for tinnitus, and last 2 questions were related to general health problems and participants interest in learning about tinnitus. All the questions were designed as objective type having multiple choices (provided as Supplementary Material; available in the online version only).

The final version of the questionnaire was prepared in the e-survey in the form of Google Forms distributed through various social platforms by the researchers through convenient sampling. Two-hundred six Nepali participants between the age group of 20 and 40 years responded to the survey. As one participant did not agree for consent, he was excluded from the study and analysis was done in 205 participants.

Statistical Analysis

All the response of the questionnaire was analyzed by investigator and converted into numerical form using Microsoft Excel. Obtained data were analyzed by using statistical package of social science (SPSS Version 25) software. Descriptive statistical procedures such as frequency and percentages were measured based on the type of questions being addressed. Results for awareness and knowledge, experience of tinnitus, and noise exposure were analyzed by using frequency counts and percentages. To analyses the average number of responses for the causes of tinnitus, mean average scores were used

Informed Consent and Ethical Guidelines

Ethical guidelines formulated by the institutional board of All India Institute of Speech and Hearing, Mysore, were followed for the study. Informed consent was taken from all the participants in the form of a question in Google Form itself. All the participants not responding to the survey were excluded from the study.

Results

Out of 205 participants included in the analysis, 109 (53.2%) participants were male, and 96 (46.8%) were female.

Awareness about Tinnitus

Among the total participants, the awareness about tinnitus and its cause and effect was limited. Although most people were aware of the tinnitus existence, very few people were aware of the tinnitus effect on individuals (16.1%) and the cause of the tinnitus (19.9%). Most people reported they got

to know about tinnitus from the Internet, books, or personal experience. Similarly, although not sure about the actual cause of tinnitus, when people were asked to guess the probable cause of tinnitus, most people responded that the cause might be ear-related problems, head and neck injury, and other illnesses. The details about the respondents about the awareness could be found in ► **Table 1**.

Experience and Impact of Tinnitus

Out of 205 participants, 155 (75.61%) stated they do not have experience with tinnitus, 50 (24.39%) reported they experience tinnitus themselves. Among 50 participants, 26 participants (12.68%) stated they do not have tinnitus at present. However, 24 (11.71%) participants reported they still experience tinnitus. The characteristics of tinnitus experienced in the population are provided in ► **Table 2**. This data showed that the incidence of tinnitus is high in the Nepalese population.

Management, Self-Treatment, and Relief of Experienced Tinnitus

Among 50 participants who experienced tinnitus, 41 participants (82%) reported they did not get any help from professionals regarding their problem, 6 (12%) participants stated they tried to get help from an audiologist, and 3 (6%)

stated they visited ENT specialist. This result clearly shows that people are not aware of the management of tinnitus.

Out of 50 participants, 41 participants (82%) reported they are not doing anything for their tinnitus whereas, 9 participants (18%) reported that they are doing self-treatment for their tinnitus by staying away from the noise, meditation, breathing exercises, opening and closing of mouth as well as rubbing ear. Fifty percent (out of nine) of participants reported they are satisfied with their self-treatment, whereas another 50% stated they are not satisfied, and tinnitus is not reducing with their self-method of treatment.

Awareness and Use of Hearing Protection Devices

Most of the participants, 158 (77.1%), reported that they are aware of HPDs. Among them, 76 (48.10%) of participants answered they heard from the Internet, 62 (39.24%) reported they heard from friends/family, 17 (10.76%) reported they heard from the doctor, and 3 (1.89%) reported they studied from books.

Even though the majority of participants, 147 (71.7%), agreed that HPDs should be used when exposing to an excessive level of noises, 187 (91.2%) participants stated they do not use HPDs when exposed to a high level of noise. Only 8.8% of participants stated they use HPDs while going to places with excessive noise like concerts and clubs. This result suggests that people are not taking this condition seriously despite being aware (62.9%) that exposure to excessive noise levels can cause tinnitus.

Request for Information on Tinnitus

Two hundred four participants answer this question. The result showed that 135 (66.2%) of participants want to know about tinnitus. Most of them stated they want to know about the cause, risk factors, and tinnitus management. It was also found that although some of the participants did not know about tinnitus, they still did not request any information about tinnitus.

Association between Gender and Awareness on Existence of Tinnitus

Effect of gender on awareness of tinnitus was assessed using chi-squared test. Test result showed gender is not significantly associated with awareness of tinnitus χ^2 (1, $n = 205$) is 0.284 ($p > 0.05$).

Table 1 Percentage of participants on awareness about existence, effect, and cause of tinnitus

Existence of tinnitus ($n = 205$)	Effect of tinnitus ($n = 205$)	Cause of tinnitus ($n = 205$)
Aware: 122 (59.2%) Unaware: 83 (40.8%)	Aware: 33 (16.1%) Unaware: 97 (47.32%) Unsure: 75 (36.58%)	Aware: 41 (19.9%) Unaware: 164 (80.1%)
Source ($n = 122$) 1. Internet: 45 (36.89%) 2. Friend: 15 (12.29%) 3. Book: 16 (13.29%) 4. Relatives: 12 (9.83%) 5. General practitioner: 11 (9.02%) 6. Own experience: 23 (18.86%)		Probable cause: Ear-related problems: 138 (67.3%) High music level: 129 (62.9%) Excessive noise: 110 (53.7%) Medication: 63 (30.7%) Illness: 83 (40.5%) Head and neck injury: 126 (58.5%)

Table 2 Characteristics of tinnitus about location, onset, duration, type, impact, annoyance caused, pitch, and loudness experienced by participants ($n = 50$)

Location	Onset	Duration	Sound type
Both ears: 25 (50%) Right ear: 7 (14%) Left ear: 4 (8%) Inside head: 6 (12%) Cannot identify exact location: 8 (16%)	Sudden: 26 (52%) Gradual: 24 (48%)	Continuous: 11 (22%) Intermittent: 39 (78%)	Ringings: 20 (40%) Buzzing: 13 (26%) Cracking: 3 (6%) Sea noise: 2 (4%) Cannot discriminate: 5 (10%)
Pitch and loudness	Type	Impact	Annoyance
Cannot discriminate: 19 (38%) High pitch and soft: 15 (30%) High pitch and loud: 4 (8%) Low pitch and soft: 10 (20%) Low pitch and loud: 2 (4%)	Subjective: 45 (90%) Objective: 5 (10%)	Concentration difficulty: 30 (60%) Sleep problems: 15 (30%) Social problems: 5 (10%)	Annoyed: 29 (58%) Not annoyed: 21 (42%)

Discussion

Awareness about Tinnitus

In this study, although, little more than half of the participants were aware of the existence of tinnitus. More than 75% of people were not aware of the tinnitus cause and its effect on the individuals. In this study, most of the awareness came from Internet sources. Hence, it could be further utilized for awareness of individuals in these groups of the population. However, in a study by Henderson et al in 2010, most people felt that the awareness could be more beneficial from the health professional itself.¹⁴ The reach from the Internet could be more easily accessible to most of the population in these groups.

Studies have suggested that there might be differences in the amount of perceived tinnitus and its impact on an individual's life.^{1,15} In our study, most people were unaware of the devastating effect of tinnitus in a person's daily living. Hence, proper awareness generating programs are a must in the current scenario. Similarly, participants were not aware of the actual cause of the tinnitus. However, when people were asked to guess the probable cause of tinnitus, most people felt that different ear and ear-related problems could be a primary cause. Also, 62.5% of people identified high music levels as a potential cause. Hence, although people were not entirely confident about the actual cause of tinnitus, people had a basic idea about the potential causes of tinnitus. The high level of music exposure and noise exposure in current young adults in various scenarios might be causing other hearing-related issues, including tinnitus. There is a very high need for younger adults to be aware of the cause of tinnitus so that they can have the potential changes in their daily listening environment. The lack of knowledge will expose the younger adults at risk of developing these problems from different listening devices and attending nightclubs, concerts, or recreational activities.^{10,16}

Experience and Impact of Tinnitus

About 24.39% of people participating in this study reported having experience with tinnitus. This number is relatively high compared to the other studies.^{17,18} The percentage of participants experiencing tinnitus is higher than the percentage of participants aware of the tinnitus's cause and effect. Hence, this could potentially result in people being more anxious and worried about their tinnitus when they do not know the potential effect. Similarly, since fewer people are aware of the cause than the people experiencing it, they will not be able to rectify their potential cause of tinnitus, be it a high music exposure or other illnesses. Hence, it may further aggravate the problem.

An almost equal number of participants reported as having gradual or sudden occurrences of tinnitus. The sudden occurrence of tinnitus may be linked to different conditions like sudden sensorineural hearing loss,¹⁹ ototoxicity,²⁰ Meniere's disease,²¹ as well as acoustic trauma.²² Similarly, gradual tinnitus may be linked to noise exposure for longer duration.²³ Along with that, the ringing type of tinnitus was most common in the participants. Literature has suggested

that ringing type of tinnitus is one of the symptoms of noise-exposed hearing loss.¹⁷ Hence, we can attribute the cause of most young adults to a higher degree of sound exposure. However, results should be interpreted with caution. More studies on the daily listening exposure to noise in the Nepalese population will be required to further understand young adults' exposure.

In our study, most people felt that tinnitus affects their concentration, followed by sleep disturbances and social disturbances. The findings are concurrent with the findings from Bagwandin and Joseph in 2017.¹⁸

Management, Self-Treatment, and Relief of Experienced Tinnitus

There are various methods for managing tinnitus like tinnitus retraining therapy, counseling, cognitive behavior therapy, or even surgical management.^{24–30} This study suggests that most individuals do not opt for tinnitus management from professionals, although they have been affected in their daily living due to tinnitus. There have been other studies that suggest similar findings. This suggests that people are not aware of the tinnitus' effect and do not see tinnitus as a significant concern.

Awareness and Use of Hearing Protection Devices

Most of the participants were aware of the HPDs and understood that they should be used while going in noisy places. Very few of them were incorporating that practice into their life. The reasons might be due to the lack of access to the procuring of HPDs. Previous studies have shown that young adults are not aware of HPDs.^{10,31} However, this study is a similar finding to the study by Bagwandin and Joseph in 2017.¹⁸ Hence, proper awareness and access to these services should be improved to increase the practices among the individuals.

Conclusion

Although aware of tinnitus and its existence, most of the participants were not aware of the actual effect of tinnitus on individuals and the causes associated with it. Similarly, the experiences with tinnitus were relatively high in our study. Most of the people were having disturbances in concentration, sleep, and social activity. Although, people are not aware of the management of tinnitus and, hence, do not seek professional help. Similarly, although having awareness about the use of HPDs while going in noise-rich environments, they do not use the devices to be safe from the noise in those environments. Hence, providing proper awareness generation programs in a different age group should be conducted. As per this study, since most of the participants pointed to the Internet as their source of awareness, that could be further tapped on to provide awareness in these age groups.

Limitations and Future Directions

There is a dearth of studies about the awareness and experiences of tinnitus and its management in the Nepali context.

This study can act as a guiding tool for future researchers about the present level of awareness and management practices in tinnitus. This study undertook only young adult individuals for participation. Future studies can further look into various age groups, compare the awareness in all those age groups, and compare the awareness in different areas across Nepal so that appropriate awareness-generating programs could be planned better.

Authors' Contributions

Sajana Aryal was involved in concept development, study design, stimulus preparation, analysis of the results, interpretation, and writing of the manuscript; Prabuddha Bhatarai helped in concept development, study design, stimulus preparation, data collection, analysis of the data, interpretation, and writing of the manuscript. Prashanth Prabhu was involved in concept development, stimulus preparation, and writing of the manuscript.

Ethical Approval

Ethical approval was obtained from the All India Institute of Speech and Hearing for carrying out the study.

Informed Consent

Informed consent was obtained from the patient to participate in the study.

Funding

None.

Conflict of Interest

None declared.

Acknowledgments

The authors acknowledge Dr. Pushpavathi M., Director, All India Institute of Speech and Hearing, affiliated to University of Mysore, for permitting to carry out the study. The authors acknowledge the participant for their co-operation.

Awareness and Experience of Tinnitus in Nepalese Young Adult Population: A Survey

Please check all the appropriate box

- Check all that apply.
- I declare that I am between the ages of 20 and 40 years
- I declare that I am a Nepali citizen
- I am not a health/medical professional
- I can understand English language
- Profession_____

I am a

- Male
- Female
- Prefer not to say

Please indicate your level of study

- Primary level
- Secondary level
- SLC/SEE

- Plus two
- Under Graduate
- Postgraduation
- PhD

Have you ever heard of tinnitus? (ringing, buzzing, whistling noises in the ear)

- Yes
- No

If yes, how did you learn about it? (Please check all appropriate box)

- I have tinnitus
- A friend
- A relative
- A book
- A general practitioner
- A magazine
- Internet
- Other: _____

Do you know how tinnitus affect people?

- Yes
- No
- Not sure
- If yes, please specify: _____

Are you aware of what cause tinnitus?

- Yes
- No
- If yes, please describe _____
- Questions related to cause of tinnitus

Certain types of illness can cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Listening to high level of sounds can cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Certain types of medication can cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Injury to head, neck, and ears may cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Ear-related problems such as ear infections, hearing difficulty, and ear related dizziness can cause tinnitus.

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Attending night clubs, raves, and concerts with high noise level can cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Questions related to hearing protective devices

Have you heard of hearing protective devices like earplugs and earmuffs

- Yes
- No

If yes, from whom you hear about it? (Please check all appropriate box)

- Friend
- Family
- Doctor
- Internet
- Books
- Other: _____

Hearing protective devices should be worn while attending an event with excessively loud level of noise

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Frequent use of iPods/MP3 player or others personal listening devices at loud levels for a prolonged duration can cause tinnitus

- Strongly agree
- Agree
- Unsure
- Disagree
- Strongly disagree

Do you wear hearing protective devices?

- Yes
- No
- If yes, please describe _____

Experience with tinnitus

Do you know anyone who experience tinnitus?

- Yes
- No
- If yes, who? _____

Do you know what causes the tinnitus?

- Yes
- No
- Unsure
- If yes or unsure, explain _____

Do you think treatment options are available for tinnitus?

- Yes
- No
- Not sure

Do you experience tinnitus?

- Yes
- No

Questions for those only who experience tinnitus

Do you still experience tinnitus?

- Yes
- No

Describe the location of tinnitus (Please select all appropriate box)

- Right ear
- Left ear
- Both ear
- Inside my head
- Outside my head
- Not sure
- Other: _____

The tinnitus started

- Gradually
- Suddenly

The tinnitus is

- Continuous
- Intermittent (comes and goes)

The tinnitus occurs

- Sometimes
- Daily
- Weekly

The tinnitus sounds like (please select all appropriate box)

- Ringing
- Whistling
- Sea noise
- Crackling
- Buzzing
- Pulsating
- Cannot discriminate
- Other: _____

Is your tinnitus heard by people around you?

- Yes
- No

Tinnitus is of

- High pitch and loud
- High pitch and soft
- Low pitch and loud
- Low pitch and soft
- Cannot discriminate

I find the tinnitus

- Extremely annoying
- Severely annoying
- Moderately annoying
- A little annoying
- Not annoying at all

The tinnitus causes me to have

- Concentration difficulty
- Sleeping problems
- Social problems
- Other: _____

Because of tinnitus I tried to get help from: (check all that apply)

- A general practitioner
- ENT specialist
- A audiologist
- I did not get any help
- Other: _____

I have found relief from the tinnitus after visiting above mentioned professionals

- Yes
- No

I was given treatment regarding the tinnitus

- Yes
- No
- If yes, please describe what treatment was given to you for tinnitus _____

Are you doing anything to relieve the problem by yourself?

- Yes
- No
- If yes, please describe what are you doing _____

Are you satisfied with the method you are using to relieve the noises?

- Yes
- No

Do you have any other health related problems?

- Yes
- No
- If yes, please explain about your illness (If you are under medication, mention that also)

Do you like to know more about tinnitus?

- Yes
- No
- If yes, please specify what you would like to know about _____

References

- 1 Alam N, Katarkar A, Shah P, Jalvi R, Jain A, Shah M. Audiological, psychological and cognitive characteristics of tinnitus sufferers. *Indian J Otol* 2012; 18 (1):20–23
- 2 Pinto PCL, Marcelos CM, Mezzasalma MA, Osterne FJV, de Melo Tavares de Lima MA, Nardi AE. Tinnitus and its association with psychiatric disorders: systematic review. *J Laryngol Otol* 2014; 128 (8):660–664
- 3 Henry JA, Dennis KC, Schechter MA. General review of tinnitus: prevalence, mechanisms, effects, and management. *J Speech Lang Hear Res* 2005; 48(5):1204–1235
- 4 Krog NH, Engdahl B, Tambs K. The association between tinnitus and mental health in a general population sample: results from the HUNT Study. *J Psychosom Res* 2010; 69(3):289–298
- 5 Cima RFF. Botherome tinnitus: cognitive behavioral perspectives. *HNO* 2018; 66(5):369–374
- 6 Erlandsson SI. Tinnitus: Tolerance or Threat?: Psychological and Psychophysiological Perspectives. University of Gothenburg; 1990
- 7 Erlandsson SI, Hallberg LRM, Axelsson A. Psychological and audiological correlates of perceived tinnitus severity. *Audiology* 1992; 31(3):168–179
- 8 Sliwinska-Kowalska M, Davis A. Noise-induced hearing loss. *Noise Health* 2012; 14(61):274–280
- 9 Degeest S, Corthals P, Vinck B, Keppler H. Prevalence and characteristics of tinnitus after leisure noise exposure in young adults. *Noise Health* 2014; 16(68):26–33
- 10 Gilles A, Van Hal G, De Ridder D, Wouters K, Van de Heyning P. Epidemiology of noise-induced tinnitus and the attitudes and beliefs towards noise and hearing protection in adolescents. *PLoS One* 2013; 8(7):e70297. doi:10.1371/journal.pone.0070297
- 11 Sweetow RW. An integrated approach to tinnitus management. *AudiologyOnline*. Published 2013. Accessed January 30, 2023 at: <https://www.audiologyonline.com/articles/integrated-approach-to-tinnitus-management-11598>
- 12 Roberts LE, Martin WH, Bosnyak DJ. The prevention of tinnitus and noise-induced hearing loss. In: *Textbook of Tinnitus*. New York: Springer; 2011: 527–534
- 13 Shrestha BL, Man Amatya RC, Shrestha I, Pokharel M. Analysis of etiological factors of tinnitus in patients attending Kathmandu University Hospital. *Indian J Otol* 2012; 18(4):196–199
- 14 Henderson E, Testa MA, Hartnick C. Prevalence of noise-induced hearing-threshold shifts and hearing loss among US youths. *Pediatrics* 2011; 127(1):e39–e46
- 15 McCombe A, Baguley D, Coles R, McKenna L, McKinney C, Windle-Taylor P; British Association of Otolaryngologists, Head and Neck Surgeons. Guidelines for the grading of tinnitus severity: the results of a working group commissioned by the British Association of Otolaryngologists, Head and Neck Surgeons, 1999. *Clin Otolaryngol Allied Sci* 2001; 26(5):388–393
- 16 Dell SM, Holmes AE. The effect of a hearing conservation program on adolescents' attitudes towards noise. *Noise Health* 2012; 14(56):39–44
- 17 Holmes S, Padgham ND. "Ringing in the ears": narrative review of tinnitus and its impact. *Biol Res Nurs* 2011; 13(1):97–108
- 18 Bagwandin V, Joseph L. A survey exploring awareness and experience of tinnitus in young adults. *S Afr J Commun Disord* 2017; 64(1): 10.4102/sajcd.v64i1.545
- 19 Schreiber BE, Agrup C, Haskard DO, Luxon LM. Sudden sensorineural hearing loss. *Lancet* 2010; 375(9721):1203–1211
- 20 Seligmann H, Podoshin L, Ben-David J, Goldsher M. Drug-induced tinnitus and other hearing disorders. *Drug safety* 1996; 14(3). doi: 10.2165/00002018-199614030-00006
- 21 Lopez-Escamez JA, Carey J, Chung W-H, et al; Classification Committee of the Barany Society; Japan Society for Equilibrium Research; European Academy of Otolology and Neurotology (EAONO); Equilibrium Committee of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS); Korean Balance Society. Diagnostic criteria for Menière's disease. *J Vestib Res* 2015; 25(1):1–7
- 22 Theodoroff SM, Konrad-Martin D. Noise acoustic trauma and tinnitus, the US Military Experience. doi:10.1016/j.otc.2020.03.004
- 23 Ding T, Yan A, Liu K. What is noise-induced hearing loss? *Br J Hosp Med* 2019; 80(9):525–529
- 24 Grewal R, Spielmann PM, Jones SEM, Hussain SSM. Clinical efficacy of tinnitus retraining therapy and cognitive behavioural therapy in the treatment of subjective tinnitus: a systematic review. *J Laryngol Otol* 2014; 128(12):1028–1033
- 25 Hobson J, Chisholm EJ, Loveland ME. Sound therapy (masking) in the management of tinnitus in adults. *Cochrane Database Syst Rev* 2007; (1): 10.1002/14651858.CD006371

- 26 Makar SK, Mukundan G, Gore G. Treatment of tinnitus: a scoping review. *Int Tinnitus J* 2017;21(2):144–156
- 27 Hoare DJ, Kowalkowski VL, Kang S, Hall DA. Systematic review and meta-analyses of randomized controlled trials examining tinnitus management. *Laryngoscope* 2011;121(7):1555–1564
- 28 Cima RFF, Andersson G, Schmidt CJ, Henry JA. Cognitive-behavioral treatments for tinnitus: a review of the literature. *J Am Acad Audiol* 2014;25(1):29–61
- 29 Andersson G, Lyttkens L. A meta-analytic review of psychological treatments for tinnitus. *Br J Audiol* 1999;33(4):201–210
- 30 Hobson J, Chisholm E, El Refaie A. Sound therapy (masking) in the management of tinnitus in adults. *Cochrane Database Syst Rev* 2012;11(11):CD006371
- 31 Beach EF, Gilliver M, Williams W. Leisure noise exposure: participation trends, symptoms of hearing damage, and perception of risk. *Int J Audiol* 2013;52(Suppl 1):S20–S25 Beach EF, Gilliver M, Williams W. Leisure noise exposure: participation trends, symptoms of hearing damage, and perception of risk. *Int J Audiol* 2013;52(Suppl 1):S20–S25