Prevalence of Tinnitus and its Characteristics Among Indian Adult Population

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Abstract

Introduction Tinnitus is a sound heard in the ears or head that originates from both external and internal sources. Tinnitus epidemiological data are critical for proper assessment and management of tinnitus sufferers. The study's goal was to determine the prevalence of tinnitus and its characteristics among middle-aged Indian individuals, as there has been no previous research in this area in India.

Methods A descriptive cross-sectional study was performed in 273 Indian adult populations ranging in age from 18 to 60 years old, utilizing a random sampling approach and an online survey mode. The SPSS 25.0 software was used to conduct the statistical analysis. The descriptive statistics were used to assess the data, and the chi-square test was used to see whether there was any correlation between the variables.

Results Studies related to tinnitus prevalence show larger variability across countries, which may be due to inconsistent research methods used. Our survey found the prevalence of tinnitus to be 6.7% among the Indian adult population, and most of the participants 76 (76%) reported that their tinnitus is of intermittent nature. In our study, we found that 15% of participants have problem with sleep and none of the participants reported perception of tinnitus in their dreams.

Conclusion Tinnitus is the most prevalent otological condition, which may have a great impact on the quality of life of sufferers as well as their family members. As the prevalence of tinnitus is high among adult population, it is very much essential to develop proper assessment and management protocols to help the patient with tinnitus.

Keywords
- prevalence
- tinnitus
- Indian population
- adult
- cross-sectional

Introduction

Tinnitus is the sensation of sound in the absence of external and internal sounds, and it affects about 10 to 15% of the adult population around the world.[1] Tinnitus is not a disease in and of itself; it is a symptom that can be caused by a variety of reasons and made worse by aggravating co-factors. Tinnitus is a very common symptom, but it can also be a sign of a dangerous condition such a vascular tumor or vestibular schwannoma. Tinnitus can range in severity and durability from a benign short-term occurrence to a persistent severe and life-threatening illness. Tinnitus-induced annoyance, tension, and insomnia have been demonstrated in studies to have a significant negative influence on the quality of life and mental health[2].

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Tinnitus can affect one or both sides of the head, and it might sound like it is coming from inside or outside the head. Tinnitus can be divided into objective and subjective tinnitus, which can be diagnosed systematically. Subjective tinnitus can further be categorized as: 1) conductive tinnitus and 2) sensorineural tinnitus: (a) motor tinnitus (b) transduction tinnitus (c) transformation tinnitus (d) extrasensory tinnitus.[3] Tinnitus quality can also vary, with patients reporting ringing, buzzing, clicking, pulsations, hissing, roaring, and other noises.[4]

There have been a few studies that have reported the prevalence of tinnitus around the world. One of them is a very quick summary from the United Nations' National Health Statistics[5] presenting very few figures with few comments. Up to 40 million people in the United States suffer tinnitus "to a lesser degree," with 5 to 13 million having "severe, quality-of-life-disrupting" tinnitus.[6] Tinnitus is expected to become more common as the population ages and society becomes increasingly noisy.[6]

India has very few data regarding prevalence of tinnitus and accompanying risk factors. A survey was undertaken by Sinha et al. (2017) to determine the prevalence of communication difficulties. They conducted research in the Mandya district of Karnataka, India. During the study, they employed a high-risk registry to determine the prevalence of communication disorders. Tinnitus was shown to be prevalent in 9.6% of people of all ages in their study. Tinnitus was identified in a greater frequency of adults and females.[7] Thirunavukkarasu and Geetha (2015) calculated the 1-year prevalence and risk factors of tinnitus in older people (60 years and older) who went to the All India Institute of Speech and Hearing in Mysore with an ear and/or hearing-related complaint, and found a prevalence of 16.81% tinnitus in geriatrics with otological problems.[8]

Hearing loss is more common in India, and tinnitus may be more prevalent in people who have hearing impairments.[8] As Coles points out, evidence on tinnitus prevalence and associated risk factors is required for improved rehabilitation approaches.[9] Because there is a dearth of data on the prevalence of tinnitus and its repercussions in the Indian adult population, it is critical to research tinnitus prevalence in order to develop better assessment methods, infrastructure, and tinnitus rehabilitation programs.

The aim of present study is to find prevalence of tinnitus along with the characteristics in Indian adult population and analyze other possible risk factors associated with tinnitus.

Methods

Participants

A descriptive cross-sectional study was conducted in the Indian adult population over the period of 5 months from May 2021 to October 2021. Data were collected from 273 participants between the age ranges 18 to 60 years. All participants who were included in the study were literate with minimum qualification of school level education and have a good English language proficiency. Participants who were not the Indian citizen and who were not educated enough to comprehend English questionnaire were excluded from the study.

Development of the Questionnaire

A questionnaire was developed to conduct the survey regarding the incidence of tinnitus along with the characteristics among Indian adult population. The authors prepared the questionnaire in the English language including the different sections in demographic details, occurrence of tinnitus, characteristics of tinnitus along with the issues related to sleep and hearing. The questionnaire was validated by three audiologists with more than 5 years of expertise in the field of audiology and tinnitus research. While finalizing the survey questionnaire, the essential modifications proposed by an experienced audiologist were taken into account.

The self-assessment questionnaire consists of 29 questions. Among 29 questions, six questions were related to demographic details, eight questions were related to the occurrence of tinnitus and the characteristics of the tinnitus, five questions were related to sleep problems due to tinnitus, one question was related to participant view for the need of treatment, five questions were designed only for those who have hearing problems and included the questions related to hearing issues, and final five questions were related to general health problems and participant interest in investigating about their tinnitus. All the questions have been designed in the objective format having the multiple choices (Supplementary Material, available in the online version only).

Procedure

The researchers employed convenient sampling to produce the final edition of the questionnaire, which was created as an e-survey in the form of Google forms and distributed through various social networks. The survey was explained to the participants, and they were made aware of the importance of their honest responses. Participants who were unable to access the link online owing to technical difficulties were given a paper copy of the same. All standard operating procedures (SOPs) and standards were followed throughout data collection for such subjects, taking into account the participant's and investigators' safety and health, as per the institute's requirements.

In total, 273 Indian adult participants between the age group of 18 and 60 years responded to the survey. As three participants did not agree for consent, they were excluded from the study and analysis was done in 270 participants.

Statistical Analysis

The investigator examined all questionnaire responses and transformed them into numerical form using Microsoft Excel. The statistical package for social science (SPSS Version 25.) software was used to analyze the data collected. Based on the sort of questions being addressed, descriptive statistical processes such as frequency and percentages were measured. The chi-square test was used to check if there was any correlation between variables, and the Cramer V coefficient was calculated to evaluate the strength of the correlation.

Informed Consent and Ethical Guidelines

The study followed the ethical principles established by the All India Institute of Speech and Hearing (AIISH) in Mysore. All participants gave their informed consent by answering a question on the Google form. Participants who did not complete the survey were removed from the study.

Results

Among 270 participants who were included for the analysis, 107 (39.6%) participants were male and 163 (60.4%) participants were female.

Prevalence of Tinnitus

Out of 270 participants, 170 (63%) participants reported they 'never' experience the tinnitus, 82 (30.4%) reported they that they 'seldom' suffered from the tinnitus, 18 (6.7%) participants answered that they 'often' suffered from tinnitus, and none of the participants answered that they 'always' suffered from the tinnitus. Regarding the frequency of tinnitus occurrence, among 100 participants who reported they seldom/often experience the tinnitus, 86 (86%) participants answered that they 'sometimes' experience the tinnitus, whereas 14 (14%) participants reported that they experienced the tinnitus 'Several times in a day.' These data showed prevalence rate of tinnitus is high in the Indian adult population.

Characteristics of the Tinnitus Experienced

Among 100 participants who reported they 'seldom' and 'often' experience the tinnitus, the most participants 62 (62%) participants reported that their tinnitus started suddenly, whereas others 38 (38%) participants reported onset of the tinnitus to be gradual. Regarding the nature of the tinnitus, most participants 76 (76%) answered that their tinnitus is of intermittent nature and other 24 (24%) reported their tinnitus is of continuous nature.

Quality and Types of Tinnitus

Out of 100 participants who reported tinnitus, the most participants 42 (42%) participants reported their tinnitus as of ringing quality, 23 (23%) participants reported their tinnitus as 'whistling quality' and 14 (14%) participants reported their tinnitus as 'buzzing quality.' Most of the participants 99 (99%) reported their tinnitus as being 'subjective' type. These data suggests that subjective type and ringing quality of tinnitus is more common in Indian adult population. The details about the type and quality of tinnitus are given in ►**Table 1.**.

Localization and Severity of Tinnitus

Out of 100 participants, the most participants 43 (43%) reported the location of tinnitus to be in both the ears and 17 (17%) of the participants answered they are not sure about the location of tinnitus. Regarding the severity of the tinnitus, most participants 62 (62%) reported that tinnitus does not bother them particularly. The details about localization and severity of the tinnitus are shown in ►**Table 2**.

Table 1 Total number and percentage of participants reporting different types and quality of tinnitus (*N* = 100)

Types of tinnitus	Total percentage of participants (%)
Subjective	99 (99%)
Objective	1 (1%)
Quality of Tinnitus	**Total percentage of participants (%)**
Ringing	42 (42%)
Whistling	23 (23%)
Buzzing	14 (14%)
Pulsating	9 (9%)
Sea noise	4 (4%)
Hissing	3 (3%)
Roaring	3 (3%)
Crackling	2 (2%)

Table 2 Percentage (%) of participants reporting different location of tinnitus and severity of the tinnitus (*N* = 100)

Localization of tinnitus (*N* = 100)	
Both ears	43 (43%)
Not sure	17 (17%)
Right ear	14 (14%)
Inside my head	13 (13%)
Left ear	12 (12%)
Outside my head	1 (1%)
Severity of tinnitus (*N* = 100)	
Tinnitus does not bother me particularly	62 (62%)
Tinnitus bothers me only in the quite surroundings	28 (28%)
Tinnitus disturbs my sleep, I have difficulty in falling asleep and I am sometimes woken by the tinnitus	10 (10%)

Tinnitus and Hearing

All the 100 participants who reported tinnitus (seldom and often) answered the questions related to hearing problems. Out of 100 participants, 79 (79%) participants reported normal hearing, 13 (13%) participants reported somewhat reduced hearing, 6 (6%) participants reported markedly reduced hearing and 2 (2%) participants reported to be completely deaf. Among 21 (21%) participants who reported the hearing problem, 9 (9%) participants reported their hearing loss is clinically diagnosed by the physician, and 3 (3%) participants reported to be hearing aid user. From the subjective analysis, it was found that the participants who reported the frequency of tinnitus occurrence 'often' also have reduced hearing in association.

Tinnitus and Sleep

All 100 participants who reported tinnitus, answered the questions related to sleep. Among 100 participants, 15 (15%) reported that they have difficulty in falling asleep because of their tinnitus, whereas other 85 (85%) participants reported they do not have any problem with sleep. Regarding the frequency of sleep problems, among 15 participants who

reported sleep problem, 8 (8%) reported of having sleep problem less than once in a week, 5 (5%) participants reported one or two times in a week, and 2 (2%) of the participants reported three or four times in a week. None of the participants reported the presence of tinnitus in their dreams. Twelve (12%) participants reported that they are woken up by their tinnitus at night and 4 (4%) of them reported difficulty in falling asleep again once awakened by the tinnitus. All 15 (15%) participants who reported sleeping problems also reported the feeling of restlessness in the morning even after the full night sleep because of their tinnitus. From the subjective analysis, it was found that the participants who reported the frequency of their tinnitus to be 'often' also were found to have sleeping problems in association. These data showed that sleep problems are more common in population having more severe and frequent tinnitus.

Treatment Need

Out of 100 participants who reported tinnitus, most participants 77 (77%) reported they are not bothered by their tinnitus and they do not need any treatment, 17 (17%) participants reported that they are sometimes bothered by their tinnitus and they would like to get some treatment, and remaining 6 (6%) participants reported they are very much bothered by their tinnitus and they consider themselves in the urgent need of the tinnitus.

Associated Problems and Patient Motivation to Investigate their Tinnitus

Among 100 participants who reported to have tinnitus, 98 participants answered questions about their associated problems. Seventeen (17%) participants reported they have associated problems such as diabetes, hypertension, sinusitis, PCOD, hypothyroidism and asthma, whereas others 81% reported of not having any associated problems. It was found that only 5 (5%) participants wanted to investigate their tinnitus, even though 100 participants reported of having tinnitus. This result clearly shows that people are neglecting their problem of tinnitus.

Association between Occurrence of Tinnitus and Gender

Effect of gender on occurrence of tinnitus was assessed using chi-square test. Test result showed gender is significantly associated with occurrence of tinnitus ($p < 0.05$). Cramer V coefficient was found to be 0.256, which suggests moderate strength of association between gender and occurrence of tinnitus as illustrated in ►**Table 3**.

Discussion

There are just a few studies on the prevalence of tinnitus, and there is still a lot to learn about it. There is heterogeneity in the epidemiological data of various research due to variance in the definition of tinnitus and its measurement. Despite definitions and questions were used inconsistently in epidemiological studies, some findings were constant. In adult populations, the prevalence of tinnitus is usually in the range of 10 to 15%.[10] Leske (1981) conducted an American study that provides simplified information on tinnitus prevalence.[5]

The goal of this research was to find how common tinnitus is among the Indian adults aged 18 to 60 years. Our data show that 6.7% of people had tinnitus, which is similar to Makar et al (2014) findings.[11] Even though the majority of participants (62%) said their tinnitus did not affect them, another 38% said they had difficulties sleeping because of it, which is a higher percentage than Axelsson and Ringdahl (1989) findings. These findings demonstrate the impact of tinnitus on daily activities and emphasized the need for tinnitus treatment, even if the intensity is mild. We discovered that the majority of the participants reported tinnitus in both ears, similar to Henry et al's findings in 2020.[10]

Although hearing loss is the most prevalent cause of tinnitus, it can develop with or without hearing loss. In the research, the percentage of subjects with tinnitus related with hearing loss varies from 85 to 96%[12]. Our investigations, however, yielded various outcomes. Only 21% of tinnitus victims reported hearing loss in our study. We excluded the elderly (those over 60 years old) from our study, as they are more likely to suffer from age-related hearing loss, which could explain the lower number of participants with tinnitus reporting hearing loss.

Sleep disturbance is the most common symptom and complaint among tinnitus patients. Recent research has found that when tinnitus is combined with sleeplessness or depression, it causes more discomfort and worse tolerance for the tinnitus.[13] In our study, we noticed that 15% of participants

Table 3 Result of chi-square test (association between gender and occurrence of tinnitus)

Chi-Square Tests			
	Value	df	Asymptotic Significance (two-sided)
Pearson chi-square	17.677	1	0.000
Likelihood ratio	18.709	1	0.000
Number of valid cases	270		

Symmetric measures			
		Value	Approximate significance
Nominal by nominal	Phi	0.256	0.000
	Cramer's V	0.256	0.000
Number of valid cases		270	

had sleep problems due to tinnitus, which is relatively high when compared to Axelsson and Ringdahl's findings, which demonstrated that the psychological impact of tinnitus in sufferers is increasing day by day.[14]

Individuals with tinnitus do not perceive their tinnitus in their dreams similar to what is reported for many phantom limb perceptions.[12] In our research, none of the individuals said they heard tinnitus in their dreams. The Bayesian brain model, which has been used to explain the genesis of tinnitus based on auditory deafferentation, has theoretically explained why people do not detect their tinnitus in their dreams but do so in the wake state.[14]

Several studies have found that men are more likely than women to suffer from tinnitus, which could be attributed to males being overrepresented in the employment, particularly in loud industries such as manufacturing, construction, and military duty.[14]According to studies, while men were more likely to experience tinnitus, females were more likely to find their tinnitus to be more irritating and annoying than males.[14]However, our findings contradicted each other, indicating that tinnitus is more common in women than in men, with a moderate degree of correlation. These results could be the result of an unbalanced distribution of male and female proportions in the research population, as well as a small sample size. As a result, these findings should be reproduced in the future using a large sample size and an equal gender distribution in the study sample.

Only 23% of tinnitus sufferers consider themselves in need of therapy, and only 5% wish to study their tinnitus, according to our data, which is low in compared to Axelsson and Ringdahl's findings. These findings revealed that, in underdeveloped nations such as India, individuals do not regard tinnitus as a serious condition, despite it having a negative influence on their quality of life. This finding revealed that the general population is unaware of tinnitus and its long-term ramifications, necessitating the implementation of an awareness program.

Conclusion

Tinnitus is described as the symptom, which can occur with and without hearing loss and other associated problems. This study confirmed that pathological tinnitus can occur in isolation as well, as only 21% of the tinnitus sufferers reported hearing loss. Tinnitus is the most prevalent otological condition, which may have large impact on the quality of life. In our study, the prevalence of tinnitus is found to be 6.7% which is relatively high among adult population. As many people have denied the need for the treatment even if they have tinnitus symptoms, there is need to implement awareness program about tinnitus and its consequences among public.

Limitations and Future Direction

There is a dearth of studies about the prevalence of tinnitus in the Indian context. This study can act as a guiding tool for future researchers about the present level epidemiological data on tinnitus. This study undertook only middle adult individuals for participation. Future studies can further investigate various age groups, compare the prevalence across those age groups, and compare the prevalence of tinnitus in different areas across India so that awareness-generating programs, assessment and rehabilitation program could be planned better.

Authors' Contributions

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

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None.

Conflict of Interest

None declared.

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