

Epidemiology and Characteristics of Tinnitus in Jordan

Lubna Khreesha¹,
Baeth Al-Rawashdeh¹,
Mohammed Tawalbeh¹,
Amer Sawalha^{1*},
Maryam Doudin¹,
Mahmoud Dardas²,
Hamza Mahafda²,
Rand Omari²,
Zain Bello²,
Abdelkareem Alhyari³

ABSTRACT

Background: Tinnitus is a common complaint that carries a significant impact on life. However, there is paucity of data regarding this condition in Jordan. Our study is the first study to demonstrate the prevalence of tinnitus in Jordan and its characteristics.

Methods: A sample of 1060 participant's representative of the Jordanian population was invited to answer a questionnaire. The questionnaire comprised of 15 questions about tinnitus and its characteristics. The data was collected over a year (2016-2017).

Results: The prevalence of tinnitus was 28.8% with 72.8% reporting non-pulsatile tinnitus, 95.5% reporting intermittent tinnitus and 57.4% had bilateral tinnitus. There was no significant difference found between males and females (p value: 0.786). There was significant correlation between tinnitus, vertigo, and dizziness (p value < 0.0001).

Conclusion: Tinnitus is a common condition with high prevalence in Jordan denoting the significance of diagnosis and offering treatment especially for debilitating cases.

Keywords: Tinnitus, Characteristics, Epidemiology, Jordan.

¹Department of Special Surgery, School of Medicine, The University of Jordan & Jordan University Hospital, Amman, Jordan

²School of Medicine, The University of Jordan, Amman, Jordan

³Hamad Medical Corporation, Doha, Qatar

***Send correspondence to**

Amer Sawalha

Department of Special Surgery, School of Medicine, The University of Jordan & Jordan University Hospital, Amman, Jordan, E-mail: amer.m.sawalha@gmail.com

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INTRODUCTION

Tinnitus is a symptom that is characterized by the perception of sound in the absence of any external stimulus¹⁰. Tinnitus is a common complaint that carries a significant impact on life. It can impair the quality of life of the patients³, by affecting their physical, emotional, and social functioning⁴, as well as increasing the susceptibility to anxiety and depression²⁵. The prevalence of tinnitus is variable ranging from 6.6 to 18.6 %^{6,7,8,19}. This prevalence shows a dramatic increase to reach 30% in people who are 55 years and older²². Although the prevalence in some countries is high but only quarter of the patients who has tinnitus seeks medical help¹⁹. Tinnitus has many modifiable risk factors. Exposure to noise and loud sounds is an important risk factor for tinnitus²¹. The nature of the occupation plays an important role in increasing the susceptibility to tinnitus and other hearing problems¹⁵. Given the scarcity of data describing the prevalence of tinnitus in Jordan, our study aims to outline the characteristics and prevalence of tinnitus in Jordan. We aspire that this study will be the beginning of a series of further studies investigating tinnitus, risk factors, impact on the patients' quality of life, treatment, and prevention of tinnitus in Jordan.

MATERIALS AND METHODS

After obtaining the approval of the Institutional Review Board of the University of Jordan hospital, the data was collected by trained medical students from the University of Jordan who approached people from the public and asked them to participate by the word of mouth and adopted the snowball sampling by asking participants to recommend acquaintances that could help fulfill the goal of this research.

The data was collected over the course of a year from 2016-2017. Sample included 1060 participants from all the governorates of Jordan. The proportion of

participants from each governorate was determined beforehand based on the population estimates according to the database of the department of statistics in Jordan in 2016²³, maintaining the same population ratios among governorates to obtain a representative sample. The mean age of participants was 29.8 with ages ranging from 11-87 years.

The interviewers began with explaining the definition of tinnitus to the participants as "the perception of sound with the absence of external stimulus."²⁵. Then, they were asked to answer a questionnaire composed of 15 questions as shown in Appendix A. The questions assessed the presence of tinnitus and its characteristics, duration and associated dizziness or vertigo.

Data was entered into and analyzed using the Statistical Package for Social Sciences (SPSS), version 24. $P < 0.05$ was assigned as the α . Data were assessed for normality using Kolmogorov-Smirnov test, histograms, and Q-Q plots. Assumptions for using parametric statistics were satisfactory using Levene test for equal variances. The effects of sociodemographic descriptives on tinnitus was determined by performing Chi square test (**Figure 1**).

RESULTS

Among the 1060 participants, 311 (28.8%) participants complained of tinnitus. Interestingly there was no significant difference found between males and females (p value: 0.786) (**Table 1**).

Of those who complained of tinnitus 72.8% complained of non-pulsatile tinnitus, 95.5% complained of intermittent tinnitus, and 57.4% had bilateral tinnitus. Among those who reported unilateral tinnitus 53.7% was in the right ear as illustrated in (**Table 2**).

There was significant correlation between tinnitus and vertigo, dizziness as mentioned in (Tables 3 & 4).

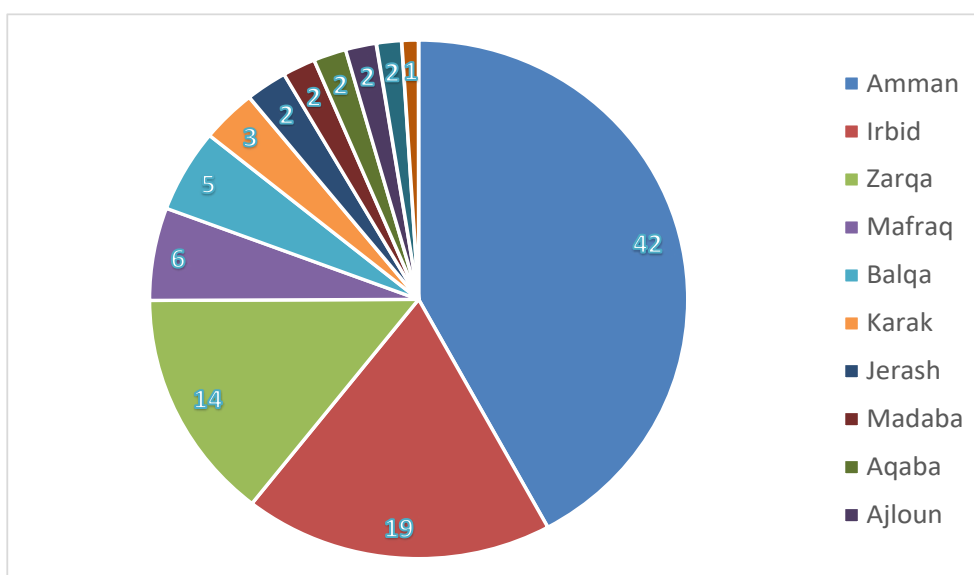


Figure 1: Population of each governorate expressed as a percentage of the overall population in Jordan.

Table 1: Correlation between Gender and Tinnitus.

Gender	Count			Total	P value = 0.786
	Yes	No			
Male	178	448		626	
Female	133	321		454	

Table 2: Characteristics of Tinnitus.

Characteristics	Count	Percentage	
Tinnitus	Yes	311	28.8
	No	769	71.2
Laterality	Unilateral	130	42.6
	Bilateral	175	57.4
Directionality	Right	72	53.7
	Left	62	46.3
Pulsatility	Yes	80	26.2
	No	222	72.8
Continuity	Continuous	14	4.5
	Intermittent	296	95.5

Table 3: Correlation between Dizziness and Tinnitus.

Dizziness		Tinnitus		Total	P value <0.0001
		Yes	No		
Yes	Yes	102	80	182	
	No	207	663	870	
Total		309	743	1052	

Table 4: Correlation between Vertigo and Tinnitus.

Vertigo		Tinnitus		Total	P value <0.0001
		Yes	No		
Yes	Yes	87	65	152	
	No	222	679	901	
Total		309	744	1053	

DISCUSSION

Tinnitus is a common problem that varies in prevalence from 4% to 30% according to previous studies done worldwide^{12, 5}. This variation may be the result of different methodologies used in data collection, the difference in prevalence of risk factors and the age groups that were surveyed. In our study the prevalence of tinnitus in Jordan was found to be 28.8%. This is considered to be high in comparison with other studies, especially in contrast to neighboring countries. For example, the prevalence of tinnitus in Egypt was found to be 5.17%, 4.6% in Iran, and 9.6% in the United States of America¹³.

Although the prevalence of tinnitus in the Blue Mountain Hearing Study done in Australia was close to our result (30.3%)²², the ages of the participants ranged from 55-99 years. In our study the ages ranged from 11- 87 years.

The high prevalence of tinnitus in Jordan can be attributed to increased incidence of sensorineural hearing loss due to many factors including but not limited to the lack of regulation of noise level in the workplace, uncontrolled use of ototoxic medications, lack of regular hearing assessment for those patients and increasing rate of consanguineous marriages reaching almost 35%¹¹. Moreover, increased levels of stress can be considered

a factor that causes tinnitus as it can cause mental changes causing or exacerbating tinnitus^{16, 18}. These are modifiable factors that can be controlled to decrease prevalence of tinnitus in Jordan. Further researches can be done about noise level in workplace, the use of ototoxic medication and hearing assessment for those patients. One of the limitations of our study is that it did not stratify the participants according to their socioeconomic status which can clarify the relationship between stress, educational level, and tinnitus for example and this can be an idea for future researches too.

In our study we found that tinnitus significantly increases with age (p value <0.0001). This result is consistent previous similar studies in the literature. In one study that was conducted in Korea, the prevalence of tinnitus was 16.0–20.5% in ages ranging between 20-54 years. The prevalence increased after 55 years and exceeded 30% after 70 years¹⁴. A systematic review of 26 studies by McCormack et al on the reporting of tinnitus prevalence and severity showed an increase in prevalence as age increases¹⁷. The increase in the prevalence of tinnitus with age can be related to the increasing incidence of hearing loss with age also known as presbycusis. It can also be explained by increased incidence of chronic diseases that can increase the risk of sensorineural hearing loss

and tinnitus. In addition to that, medications used to treat these conditions can carry risk for ototoxicity and tinnitus¹³.

In our study we deduced that bilateral tinnitus is more common than unilateral tinnitus. In 57.4% of those who had tinnitus the tinnitus was bilateral while in 42.6% the tinnitus was unilateral. Hearing loss is one of the most important risk factors of tinnitus². Noise exposure²⁴, aging, chronic diseases and medications that can affect hearing usually affect both ears. These factors may contribute to the higher percentage of bilateral tinnitus.

Regarding difference between genders, our study did not outline a difference between males and females. Studies in Egypt and Japan found no difference between genders which was consistent with our results^{13, 18}. On the other hand, other studies in Saudi Arabia and Iran found that tinnitus prevalence increases slightly in males^{1, 12}. This may be caused by the fact that males are exposed to occupational acoustic trauma more than females¹².

Of note the nature of tinnitus should be determined if it is pulsatile or non-pulsatile⁹. It is determined by how the patient describes tinnitus. These two descriptions have different etiologies and different treatment options. In our study we discovered that 72.8 % of participants reported non-pulsatile tinnitus while only 26.2% reported pulsatile tinnitus.

There are many conditions that are associated with tinnitus and vertigo or dizziness, such as Meniere's disease and vestibular schwannoma. Dizziness differs from vertigo. Vertigo is an illusion of movement caused by asymmetric input to the vestibular system characterized by feeling of rotational movement. Conversely, dizziness is a general term that includes light-headedness, unsteadiness, motion intolerance, imbalance, floating, or a tilting sensation²⁰. This was explained to the participants by the interviewers. We found that tinnitus is significantly related to vertigo and dizziness (p value <0.0001).

CONCLUSION

Our study revealed the high prevalence of tinnitus in Jordan. Most of the factors affecting tinnitus are modifiable. Hence, regulations should be applied to control these risk factors. Increasing awareness of the general population regarding tinnitus and its risk factors is important to prevent it as well.

Declaration of Interests Statement: All authors declare that they have no conflict of interest.

APPENDIX

Tinnitus in Jordan Questionnaire

Questionnaire number.....

Name:

Age:

Gender:

-male

-female

Profession:

Province/city:

Nationality:

Telephone number:

Tinnitus: It is the feeling of noise or sounds in the ear that are not related to an external cause.

Do you complain of tinnitus:

-yes

-No

*If the answer was Yes, then answer questions 9-13:

Do you complain of tinnitus in one ear or both ears?

-one ear

-both ears

In which ear?

-Right

-Left

Since when have you been complaining of tinnitus?

What is the nature of the sound that you hear?

-pulsating sound

-non pulsating sound

Is the sound:

-Continuous

-intermittent

*If the answer was Yes, then answer questions 15-16:

Do you complain of dizziness?

-Yes

-No

Do you complain of imbalance?

-Yes

-No

REFERENCES

1. Henry JA, Dennis KC, Schechter MA. General review of tinnitus. *J Speech Lang Hear Res.*2005; 48:1204-35.
2. Bartels H, Pedersen SS, van der Laan BF, Staal MJ, Albers FW, Middel B. The impact of Type D personality on health-related quality of life in tinnitus patients is mainly mediated by anxiety and depression. *Otology & Neurotology.* 2010 Jan 1;31(1):11-8.
3. Bayar N, Oguztürk Ö, Koç C. Minnesota Multiphasic Personality Inventory profile of patients with subjective tinnitus. *Journal of otolaryngology.* 2002;31(5).

4. Zöger S, Svedlund J, Holgers KM. Relationship between tinnitus severity and psychiatric disorders. *Psychosomatics*. 2006;47(4):282-8.
5. Chung DY, Gannon RP, Mason K. Original papers· travaux originaux: factors affecting the prevalence of tinnitus. *Audiology*. 1984;23(5):441-52.
6. Coles RR. Epidemiology of tinnitus:(1) prevalence. *The Journal of Laryngology & Otology*. 1984;98(S9):7-15.
7. DAVIs AC. The prevalence of hearing impairment and reported hearing disability among adults in Great Britain. *International journal of epidemiology*. 1989;18(4):911-7.
8. Nondahl DM, Cruickshanks KJ, Wiley TL, Klein R, Klein BE, Tweed TS. Prevalence and 5-year incidence of tinnitus among older adults: the epidemiology of hearing loss study. *Journal of the American Academy of Audiology*. 2002;13(06):323-31.
9. Sindhusake D, Mitchell P, Newall P, Golding M, Rochtchina E, Rubin G. Prevalence and characteristics of tinnitus in older adults: the Blue Mountains Hearing Study: Prevalencia y características del acúfeno en adultos mayores: el Estudio de Audición Blue Mountains. *International journal of audiology*. 2003;42(5):289-94.
10. Shargorodsky J, Curhan GC, Farwell WR. Prevalence and characteristics of tinnitus among US adults. *The American journal of medicine*. 2010;123(8):711-8.
11. Masterson EA, Themann CL, Luckhaupt SE, Li J, Calvert GM. Hearing difficulty and tinnitus among US workers and non-workers in 2007. *American journal of industrial medicine*. 2016;59(4):290-300.
12. Ancev T, Nguyen CD, MacAulay G, Hall H. FR2021-053. 2021.
13. Bhatt JM, Lin HW, Bhattacharyya N. Prevalence, severity, exposures, and treatment patterns of tinnitus in the United States. *JAMA Otolaryngology–Head & Neck Surgery*. 2016;142(10):959-65.
14. Jalessi M, Farhadi M, Asghari A, Kamrava SK, Amintehran E, Ghalehbaghi S, et al. Tinnitus: an epidemiologic study in Iranian population. *Acta Medica Iranica*. 2013:886-91.
15. Khedr EM, Ahmed MA, Shawky OA, Mohamed ES, El Attar GS, Mohammad KA. Epidemiological study of chronic tinnitus in Assiut, Egypt. *Neuroepidemiology*. 2010;35(1):45-52.
16. Islam MM, Ababneh FM, Khan MH. Consanguineous marriage in Jordan: an update. *Journal of biosocial science*. 2018;50(4):573-8.
17. Mazurek B, Stöver T, Haupt H, Klapp BF, Adli M, Gross J, et al. The significance of stress: its role in the auditory system and the pathogenesis of tinnitus. *Hno*. 2010;58:162-72.
18. Michikawa T, Nishiwaki Y, Kikuchi Y, Saito H, Mizutari K, Okamoto M, et al. Prevalence and factors associated with tinnitus: a community-based study of Japanese elders. *Journal of epidemiology*. 2010;20(4):271-6.
19. Kim HJ, Lee HJ, An SY, Sim S, Park B, Kim SW, et al. Analysis of the prevalence and associated risk factors of tinnitus in adults. *PloS one*. 2015;10(5):e0127578.
20. McCormack A, Edmondson-Jones M, Somerset S, Hall D. A systematic review of the reporting of tinnitus prevalence and severity. *Hearing research*. 2016;337:70-9.
21. Baguley D, McFerran D, Hall D. Tinnitus. *The Lancet*. 2013;382(9904):1600-7.
22. Zagólski O, Stręk P. Comparison of characteristics observed in tinnitus patients with unilateral vs bilateral symptoms, with both normal hearing threshold and distortion-product otoacoustic emissions. *Acta oto-laryngologica*. 2017;137(2):174-8.
23. Alsanosi AA. Impact of tinnitus on the quality of life among Saudi patients. *Saudi Med J*. 2011;32(12):1274-8.
24. Heller AJ. Classification and epidemiology of tinnitus. *Otolaryngologic Clinics of North America*. 2003;36(2):239-48.
25. Samy HM. Dizziness, Vertigo, and Imbalance Clinical Presentation: History, Physical Examination.