

Characteristics of Tinnitus and its Association with Clinico-Demographic Factors & Mental Health

Maria Murtaza¹, Ghulam Saqulain², Razaqat Ali Rao³

¹ Audiologist, ENT Department, Sheikh Zayed Hospital and Medical College Rahim Yar Khan

² Head of Department, Department of Otorhinolaryngology & CDA Cochlear Implant Centre, Capital Hospital PGMI, Islamabad

³ District ENT Surgeon, Health Department, DHQ Hospital, Chakwal

Author's Contribution

²Conception and design, ³Collection and assembly of data, ^{1,2,3}Analysis and interpretation of the data, Statistical expertise, drafting of article, ³Critical revision of the article for important intellectual content,

Article Info.

Received: January 16, 2023

Acceptance: January 05, 2024

Conflict of Interest: None

Funding Sources: None

Address of Correspondence

Dr Ghulam Saqulain

ghulam_saqulain@yahoo.com

ORCID: 0000-0002-6452-9339

Cite this article as: Murtaza M, Saqulain G, Rao RA. Characteristics of Tinnitus and its Association with Clinico-Demographic Factors & Mental Health. JRCRS. 2024; 12(1):3-9.

DOI:

<https://dx.doi.org/10.53389/JRCRS.2024120102>

A B S T R A C T

Objectives: To determine the characteristics of tinnitus and its association with clinical and demographic variables including psychological health.

Methodology: This cross-sectional study recruited 80 tinnitus cases from ENT outpatients of District Head Quarter Hospital Chakwal from over a period of 6 months from 1st Jan 2019 to 31st June, 2019, using convenience sampling. Sample included both genders, aged 18-75 years with tinnitus for at least three months. Tinnitus Handicap Inventory (THI) & Depression Anxiety and Stress Scale 21 (DASS-21) were used for data collection & analysis done using SPSS-version 20. Anova statistics & Pearsons correlation was determined for THI and DASS-21. Chi-square test was used to see any association with clinic-demographic variables. $P < 0.05$ was considered significant.

Results: Study revealed 30(37.5%) cases with mild, 20(25%) each with moderate and severe while least 4(5%) catastrophic tinnitus. Tinnitus severity was significant associated with gender ($p=0.005$), age ($p=0.035$), educational level ($p=0.049$), occupation ($p=0.002$), duration of tinnitus ($p=0.038$), site of tinnitus ($P < 0.001$) and type of tinnitus sound ($P=0.003$). Duration of tinnitus was associated with anxiety ($p=0.024$), site of tinnitus was associated with THI ($p=0.016$), anxiety ($p=0.021$), stress ($p < 0.001$) and depression ($p=0.02$) and total DASS-21 ($p=0.005$). A significant positive correlation was present between tinnitus handicap, Anxiety, stress, depression and DASS-21 total score ($P < 0.001$).

Conclusion: Mild tinnitus was most prevalent (37.5%) with Tinnitus severity having significant association with gender, age, educational level, occupation, duration of tinnitus, site of tinnitus, and type of tinnitus sound. Duration of tinnitus was also associated with anxiety while site of tinnitus has association with THI, anxiety, stress, depression and total DASS-21. Significant positive correlation is present between THI and Anxiety, stress, depression and DASS-21 total score.

Key Words: Anxiety, Depression, Psychology, Tinnitus.

Introduction

Mental and physical disability both affects one's quality of life by limiting participation in activities of daily living. Health condition of a person, personal factors and environmental factors as described by International Classification of Functioning, Disability and Health Framework all contributed in case of mental and physical disability. Tinnitus

is one of the common mental disorders affecting majority of people worldwide.¹

Tinnitus is a frequently occurring complaint with people worldwide suffering from tinnitus.² It is defined as a conscious perception of sound with no external acoustic stimulus.³ The sound may be unique for an individual like the sound of whistling, hissing & raining etc. and may have intermittent or continuous character resulting in varying level of

annoyance⁴ and can also become catastrophic³ affecting quality of life. ⁴

Tinnitus has previously been associated with auditory hallucinations; however, it is not considered as auditory hallucination or related to schizophrenia. It varies in loudness from 5-10 dB & has a frequency from 6-8 kHz making measuring difficult.² It is labeled as Subjective tinnitus where only the individual affected hears the sound and Objective variety where others around can also hear the tinnitus sound.² Objective variety usually results from either a vascular phenomenon or muscular changes including spasms of middle ear or palatal musculature .²

Tinnitus prevalence ranges from around 5% to 43% however, McCormack A et al. noted a prevalence range of 11.9% to 30.3% for studies utilizing one definition of tinnitus ⁵ while a recent European study reported a prevalence rate of 14.7 to 28.3%.⁶ Tinnitus is a public health concern. Deficient awareness of causes and impact of tinnitus is not without implications especially for audiologists who are responsible for maintain hearing health the population throughout their life span.⁷

Tinnitus is a distressing clinical condition with 0.5 to 2.5% suffering significant distress which interferes with individuals' quality of life ⁸ including psychological conditions.⁹ Also increasing age has been reported to result in increased tinnitus intensity as well as psychological issues, however research is required to further validate the association of tinnitus with psychological issues¹⁰ including depression.¹¹

A study by Reavis KM et al. revealed that population with tinnitus was more vulnerable to depression and anxiety in their lifespan compared to those not having tinnitus, hence determination of association of severity of tinnitus and mental states like depression and anxiety may be important since it can be of help in identifying the population groups who should be considered for targeting interventional strategies.¹²

Zhang et al in 2023 had explored the factors related with acute and chronic tinnitus for understanding clinical, and demographic characteristics and psychoacoustic status of tinnitus patients. Cross-sectional study was carried out for a period of 1 year. The outcomes of this study had interpreted that chronic tinnitus patients were at higher risk for depression, while patients in acute stage were at higher risk for sleep disturbances, anxiety, and an increase of tinnitus perception.¹³

Loughlin et al in 2023 studied the positive attitude of tinnitus patients who had taken rehabilitation programs. The findings of this cross-sectional study had demonstrated that tinnitus patients had shown positive behavior.¹⁴ Cheng et al in

2023 expounded the association of tinnitus and risk of attempted suicide in diagnosed patients of tinnitus. The study was carried out for a period of one year. The results of this study had depicted a positive correlation between risk of suicide and tinnitus. As tinnitus is directly related with stress and depression, hence causes a higher risk of suicide in tinnitus patients.¹⁵

Baniotopoulou et al in 2023 had investigated the relationship between neutral sounds and psychological association. Mayring's content analysis was used for exploring this relationship. Nine tinnitus patients were included in this qualitative examination of patients. The results of the study had illustrated that auditory stimuli are intricately associated with emotional states which can further evoke the emotional reactions. Three sound-induced associations were studied in this research including factors linked to episodic memories, affective factors, and other components like sensory overload and physical stress.¹⁶

Rademaker et al in 2022 explicated that tinnitus is a heterogeneous group of disorders with variations in its onset and its related complications. Mental disease like depression and anxiety have been defines as psychological risk factors for tinnitus.¹⁷ Manuela et al in 2022 investigated different factors which are responsible for causing tinnitus. This observational study had demonstrated various factors with tinnitus such as older age, higher blood pressure, high Body Mass Index, hearing loss, male gender, and smoking history.¹⁸

Molnar et al in 2022 analyzed the correlation between anxiety, depression, and tinnitus handicap among patients having primary tinnitus. 120 patients were examined using Beck Depression Inventory, Tinnitus Handicap Inventory, and Symptom-Checklist-90-Revised. The results of this study had shown that tinnitus handicap had a significant impact on depression scores¹⁹

Literature has suggested research on association of tinnitus with with factors like age and psychological health.⁹ Also studies to verify association of tinnitus with psychological domains of depression and anxiety have been proposed.¹⁰ Hence current study was conducted to determine the characteristics of tinnitus and its association with clinical and demographic variables including psychological health with the research hypothesis that "psychological aspects are associated with tinnitus". This study is of significant importance for clinicians to abreast them to better manage their tinnitus customers and for providing a base for future research.

Methodology

Current cross-sectional study recruited N=80 cases with tinnitus from ENT outpatients of District Head Quarter Hospital Chakwal using non-probability convenience sampling over 6 months' duration from 1st January, 2019 to 31st June, 2019. Sample comprised both genders, aged 18-75 years with complaints of tinnitus for the preceding three months. Patients with Meniere's, Sudden Sensory Neural HL, middle ear diseases were excluded from the study

Basic demographic sheet, Tinnitus Handicap Inventory (THI) and Depression Anxiety and Stress Scale 21 (DASS-21) were utilized for data collection.

THI is a 25-item valid and reliable tool to assess subjective severity of tinnitus handicap with a Chronbach's alpha value of 0.942²⁰. Scoring is based on participants response to each item with 4 points for 'Yes', 2 for 'Sometimes' and 0 for 'No'. The summed response score ranging from 0 to 100, with increased score indicating severity of tinnitus and on the basis of severity it is divided into Catastrophic (78-100), Severe (58-76), moderate (38-56), mild (18-36) and slight (0-16). DASS-21 is a 21-item valid and reliable scale to measure the level of depression, anxiety and stress with 7 items in each with score rated as '0' for 'did not apply to be at all', for 'applied to me to some degree, or some of the time', 2 for 'applied to me a considerable degree or a good part of time' & 3 for 'applied to me very much or most of the time'.

Study was carried out following ethical approval of Institutional Research Board of IIRS, Isra University, Islamabad vide registration No. 1609-MPhil HS-008 dated 29th November, 2018 and informed consent of the study participants before recruiting them for the study.

Patients' data was collected by researcher herself and questionnaire filled by the researcher as per patients' responses. For the statistical analysis of collected data SPSS-version 20 was utilized. Anova statistics were utilized to see association of tinnitus characteristics with DASS-21, Pearson correlation was determined between tinnitus handicap index and DASS-21. Chi-square analyzed association between demographic and clinical variables. $P < 0.05$ was considered significant.

Results

Current study with a sample of N=80 participants (table 1) with mean age of 43.05 ± 16.49 years comprised 42(52.5%) females & 38(47.5%) males with majority 20(25%) each in the age group of 26-45 & 56-65 years with most 22(27.5%) having matric qualification & housewives 22(27.5%).

In current study most 30(37.5%) suffered mild tinnitus handicap followed by moderate and severe in 20(25%) each and least 4(5%) had catastrophic tinnitus.

There was significant association ($p=0.005$) of gender with THI categories with most females having moderate and severe handicap, while most males having mild tinnitus handicap. Similarly, age was significantly associated ($p=0.035$) with THI categories with more 26-35 years and 5 to 65 years age group having severe tinnitus handicap. Also, educational level was associated ($p=0.049$) with severity of tinnitus handicap with those with higher education revealed less severe tinnitus compared to matric. Occupation was also significantly ($p=0.002$) associated with severity of handicap with more housewives having severe tinnitus.

Though history of ENT surgery was present in 12(15%) and hearing was affected in 58(72.5%), however hearing loss and history of ENT surgery were not associated with THI categories. Similarly, no significant association was noted for degree of hearing loss in both right and left ear (table I). Tinnitus characteristics (table II) including duration of tinnitus revealed significant ($p=0.038$) association with THI categories with more cases having moderate and severe handicap in the 3 months to <1 year and <3-month groups, compared to those with longer duration. Similarly, site of tinnitus also revealed significant ($P < 0.001$) association with those having tinnitus in both ears having more severe handicap. Number of tinnitus sounds did not reveal significant association with THI categories. Type of tinnitus sound was significantly ($P=0.003$) associated with THI categories with more cases of machine like and whistling tinnitus in the severe category and more cases of whistling and ocean roar in the catastrophic category.

Anova statistics (table III) revealed significantly association ($p=0.024$) of duration of tinnitus with Anxiety with highest (12.00 ± 10.10) mean scores for < 3months duration and lowest for > 3 years duration (5.33 ± 4.5); while no association with stress, depression and THI score was noted. Site of tinnitus revealed significant association with THI ($p=0.016$), Anxiety ($p=0.021$), Stress ($p < 0.001$) and depression ($p=0.02$) and total DASS-21 ($p=0.005$) with highest sores for right ear. Type of tinnitus did not reveal significant association ($p > 0.05$) with THI and DASS-21 though scores were higher for tonal tinnitus. Different tinnitus sounds did not reveal association ($p > 0.05$) with THI and DASS-21.

Pearson's Correlation matrix (table 4) revealed significant positive correlation of THI with Anxiety, stress, depression and DASS-21 total score with $P < 0.001$. Anxiety, stress, depression and total DASS-21 total were also revealed significantly positive correlation ($p < 0.001$) with each other.

Table I: Frequency distribution of clinic-demographic data of participants versus severity of tinnitus handicap Cross Tabulation & Chi-square association. (n=80)

Variable	Group [n(%)]	Tinnitus Handicap Inventory: Category					Chi-square X2, P-value	
		Slight (n=6)	Mild (n=30)	Moderate (n=20)	Severe (n=20)	Catastrophic (n=4)		
Gender	Male [38(47.5)]	2	22	8	4	2	15.04, 0.005*	
	Female [42(52.5)]	4	8	12	16	2		
Age Group	18-25 [10 (12.5)]	2	4	2	2	0	32.81, 0.035*	
	26-35 [20(25)]	2	4	4	8	2		
	36-45 [12(15)]	0	8	2	2	0		
	46-55 [14(17.5)]	2	4	6	0	2		
	56-65 [20(25)]	0	6	6	8	0		
	66-75 [4(5)]	0	4	0	0	0		
Education	Uneducated [12(15)]	0	4	4	4	0	31.49, 0.049*	
	Primary [4(5)]	0	0	0	4	0		
	Matric [22(27.5)]	2	6	4	8	2		
	Intermediate [4(5)]	0	4	0	0	0		
	Under graduate [18(22.5)]	2	6	6	2	2		
	Post graduate [20(25)]	2	10	6	2	0		
Occupation	House wife [22(27.5)]	0	4	6	10	2	59.32, 0.002*	
	Student [10(12.5)]	2	4	2	2	0		
	Business man [6(7.5)]	0	2	2	0	2		
	Farmer [2(2.5)]	0	2	0	0	0		
	Govt Employee [8(10)]	0	4	2	2	0		
	Retired person [14(17.5)]	0	6	4	4	0		
	No job [4(5)]	0	4	0	0	0		
	Army professional [8(10)]	4	2	2	0	0		
	Traffic warden [6(7.5)]	0	2	2	2	0		
	History of ENT surgery	Yes [12(15)]	0	4	4	2		2
No [68(85)]		6	26	16	18	2		
Hearing	Normal [22(27.5)]	2	12	4	2	2	7.11, 0.13	
	Affected [58(72.5)]	4	18	16	18	2		
Degree of Hearing Loss	Right Ear	Normal [24(30)]	2	10	4	6	2	25.83, 0.057
		Mild [19(23.8)]	0	10	5	2	2	
		Moderate [22(27.5)]	4	5	9	4	0	
		Moderately severe [9(11.3)]	0	3	0	6	0	
		Severe [6(7.5)]	0	2	2	2	0	
	Left Ear	Normal [9(11.3)]	1	3	1	3	1	9.08, 0.696
		Mild [5(6.3)]	0	3	1	1	0	
		Moderate [11(13.8)]	0	5	4	1	1	
		Moderately severe [1(1.3)]	0	0	0	1	0	

Discussion

In current study most 37.5% suffered mild tinnitus handicap followed by moderate and severe in 25% each and least 5% had catastrophic tinnitus. In contrast another local study revealed severe tinnitus in 34.87% and catastrophic in 17.10%.²¹

Current study with a sample of N=80 participants with mean age of 43.05±16.49 years with majority 20(25%) each in the age group of 26-45 & 56-65 years. In a systematic review, Abby Mc Cormack et al. noted that 76.7% researches had reported the development of tinnitus in various age groups, with

a general trend of tinnitus to increase with age.²² Similarly in the current study age was significantly associated (p=0.035) with THI categories with more 26-35 years and 56 to 65 years age group having severe tinnitus handicap. Literature revealed increased prevalence of tinnitus with advancing age.^{4,5} In contrast Ukaegbe OC et al. reported no correlation between THI score and age.²³

In present study, sample included 42(52.5) females & 38(47.5) males with a significant association (p=0.005) of gender with THI categories with most females having moderate and severe handicap, while most males having mild tinnitus handicap. In contrast literature revealed higher prevalence for

Table II: Frequency distribution of characteristics of tinnitus versus severity of tinnitus Cross tabulation & Chi-Square association. (No=80)

Variable	Group [n(%)]	Tinnitus Handicap Inventory: Category					Chi-Square X², P-Value
		Slight (n=6)	Mild (n=30)	Moderate (n=20)	Severe (n=20)	Catastrophic (n=44)	
Duration of Tinnitus	< 3 Month [22(27.5)]	4	6	4	6	2	21.97, 0.038*
	3 month to <1 Year [32(40)]	0	12	10	8	2	
	1 Year to < 3 Years [20(25)]	0	12	4	4	0	
	> 3 Years [6(7.5)]	2	0	2	2	0	
Site of Tinnitus	Right ear [10(12.5)]	0	0	4	4	2	48.00, 0.000*
	Left ear [10(12.5)]	0	6	0	2	2	
	Both ears [58(72.5)]	4	24	16	14	0	
	Somewhere from head [2(2.5)]	2	0	0	0	0	
Number of sound heard	Tonal [50(62.5)]	4	16	12	16	2	4.05, 0.399
	Non- Tonal [30(37.5)]	2	14	8	4	2	
Types of Tinnitus Sound	Insect / Cricket sound [10(12.5)]	0	4	6	0	0	42.06, 0.003*
	Machine like [14(17.5)]	2	4	2	6	0	
	Wind Blowing [8(10)]	0	4	2	2	0	
	Whistling [24(30)]	0	6	8	8	2	
	Ocean roaring [12(15)]	0	6	0	4	2	
	Others [12(15)]	4	6	2	0	0	

males.^{4,15,16} While Ukaegbe OC et al. reported no correlation of THI score with gender.²³

Jung DJ et al. revealed that lower level of education was associated with higher degree of tinnitus.²⁴ Similarly educational level was significantly associated (p=0.049) with severity of tinnitus handicap with those with higher education having less severe tinnitus compared to matric. While occupation was also significantly (p=0.002) associated with severity of handicap with more housewives having severe tinnitus in current study. While literature revealed high occupational noise exposure which was self-reported had association with tinnitus.²⁵ In current study, though history of ENT surgery was present in 12(15%) and hearing was affected in 58(72.5%), however hearing loss and history of ENT surgery were not associated with THI categories. Similarly, no significant association was noted for degree of hearing loss in both right and left ear. Similarly, a study by Cuesta & Cobo revealed that there was no significant correlation between tinnitus distress and HL²⁶ while Gibrin PC et al. reported that HL was affected in 79% cases with tinnitus.²⁷ Similarly in another local study 90% tinnitus patients suffered HL.²¹ However, Aqeel M et al. reported HL to be a significant positive predictor of tinnitus (P<0.001).²⁸ In contrast to our study Biswas R et al. reported significantly higher prevalence of tinnitus with increasing hearing loss⁶ and those with HL suffered significantly more in ADL.¹⁵ While Aqeel M et al reported that

tinnitus with profound HL had less change of psychological issues compared to those with mild or moderate HL.²⁸

Literature reveals no significant correlation of THI score with the characteristics of tinnitus including tinnitus duration, tinnitus frequency, tinnitus loudness and side of tinnitus.²² In contrast current study revealed that duration of tinnitus has significant (p=0.038) association with THI with more cases having moderate and severe handicap <1 year groups, compared to those with longer duration; site of tinnitus having significant (P<0.001) association with those having tinnitus in both ears having more severe handicap; type of tinnitus sound having significantly (P=0.003) associated with THI categories with more cases of machine like and whistling tinnitus in the severe category and more cases of whistling and ocean roar in the catastrophic category. However, number of tinnitus sounds did not reveal significant any association with THI.

Literature reveals association of tinnitus, anxiety and depression.²⁷ While current study revealed significantly association (p=0.024) of duration of tinnitus with Anxiety with highest (12.00±10.10) mean scores for <3months duration and lowest for >3 years duration (5.33±4.5); while no association with stress, depression and THI score was noted. Goma MA reported that duration of tinnitus correlates with depression severity and severity of stress.²⁹

Variable	Group (n)	Depression Anxiety & Stress Scale Score				
		THI Total Score	Anxiety	Stress	Depression	Total DASS
		Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Duration	< 3 Month (22)	43.81±23.57	12.00±10.10	13.45±9.03	9.63±8.18	32.54±21.59
	3 month to <1 Year (32)	46.50±17.20	10.19±6.57	14.37±7.64	11.87±6.79	36.12±19.57
	1 Year to < 3 Years (20)	37.40±19.70	5.6±5.72	11.2±5.89	8.6±7.84	23.7±16.69
	> 3 Years (6)	34.66±19.12	5.33±4.5	8.67±4.13	6.67±5.75	20.67±4.50
	P-value	0.311	0.024	0.239	0.267	0.072
Site of Tinnitus	Right ear (10)	55.60±14.13	15.2±10.03	21.6±8.47	15.6±7.70	46.8±19.71
	Left ear (10)	44.80±21.89	11±10.55	13.6±4.29	10±5.81	33.6±16.73
	Both ears (58)	41.10±19.36	8.07±6.32	11.72±6.65	9.45±7.28	28.65±18.30
	Inside head (2)	10.00±00	2±0	0	0	2
	P-value	0.016	0.021	0	0.02	0.005
Type	Tonal Tinnitus (50)	44.80±20.18	9.88±8.16	12.24±8.498	10.96±7.71	30.56±19.39
	Non- Tonal Tinnitus (30)	38.93±19.36	8±7.01	14±5.66	8.53±6.87	31.4±19.66
	P-value	0.205	0.297	0.316	0.16	0.853
Sound	Insect / Cricket sound (10)	40.80±13.89	9.6±2.46	14.8±3.91	12±6.11	39±16.44
	Machine like (14)	44.00±21.76	10.71±6.16	12.28±9.69	10.28±6.02	32.57±19.33
	Wind Blowing (8)	42.50±17.19	12.5±7.62	12.5±7.31	12±10.47	36.5±24.48
	Whistling (24)	48.16±17.20	10.5±10.21	13.83±8.48	12±7.64	32.5±19.4
	Ocean roaring (12)	45.00±24.82	7±8.16	15.33±5.48	7.67±7.57	30±20.5
	Others (12)	29.00±20.98	4.33±3.41	8±5.78	5.33±5.61	16±10.5
	P-value	0.168	0.133	0.191	0.108	0.075

In current study the hypothesis “psychological aspects are associated with tinnitus” is accepted. It also revealed significant association of THI ($p=0.016$), Anxiety ($p=0.021$), Stress ($p<0.001$) and depression ($p=0.02$) and total DASS-21 ($p=0.005$) with site of tinnitus with highest scores for tinnitus in right ear but type of tinnitus did not reveal association with THI and DASS-21 though scores were higher for tonal tinnitus. Also, different tinnitus sounds did not reveal association with THI and DASS-21 though Stegeman I et al. reported that Stress, anxiety and depression were tinnitus related risk factors.³⁰

In present study significant positive correlation of THI was present with anxiety, stress, depression and DASS-21 total score ($P<0.001$) & anxiety, stress, depression and total DASS-21 total also revealed significantly positive correlation ($p<0.001$) among each other. Similarly significant ($p<0.05$) association between tinnitus and psychological issues including depression and anxiety were reported in another study by Shaid F et al,³¹ However Reavis KM et al. in their population based study also reported association of tinnitus with anxiety and depression¹² A local study by Aqeel M et al. also revealed that tinnitus was significant predictor ($P<0.001$) and significant ($P<0.001$)

positive correlation was present between tinnitus with anxiety, depression and stress.²⁸

Conclusion

This study concluded that with the prevalence of 32%, whistling, tonal and bilateral tinnitus were most prevalent in District Headquarter Hospital Chakwal. There is significant association of tinnitus with depression, anxiety and stress. Tinnitus has impact on the mental life of the patients.

References

1. Beukes EW, Chundu S, Ratinaud P, Andersson G, Manchiaiah V. Experiential characteristics among individuals with tinnitus seeking online psychological interventions: a cluster analysis. *Brain Sciences*. 2022 Sep 9;12(9):1221.
2. Nersissov R, Sengupta A, Sarkar S, Agrawal S, Singh P, Josephraj AN, et al. Tinnitus: A Tingling Mystery to be Decrypted. *The open Neuroimaging Journal*. 2020;13:37-50. DOI: 10.2174/1874440002013010037
3. Messina A, Corvaia A, Marino C. Definition of Tinnitus. *Audiol Res*. 2022 May 23;12(3):281-289. doi: 10.3390/audiolres12030029.
4. Teixeira A, Lessa A, Rosito L, Neves C, Bueno C, Picinini T et al. Influence of factors and personal habits on the tinnitus perception. *Rev. CEFAC*. 2016;18(6):1310-5
5. McCormack A, Edmondson-Jones M, Somerset S, Hall D. A systematic review of the reporting of tinnitus prevalence and severity.

- Hearing Research. 2016;337:70-79. <https://doi.org/10.1016/j.heares.2016.05.009>.
6. Biswas R, Lugo A, Akeroyd MA, Schlee W, Gallus S, Hall DA. Tinnitus prevalence in Europe: a multi-country cross-sectional population study. *The Lancet Regional Health*. 2022;12:100250
 7. Bagwandin V, Joseph L. A survey exploring awareness and experience of tinnitus in young adults. *S Afr J Commun Disord*. 2017 Nov 17;64(1):545. doi: 10.4102/sajcd.v64i1.545.
 8. Hamed SA, Attiah FA, Fawzy M, Azzam M. Evaluation of chronic idiopathic tinnitus and its psychosocial triggers. *World J Clin Cases*. 2023 May 16;11(14):3211-3223. doi: 10.12998/wjcc.v11.i14.3211
 9. Abbas J, Aqeel M, Nurunnabi M, Bano S. Tinnitus perception mediates the relationship between physiological and psychological problems among patients. *Journal of Experimental psychopathology*. 2019;10(3): <https://doi.org/10.1177/2043808719858559>
 10. Gibrin PCD, Ciquinato DSA, Gonoalves IC, Morchiori VM, Morchiori LLM. Tinnitus and its relationship with anxiety and depression in the elderly: a systematic review. *Rev. CEFAC*. 2019;21(4):e7918. <http://dx.doi.org/10.1590/1982-0216/20192147918>.
 11. McCormack A, Edmondson-Jones M, Fortnum H, Dawes PD, Middleton H, Munro KJ, Moore DR. Investigating the association between tinnitus severity and symptoms of depression and anxiety, while controlling for neuroticism, in a large middle-aged UK population. *Int J Audiol*. 2015;54(9):599-604. doi: 10.3109/14992027.2015.1014577. Epub 2015 Mar 13. PMID: 25766493; PMCID: PMC4673512.
 12. REavis KM, Henry JA, Marshall LM, Carison KF. Prevalence of Self-Reported Depression Symptoms and Perceived Anxiety Among Community-Dwelling U.S. Adults Reporting Tinnitus. *Perspectives of the ASHA Special Interest Groups*. 2020;5:959-970. *Perspectives of the ASHA Special Interest Groups*.
 13. Zhang H, Ji L, Wang L, Yin Z, Cen J, Guo Y. Clinical characteristics and psychoacoustic analysis of acute and chronic subjective tinnitus. *Laryngoscope Investigative Otolaryngology*. 2023 Apr;8(2):546-53.
 14. Loughlin J, Das V, Manchaiah V, Beukes E, Andersson G, Shekhawat GS. The positive side of living with tinnitus: A cross-sectional study. *International Journal of Audiology*. 2023 Mar 31:1-8.
 15. Cheng YF, Xirasagar S, Kuo NW, Lin HC. Tinnitus and risk of attempted suicide: A one year follow-up study. *Journal of affective disorders*. 2023 Feb 1;322:141-5.
 16. Baniotopoulou C, Boecking B, Mazurek B. Do you Hear what I Hear? A Qualitative Study Examining Psychological Associations Underlying Evaluations of Everyday Sounds in Patients with Chronic Tinnitus. *Journal of Personalized Medicine*. 2023 Apr 20;13(4):690.
 17. Rademaker MM, Stegeman I, Brabers AE, de Jong JD, Stokroos RJ, Smit AL. Associations between Demographics, Tinnitus Specific-, Audiological-, General-and Mental Health Factors, and the Impact of Tinnitus on Daily Life. *Journal of Clinical Medicine*. 2022 Aug 5;11(15):4590.
 18. Cresswell M, Casanova F, Beaumont RN, Wood AR, Ronan N, Hilton MP, Tyrrell J. Understanding factors that cause tinnitus: A mendelian randomization study in the UK Biobank. *Ear and Hearing*. 2022 Jan 1;43(1):70-80.
 19. Molnár A, Mavrogeni P, Tamás L, Maihoub S. Correlation Between Tinnitus Handicap and Depression and Anxiety Scores. *Ear, Nose & Throat Journal*. 2022 Nov 8:01455613221139211.
 20. Gos E, Sagan A, Skarzynski PH, Skarzynski H. Improved measurement oftinnitus severity: Study of the dimensionality and reliability of the Tinnitus Handicap Inventory. *PLoS ONE*. 2020; 15(8): e0237778.
 21. Zubair M, Mumtaz N, Saqulain G. Tinnitus related handicap in daily living among Pakistani population: A multicenter study. *J Pak Med Assoc*. 2021 Jan;71(1(A)):90-93. doi: 10.47391/JPMA.641.
 22. McCormack A, Edmondson-Jones M, Somerset S, Hall D. A systematic review of the reporting of tinnitus prevalence and severity. *Hear Res*. 2016 Jul;337:70-9. doi: 10.1016/j.heares.2016.05.009.
 23. Ukaegbe OC, Orji FT, Ezeanolue BC, Akpeh JO, Okorafor IA. Tinnitus and Its Effect on the Quality of Life of Sufferers: A Nigerian Cohort Study. 2017;157(4):690-695. <https://doi.org/10.1177/0194599817715257>
 24. Jung DJ, Yoo MH, Jung YJ, Lee HJ, Lee KY. The Influence of Education Level on Tinnitus and Quality of Life in Korean Adults. *Korean J Otorhinolaryngol-Head Neck Surg*. 2019;62 (9): 499-506. doi:<https://doi.org/10.3342/kjorl-hns.2018.00773>
 25. Molaug I, Aarhus L, Mehlum IS, Stokholm ZA, Kolstad HA Engdahl B. Occupational noise exposure and tinnitus: the HUNT Study. *Int. J. Audiol*. 2023; Doi: 10.1080/14992027.2023.2211735
 26. Cuesta M, Cobo P. Audiometric Characteristics and Tinnitus Features in a Cohort of 170 Spanish Patients. *Audiol Res*. 2021 Nov 3;11(4):594-602. doi: 10.3390/audiolres11040053.
 27. Gibrin PC, Melo JJ, Marchiori LL. Prevalence of tinnitus complaints and probable association with hearing loss, diabetes mellitus and hypertension in elderly. *Codas*. 2013;25(2):176-80. English, Portuguese. doi: 10.1590/s2317-17822013000200014.
 28. Aqeel M, Ahmed A, Akhtar T. The mediating role of tinnitus perception between hearing impairment and development of psychological problems in male and female tinnitus patients. 2017;10(9): DOI: 10.1108/IJHRH-05-2017-0017
 29. Gomaa MA, Elmagd MH, Elbadry MM, Kader RM. Depression, Anxiety and Stress Scale in patients with tinnitus and hearing loss. *Eur Arch Otorhinolaryngol*. 2014 Aug;271(8):2177-84. doi: 10.1007/s00405-013-2715-6. Epub 2013 Sep 27.
 30. Stegeman I, Eikelboom RH, Smit AL, Baguley DM, Bucks RS, Stokroos RJ et al. Chapter 19 - Tinnitus and its associations with general health, mental health and hearing loss. *Progress in Brain Research*. Volume 262, 2021, Pages 431-450. <https://doi.org/10.1016/bs.pbr.2021.01.023>
 31. Shaid F, Salman H, Khattak M, Hamid N. Association of anxiety and depression with tinnitus in young adults. *J Postgrad Med Inst* 2020; 34(1): 45-8.

Copyright Policy

All Articles are made available under a Creative Commons "**Attribution-NonCommercial 4.0 International**" license. (<https://creativecommons.org/licenses/by-nc/4.0/>). Copyrights on any open access article published by *Journal Riphah college of Rehabilitation Science (JRCRS)* are retained by the author(s). Authors retain the rights of free downloading/unlimited e-print of full text and sharing/disseminating the article without any restriction, by any means; provided the article is correctly cited. JRCRS does not allow commercial use of the articles published. All articles published represent the view of the authors and do not reflect the official policy of JRCRS.