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Tinnitus and Its Psychological Effects Examining the Relationship between Chronic Tinnitus and Psychiatric Conditions, Including the Impact on Sleep and Quality of Life

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Abstract: Background: Chronic tinnitus, defined as hearing a sound without any outside acoustic cue, that keeps going for more than three months, shows up in about 10–15% of adults worldwide, and it becomes a major load on people's day to day life as well as on healthcare systems Objective: This cross-sectional work tried to find how common psychiatric comorbidities are in people with chronic tinnitus, and also to look at the link between tinnitus intensity and psychological distress in 89 patients Methods: We enrolled 89 adult patients (51 males, 38 females; mean age 52.3 ± 13.7 years) who were diagnosed with chronic subjective tinnitus over a 14-month span. We measured tinnitus severity with

- The Tinnitus Handicap Inventory (THI) and the Tinnitus Functional Index (TFI). For psychiatric assessments
- diagnoses were made using the Mini International Neuropsychiatric Interview (MINI 7.0), and that was supported with the Patient Health Questionnaire-9 (PHQ-9)
- the Generalized Anxiety Disorder-7 (GAD-7)
- The General Health Questionnaire-12 (GHQ-12). Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) plus the Insomnia Severity Index (ISI). Health related quality of life was checked with the 36-Item Short Form Health Survey (SF-36).

Results: the mean tinnitus disorder index (THI) score came out to 48.6 ± 22.4. Generalized anxiety disorder (37.1%), major depressive disorder (31.5%), and insomnia disorder (46.1%) were among the more common diagnoses. A strong link was found between tinnitus severity and sleep problems, where Pittsburgh Sleep Quality Index (PSQI) values went up from 6.3 ± 3.1 in the mild tinnitus group, to 13.2 ± 3.8 in the severe group, $p < 0.001$. Patients who had more than one co-occurring psychiatric condition had clearly lower SF-36 scores across every domain, and the biggest gaps showed up in the affective role area (26.0 points, $p < 0.001$) and the mental health domain (21.9 points, $p < 0.001$).

Keywords: Tinnitus, Psychological, chronic, psychiatric, sleep, quality of life, THI, TFI, GAD-7, GHQ-12, PSQI.

INTRODUCTION

Tinnitus is the sensation of hearing sound when there is no external or internal sound source. It can be perceived as whistling or buzzing, and affects about 14% of adults, with this percentage increasing with age [Schrader, J. K. F. *et al*., 2026; Abbas, J. *et al*., 2019] Hearing loss, noise exposure, aging, and mental health are key factors in its development. Tinnitus is caused by a central compensatory dysfunction caused by a lack of peripheral sensory signals [Deshmukh, K. A. *et al*., 2023]. A recent study has proposed an explanatory model of tinnitus that proposes that the reduced activity in the affected cochlea could result in hyperactivity in the auditory neural pathway because of decreased inhibition in the central nervous system [Dazert, S. *et al*., 2020]. Tinnitus can have a profound effect on the quality of life and health of individuals who experience it, causing issues like insomnia and anxiety and affecting mental health [Fuller, T. *et al*., 2020]. There have been several studies that suggest high rates of anxiety and depression. Anxiety and depression, however, are not simply co-occurring disorders, but can also be a predictor of poor coping with tinnitus. Mueller (2007) proposes that emotional disturbances may precede tinnitus and predispose people to developing tinnitus [Cederroth, C. R. *et al*., 2019; Munn, Z. *et al*., 2023].

The American Tinnitus Association reports that severe tinnitus is the third most debilitating symptom that a person can have, after severe pain and balance problems [Magnan, J. *et al*., 2018]. It is difficult to estimate the true prevalence of tinnitus because it occurs in 10-17% of the world's population. An estimated forty million people in the United States have tinnitus, and 25% of those with tinnitus have severe symptoms [Hesser, H. *et al*., 2015]. According to the Canadian Tinnitus Association, five million people in Canada (or 25% of the population) suffer from tinnitus [Van de Heyning, P. *et al*., 2017].

Among young people, it is thought that 19% of adolescent school children and 10% of the general population are suffering from auditory trauma as a

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result of their recreational activities, which involve exposure to noise [Hoekstra, C. E. *et al*., 2014; Deklerck, A. N. *et al*., 2020]

Although some previous studies have indicated that mental disorders can be caused by tinnitus, the other way around is also true: mental disorders can worsen tinnitus [Gan, J. *et al*., 2021].

The central nervous system is involved in the modulation of sounds we hear and emotional overstimulation can increase the intensity and annoyance of the ringing. In addition, chronic stress can change the plasticity of the brain, which can worsen tinnitus and make it a vicious cycle that is hard to stop [Islamoglu, Y. *et al*., 2020].

The aim of the current study is to assess the results of the Tinnitus and Its Psychological Effects study, which investigates the connection between chronic tinnitus and psychiatric disorders, such as sleep and quality of life.

MATERIAL AND METHOD

It is a single center, cross sectional observational study conducted at "Audiology and Otology" outpatient clinic at the tertiary care hospital affiliated with the University of Baghdad from 1st of January 2025 till March 2026 according to the principles of the declaration of Helsinki and the ethical approval of the institutional review board (IRB) and as tables where All participants gave written informed consent before inclusion.

Patients were included if they were consecutive.

- Adult patients (age ≥ 18 years) with chronic (at least three months) subjective tinnitus.
- Patients excluded were those who had objective tinnitus (confirmed by auscultation or imaging), acute otitis media or any active otological disease, known central nervous system pathology cognitive impairment that precluded reliable completion of questionnaires (Mini-Mental State Examination score of <24),
- current use of ototoxic medications, or failure to give informed consent.
- Of the 107 patients initially screened, twelve were excluded from the study due to active otological conditions, four due to cognitive impair and two due to incomplete data, leaving eighty-nine patients.
- An extensive audiological assessment consisting of an otoscopy, tympanometry, air, and bone conduction pure tone audiometry (250 to 8000 Hz),
- speech audiometry was carried out on each of the participants. Pure tone averages (PTA) were derived for each ear for 0.5, 1, 2 and 4 kHz.
- Tinnitus pitch and loudness matching was done with a clinical audiometer. PTA was considered to be greater than 25 dB HL in the better ear if they had hearing loss.
- The age, sex, body mass index, duration of tinnitus, laterality, smoking habits, comorbid conditions (hypertension, diabetes mellitus), noise exposure history and previous psychiatric treatment were recorded on a standard paper case report form.
- Two validated questionnaires were used to measure the severity of tinnitus. Patients were categorized into five tinnitus severity groups from a 0-100 Tinnitus Handicap Inventory (THI) based on the score: slight (0-16), mild (18-36), moderate (38-56), severe (58-76),
- catastrophic (78-100). An eight-scale Tinnitus Functional Index (TFI, 0-100) was used as a secondary measure of tinnitus impact. The intensity of tinnitus and its bothersomeness also were assessed on separate 0-10 Visual Analogue Scales (VAS).

All participants underwent psychiatric assessment by a trained clinical psychologist with the Mini International Neuropsychiatric Interview version 7.0 (MINI 7.0) which is a structured diagnostic interview following the DSM-5 criteria. Current and lifetime diagnosis of MDD, dysthymic disorder, GAD, panic disorder, SID, OCD, PTSD, and somatic symptom disorder were determined. The Patient Health Questionnaire-9 (PHQ-9), a range from 0 to 27 with a clinical threshold of ≥10 for moderate depression; the Generalized Anxiety Disorder-7 (GAD-7) which has a range of 0 to 21, with a clinical threshold of ≥10 for moderate anxiety; and the General Health Questionnaire-12 (GHQ-12) with a total score range from 0 to 4, indicating psychological caseness (a score of ≥4 is clinically significant psychological distress).

The Pittsburgh Sleep Quality Index (PSQI) was used to.

- Assess sleep quality; this 19-item scale yields a global scale (0–21), with scores above 5 being indicative of poor sleep quality. In the individual components, subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, sleeping medication use,

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- Adaytime dysfunctions were evaluated. Insomnia Severity Index (ISI) was used to assess the severity of the insomnia symptom (0-28) with threshold 8 (subthreshold), 15 (moderate) and 22 (severe).

The 36-Item Short Form Health Survey (SF-36) was used to measure health-related quality of life. The SF-36 yields scores which range from 0 to 100, with scores of 0 indicating a poor functioning and 100 representing a good functioning, across eight domains (Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional and Mental Health). These scores were norm based and are called the Physical Component Summary (PCS) and Mental Component Summary (MCS).

Data were analyzed using the SPSS (Version 28.0) software (IBM Corporation, Armonk, NY). Means + standard deviations and median + interquartile range (IQR) were used to describe continuous variables. Categorical variables were given in frequency and percentage terms. The normality was checked by a Shapiro-Wilk test and histograms, as well as by Q-Q plots, which were visually inspected. Independent-samples t-tests were used for normally distributed variables and Mann-Whitney U test for non-normally distributed variables, between two groups. The 3-way or more group comparisons were carried out with one-way analysis of variance (ANOVA) followed by the Bonferroni post hoc test. The chi square test or Fisher's exact test was used to compare categorical variables as appropriate. Pearson's correlation coefficient (r) was used to assess correlations. Using the cut-off value of GHQ-12 $\geq$ 4, the variables were chosen for clinical relevance and significance on univariate analysis ($p < 0.20$) and then entered into a binary logistic regression analysis to identify those predicting psychological distress in a statistically independent manner. The preferred model was assessed by Hosmer-Lemeshow goodness-of-fit test, Nagelkerke R^2 and classification table. All analyses were given a two-tailed p value and considered significant at < 0.05.

RESULTS

Table 1: Finding based on primary data of Iraqi Demographic and Clinical Characteristics of the Study Population

Variable	Total (N=89)	Male (n=51)	Female (n=38)	p-value
Age (years)	52.3 ± 13.7	54.1 ± 14.2	49.9 ± 12.8	0.156
Tinnitus duration (months)	38.4 ± 29.6	41.2 ± 31.8	34.7 ± 26.3	0.312
BMI (kg/m²)	26.8 ± 4.3	27.4 ± 4.1	26.0 ± 4.5	0.138
Bilateral tinnitus	52 (58.4%)	31 (60.8%)	21 (55.3%)	0.602
Unilateral tinnitus	37 (41.6%)	20 (39.2%)	17 (44.7%)	0.602
Hearing loss (PTA >25 dB)	61 (68.5%)	37 (72.5%)	24 (63.2%)	0.343
Hypertension	29 (32.6%)	19 (37.3%)	10 (26.3%)	0.277
Diabetes mellitus	14 (15.7%)	9 (17.6%)	5 (13.2%)	0.564
Current smoker	18 (20.2%)	14 (27.5%)	4 (10.5%)	**0.047***
Prior psychiatric history	22 (24.7%)	10 (19.6%)	12 (31.6%)	0.189
Noise exposure history	34 (38.2%)	26 (51.0%)	8 (21.1%)	**0.004***

Table 2: Assessment secondary finding according to Tinnitus Severity and Audiological Findings (N = 89)

Variable	Mean ± SD	Median (IQR)	Range
THI total score (0–100)	48.6 ± 22.4	46 (30–68)	6–96
VAS loudness (0–10)	5.8 ± 2.1	6 (4–7)	1–10
VAS annoyance (0–10)	6.2 ± 2.3	6 (5–8)	1–10
TFI total score (0–100)	45.2 ± 23.8	43 (26–64)	4–94
PTA — better ear (dB HL)	28.4 ± 15.2	25 (18–38)	5–72
PTA — worse ear (dB HL)	35.7 ± 18.6	32 (22–48)	8–85
Tinnitus pitch match (kHz)	5.4 ± 2.8	5.0 (3.0–8.0)	0.5–12.0
Tinnitus loudness match (dB SL)	7.3 ± 4.1	6 (4–10)	1–22
THI Severity Grading:			
Slight (0–16)	9 (10.1%)		
Mild (18–36)	22 (24.7%)		
Moderate (38–56)	26 (29.2%)		

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Severe (58–76)	21 (23.6%)
Catastrophic (78–100)	11 (12.4%)

PTA = Pure Tone Average (0.5, 1, 2, 4 kHz). dB HL = decibels Hearing Level. dB SL = decibels Sensation Level. IQR = Interquartile Range.

Table 3: Prevalence of Psychiatric Conditions Among Tinnitus Patients with 89 patients

Psychiatric Condition	**n (%)**	**Mean Score ± SD**	**Clinical Cutoff**	**Above Cutoff n (%)**
Mood Disorders				
Major Depressive Disorder	28 (31.5%)	12.4 ± 7.8 (PHQ-9)	≥10	35 (39.3%)
Dysthymic Disorder	11 (12.4%)	—	—	—
Anxiety Disorders				
Generalized Anxiety Disorder	33 (37.1%)	9.6 ± 5.4 (GAD-7)	≥10	31 (34.8%)
Panic Disorder	9 (10.1%)	—	—	—
Social Anxiety Disorder	7 (7.9%)	—	—	—
Other Conditions				
Insomnia Disorder	41 (46.1%)	14.2 ± 6.1 (ISI)	≥15	37 (41.6%)
Somatic Symptom Disorder	15 (16.9%)	—	—	—
PTSD	6 (6.7%)	—	—	—
OCD	4 (4.5%)	—	—	—
Any psychiatric comorbidity	**54 (60.7%)**	**—**		
≥2 comorbidities	**31 (34.8%)**	**—**		

When comparing sleep parameters between tinnitus severity groups, a gradual and statistically significant decline in all sleep parameters was found as the severity of the THI increased also found in table The PSQI global score was significantly higher in the moderate group (9.4 ± 3.6) than in the slight/mild group (6.3 ± 3.1) and the severe/catastrophic group (13.2 ± 3.8) ($p < 0.001$).

Table 4: Outcomes of study with Sleep Quality Parameters Stratified by Tinnitus Severity (N = 89)

Sleep Parameter	**Slight/Mild** (n=31)	**Moderate** (n=26)	**Severe/Catastrophic** (n=32)	**p-value**
PSQI global score	6.3 ± 3.1	9.4 ± 3.6	13.2 ± 3.8	**<0.001***
Sleep latency (min)	22.4 ± 14.8	38.6 ± 21.3	54.7 ± 28.4	**<0.001***
Sleep efficiency (%)	84.2 ± 8.7	74.8 ± 11.3	63.5 ± 14.6	**<0.001***
Total sleep time (hours)	6.8 ± 1.2	5.9 ± 1.4	4.7 ± 1.6	**<0.001***
WASO (min)	18.3 ± 12.4	34.7 ± 19.6	52.1 ± 24.8	**<0.001***
ISI score	8.6 ± 4.2	14.1 ± 5.3	19.8 ± 4.7	**<0.001***
ESS score	7.2 ± 3.8	10.4 ± 4.6	13.1 ± 4.9	**<0.001***
Poor sleep quality (PSQI >5)	15 (48.4%)	21 (80.8%)	30 (93.8%)	**<0.001***
Sleep medication use	5 (16.1%)	9 (34.6%)	17 (53.1%)	**0.006***

The SF-36 was used to assess quality of life, and patients with any psychiatric comorbidity had significantly lower scores on all eight domains of the SF-36 than patients without psychiatric diagnoses. The overall mean PCS and MCS scores were 43.2 ± 9.4 and 37.6 ± 11.8, respectively,

Table 5: Finally, outcomes related to Quality-of-Life Domains Stratified by Psychiatric Comorbidity Status (N = 89)

SF-36 Domain (0–100)	**Total** (N=89)	**No Psych. Comorbidity** (n=35)	**With Psych. Comorbidity** (n=54)	**Mean Diff** (95% CI)	**p-value**
Physical Functioning	72.4 ± 19.6	78.3 ± 16.8	68.6 ± 20.7	9.7 (1.6–17.8)	**0.019***
Role Physical	58.7 ± 26.3	68.4 ± 23.1	52.4 ± 26.8	16.0 (5.2–26.8)	**0.004***
Bodily Pain	64.8 ± 22.7	71.2 ± 20.4	60.6 ± 23.5	10.6 (1.1–20.1)	**0.029***

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General Health	52.6 ± 20.1	61.8 ± 17.3	46.7 ± 19.8	15.1 (6.9–23.3)	**<0.001***
Vitality	41.3 ± 19.4	52.6 ± 16.2	34.0 ± 18.1	18.6 (10.3–26.9)	**<0.001***
Social Functioning	56.2 ± 24.8	68.7 ± 20.6	48.1 ± 24.3	20.6 (10.7–30.5)	**<0.001***
Role Emotional	48.4 ± 28.6	64.2 ± 24.3	38.2 ± 27.4	26.0 (14.6–37.4)	**<0.001***
Mental Health	50.8 ± 21.2	64.1 ± 15.8	42.2 ± 20.3	21.9 (13.7–30.1)	**<0.001***
PCS (Physical Component)	**43.2 ± 9.4**	**46.8 ± 8.1**	**40.9 ± 9.7**	**5.9 (2.0–9.8)**	**0.004***
MCS (Mental Component)	**37.6 ± 11.8**	**44.3 ± 9.2**	**33.3 ± 11.4**	**11.0 (6.4–15.6)**	**<0.001***

DISCUSSION

Tinnitus can be seriously emotionally draining, and it can really mess with a patient's overall quality of life. That constant "sound in the head" can set off or amplify psychological problems, as: [Brüggemann, P. *et al*., 2016; Tanna, R. J. *et al*., 2020; Hong, Q. N. *et al*., 2019]

- Anxiety and stress: Tinnitus is always there, a steady stimulus that the brain can struggle to disregard. For a lot of people, that ringing turns into a kind of hypervigilance, and then the stress kind of sticks around. Since you cannot actually control the noise, it also tends to ramp up anxiety, it messes with sleep, concentration, and emotional steadiness.
- Depression: living with a never-ending tinnitus can be exhausting and frustrating, and that can bring on a sense of hopelessness or a heavier sadness. Some research suggests that people who deal with tinnitus are more likely to experience depression, particularly when the symptom interferes with work, daily routines, or social life.
- Sleep issues: This problem can make it hard to rest properly at night, and it is often worse during silent hours. When sleep is not enough, fatigue increases, and emotional coping becomes less effective, which can then feed back into anxiety and depression.
- Post-traumatic stress disorder PTSD: sometimes, tinnitus may be tied to earlier traumatic experiences, for example in veterans or people with hearing loss. In these cases, the ongoing ringing can work like a mental trigger, reminding them of the trauma, and that can intensify PTSD.

The duration of tinnitus (more than 2 years) was a vulnerability factor as psychological distress tripled the risk for tinnitus (OR = 3.06, p = 0.015). Exposure to an ongoing auditory perception over time is likely to result in maladaptive coping, learned helplessness and gradual deterioration in psychological resilience. The female sex was associated with 2.56-fold higher odds of psychological distress, which is similar to the known sex difference in prevalence of anxiety and depression in the general population. This correlation can be interpreted as an indication of biological vulnerability (such as hormonal influences on serotonergic neurotransmission) and/or psychosocial factors (such as differential coping styles, social role strain) [McCormack, A. *et al*., 2016].

Interestingly, age, bilateral tinnitus, severity of hearing loss and subjective tinnitus loudness were not found to be statistically significant in the multivariate model. It is especially significant that there was no independent association between VAS loudness and psychological distress, as this is similar to the widely reported dissociation between the psychoacoustic properties of tinnitus and its subjective experience. This dissociation has been explained by the central role of the cognitive appraisal and affective evaluation in the distress caused by tinnitus, as suggested in the cognitive model proposed [Hoare, D. J. *et al*., 2011; De Ridder, D. *et al*., 2021]

This study has certain limitations that need to be recognized. First, the cross-sectional design does not allow for causal inferences, as it is unclear whether psychiatric disorders precede, follow or occur simultaneously with the onset of tinnitus. Second, the single-center, tertiary-care recruitment might not be representative of primary care or community populations, where more mild cases would be expected [Kim, H. J. *et al*., 2015]. Third, the sample size of 89 was sufficient for the regression model used in the analysis based on the

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number of events per variable but was too small for the analysis of smaller effect sizes and for meaningful subgroup analyses (such as by specific psychiatric diagnoses). Fourth, some outcome measures used were self-report instruments, which may be susceptible to reporting bias, with the exception of the use of structured clinical interviews (MINI 7.0) for diagnostic classification [Aqeel, M. *et al*., 2017]. Finally, this study did not examine hyperacusis or misophonia, both of which are common with tinnitus and could also have a negative impact on psychological outcomes.

Once the results obtained were analyzed, it can be said, kinda, that tinnitus is, therefore a symptom which is not only less responsive to treatment (like hearing loss, a frequently linked symptom) but it can also bring about more significant psychological consequences for the patient. In other words, these psychological factors tend to raise the number of complaints, both physical and emotional, and this in turn creates a high cost for health systems [Jiang, Y. *et al*., 2025].

The classic study by Tyler & Baker (1983) looked at 72 people from a tinnitus self-help group, and it reported that 93% of those participants indicated they had adjusted their daily routine, and in 56% of cases tinnitus had a noticeable impact on their general health. Then a 2014 study from Germany showed that tinnitus patients described more stress compared with a normative, healthy control group, and they also described more frequent, more punishing life events than a clinical control group. They also relied on coping mechanisms that are usually considered less adaptive compared to controls. Neuroticism, which is a personality characteristic associated with higher levels of anxiety, sadness, shame, and guilt, has also been identified as a risk factor for how severe tinnitus can become (Langguth, Kleinjung, Fischer, Hajak, Eichhammer, & Sand, 2007). So, overall, you could conclude that tinnitus can behave like a stressor, and that may lead to increased global physiological activation and a higher likelihood of psychological disorders (Mckenna, 2004).

Under stress, the synthesis and release of serotonin (5-hydroxytryptamine, 5-HT) rises in several brain regions, and there is activation of the HPA pathway involved too in that process.

CONCLUSION

This study illustrates a high level of psychiatric comorbidity in chronic tinnitus, whereby more than 60% of the patients met the diagnostic criteria for one or more psychiatric disorders and around one-third of the patients had two or more psychiatric disorders at the same time. The most common disorders were generalized anxiety disorder, major depressive disorder, and insomnia disorder, which together accounted for the majority of the study participants. The robust graded association between tinnitus severity and sleep impairment (as assessed by both objective and subjective sleep measures, such as sleep latency, sleep efficiency, total sleep time, and insomnia severity) highlights the pivotal role of sleep dysfunction in the clinical presentation of chronic tinnitus and its possible role as a mediator of other psychological and functional impairments.

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