



Research

Investigation of the Relationship Between Suicidal Behavior and Anxiety Sensitivity and Somatosensory Amplification in Patients with Tinnitus

Tinnitus Hastalarında İntihar Davranışı, Anksiyete Duyarlılığı ve Somatosensoriyal Amplifikasyon Arasındaki İlişkinin İncelenmesi

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ABSTRACT

Objective: Some patients with tinnitus experience substantial psychosocial challenges. This study aimed to investigate the relationships among tinnitus severity, anxiety sensitivity, somatosensory amplification, and suicidal behavior. Additionally, the study examined whether tinnitus patients and healthy controls on these factors.

Methods: The study consisted of 45 patients admitted to the otorhinolaryngology clinic with complaints of tinnitus; and 45 healthy individuals. We administered the sociodemographic and clinical data form, Tinnitus Handicap Inventory (THI), anxiety sensitivity index-3 (ASI-3), somatosensory amplification scale (SSAS), and suicidal behaviors questionnaire (SBQ) to the study participants.

Results: No significant differences were found between the patient and control groups in ASI-3, SSAS, and SBQ scores (all $p>0.05$). However, in the tinnitus group, positive correlations were observed between THI total scores and ASI-3 ($r=0.55$; $p<0.001$), SSAS ($r=0.47$; $p=0.001$), and SBQ ($r=0.72$; $p<0.001$). According to the multiple regression analysis, 44% of the variance in SBQ scores was explained by THI ($F=34.37$; $p<0.001$). When ASI-3 was added to the model, the explained variance increased to 49% ($F=20.22$; $p<0.001$), and with the addition of SSAS, it increased further to 50% ($F=13.55$; $p<0.001$). However, in this model, only THI ($p<0.001$) and ASI-3 ($p=0.043$) made significant contributions, while the effect of SSAS was not statistically significant ($p=0.443$). Mediation analysis revealed that ASI-3 partially mediated the relationship between THI and SBQ, whereas SSAS had no significant mediating effect.

Conclusion: Our findings suggest that tinnitus severity may be closely associated with suicidal tendency, particularly as anxiety sensitivity increases.

Keywords: Subjective tinnitus, anxiety, somatosensory amplification, suicidal ideation

ÖZ

Amaç: Tinnitus hastası bazı bireyler, önemli psikososyal zorluklar yaşamaktadır. Bu çalışma, tinnitus şiddeti, anksiyete duyarlılığı, somatosensoryal amplifikasyon ve intihar davranışı arasındaki ilişkileri araştırmayı amaçlamıştır. Ayrıca, tinnitus hastaları ile sağlıklı kontrol grupları arasında bu faktörler açısından farklılık olup olmadığını incelemiştir.

Gereç ve Yöntem: Çalışma, tinnitus şikayetiyle kulak burun boğaz kliniğine başvuran 45 hasta ve 45 sağlıklı bireyden oluşmuştur. Çalışma katılımcılarına sosyodemografik ve klinik veri formu, Tinnitus Handicap Envanteri (THE), anksiyete duyarlılığı indeksi-3 (ADİ-3), somatosensoryal amplifikasyon ölçeği (SAÖ) ve intihar davranışı ölçeği (İDÖ) uygulanmıştır.

Bulgular: Gruplar arasında ADİ-3, SAÖ ve İDÖ puanları açısından kontrol grubuna göre anlamlı fark saptanmamıştır (tümü $p>0.05$). Bununla birlikte, tinnitus tanılı hasta grubunda THE toplam puanı ile ADİ-3 ($r=0.55$; $p<0.001$), SAÖ ($r=0.47$; $p=0.001$) ve İDÖ ($r=0.72$; $p<0.001$) arasında pozitif korelasyonlar bulunmuştur. Çok değişkenli regresyon analizine göre, İDÖ puanlarındaki varyansın %44'ü THE ile ($F=34.37$; $p<0.001$) açıklanmıştır. ADİ-3 eklendiğinde açıklanan varyans %49'a yükselmiş ($F=20.22$; $p<0.001$), SAÖ'nün de eklenmesiyle %50'ye ulaşmıştır ($F=13.55$; $p<0.001$). Ancak bu modelde yalnızca THE ($p<0.001$) ve ADİ-3 ($p=0.043$) anlamlı katkı sağlamış; SAÖ'nün etkisi anlamlı bulunmamıştır ($p=0.443$). Mediasyon analizi, ADİ-3'ün THE ile İDÖ arasındaki ilişkiyi kısmen aracıldığını, SAÖ'nün ise anlamlı bir aracılık etkisine sahip olmadığını göstermiştir.

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ÖZ

Sonuç: Bulgularımız tinnitus şiddetinin, özellikle anksiyete duyarlılığı arttıkça intihar eğilimiyle yakından ilişkili olabileceğini göstermektedir.

Anahtar Kelimeler: Subjektif tinnitus, anksiyete, somatosensoryal amplifikasyon, intihar düşüncesi

INTRODUCTION

Tinnitus is the perception of sound without an external source, commonly described as buzzing, ringing, whistling, or hissing. It affects a significant portion of the population, with prevalence rates ranging from 8% to 30%, and becomes more common with age (1). While some individuals tolerate tinnitus without seeking medical attention, others experience substantial psychosocial challenges (2). The condition is heterogeneous in clinical presentation and etiology, and no reliable objective measure exists to diagnose tinnitus (3).

Tinnitus is associated with various factors, including exposure to loud noise, head and neck injuries, and underlying medical conditions such as hearing loss, neurological disorders, and psychiatric illnesses (4). Its pathophysiology involves both auditory and central nervous system dysfunctions, with neuroimaging studies showing changes in brain areas such as the limbic system and prefrontal cortex, which may contribute to the psychological distress experienced by patients with tinnitus (5,6).

The relationship between tinnitus and psychiatric conditions, particularly anxiety, depression, and suicidal behavior, has been well-documented (7). Previous studies suggest that tinnitus may be both a consequence and a trigger of psychiatric symptoms, creating a vicious cycle in which tinnitus exacerbates psychological distress, which in turn worsens the perception of tinnitus (8,9). Suicidal behavior has also been linked to tinnitus, particularly in individuals with underlying psychiatric conditions, although the exact nature of this relationship remains complex and multifactorial (10).

While psychiatric comorbidities of tinnitus, such as anxiety and depression, have been extensively studied, fewer investigations have focused on the combined roles of anxiety sensitivity, somatosensory amplification, and suicidal behavior in tinnitus patients. Understanding how these factors interact may provide deeper insight into the psychological mechanisms that exacerbate tinnitus severity and contribute to the distress experienced by patients. This study aims to explore the association between tinnitus severity and psychiatric factors such as anxiety sensitivity, somatosensory amplification, and suicidal behavior in adults diagnosed with subjective tinnitus. Additionally, we aim to

determine whether these factors differ between tinnitus patients and healthy controls.

METHODS**Participants**

This cross-sectional case-control study was conducted at the otorhinolaryngology outpatient clinic between December 2019 and June 2022 and enrolled patients clinically diagnosed with subjective tinnitus. Eligibility criteria required participants to be over 18 years of age, to have no severe medical or neurological disorders, and not to be receiving active psychiatric treatment at the time of assessment. Individuals with a documented psychiatric diagnosis or psychotropic medication use within the preceding 6 months were excluded to minimize potential confounding effects of acute psychiatric symptomatology. Participants with a more distant psychiatric history but without any current diagnosis or medication record in the institutional health system and who were evaluated as clinically stable based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition criteria were considered eligible for inclusion. Detailed otorhinolaryngological evaluations were performed to exclude secondary causes, such as otologic or systemic diseases. Patients with mild sensorineural hearing loss, defined as thresholds of 25-40 dB HL on pure-tone audiometry, were included because mild hearing loss is commonly observed in idiopathic tinnitus and does not directly affect the psychological variables under investigation. Individuals with moderate to severe hearing loss (>40 dB HL) or conductive hearing loss were excluded. Idiopathic tinnitus was defined as subjective tinnitus without any identifiable cause. Patients underwent otoscopic examination, pure tone audiometry, and basic laboratory screening. The control group consisted of age- and sex-matched healthy individuals recruited from hospital staff and patient relatives who reported no tinnitus or hearing loss. Written informed consent was obtained from all participants prior to enrollment.

The sample size was determined a priori based on effect sizes reported in the literature examining the relationship between tinnitus severity and psychological variables. In a reference study, the correlation between Tinnitus Handicap Inventory (THI) and anxiety symptoms was reported as

$r=0.532$ (11). This value was adopted as the target effect size, and a power analysis was conducted using G*Power 3.1.9.7 under the option linear multiple regression: fixed model, R^2 deviation from zero. Assuming $\alpha=0.05$, power $(1-\beta)=0.80$, and $f^2=0.395$ (derived from $r=0.532$), the minimum required sample size was estimated to be approximately $n=30$ (for 3 predictors). As the tinnitus group in the present study consisted of $n=45$, the sample size provides sufficient power to detect the moderate-to-large effects reported in previous research.

A total of 45 patients with idiopathic tinnitus were included in the case group, while the control group consisted of 45 healthy volunteers with no physical or psychiatric disorders. The study received ethical approval from the Recep Tayyip Erdoğan University Faculty of Medicine, Non-Interventional Clinical Research Ethics Committee (approval no: 2019/202, date: 12.12.2019).

Measures

Sociodemographic and Clinical Data Form

The researchers designed a questionnaire to collect data on the study's independent variables, including sociodemographic and clinical characteristics of patients and healthy volunteers. The form collected data on age, sex, education, smoking, alcohol consumption, occupation, chronic diseases, history of psychiatric treatment, history of suicide attempts, and family history of suicide attempts.

The somatosensory amplification scale (SSAS), developed by Barsky et al. (12), consists of 10 statements that assess participants' sensitivity to bodily sensations. Each item is scored on a 5-point scale, with higher scores indicating greater symptom amplification. The Turkish validity and reliability study was conducted by Güleç and Sayar (13).

The anxiety sensitivity index-3 (ASI-3) is the latest version of the ASI. It is an 18-item self-report scale that assesses anxiety sensitivity across 3 domains: social, physical, and cognitive. Each item is rated on a five-point scale, with total possible scores ranging from 0 to 72; higher scores indicate greater anxiety sensitivity (14). The Turkish version was validated by Mantar et al. (15).

Suicidal Behaviors Questionnaire

The suicidal behaviors questionnaire (SBQ) is a self-reported measure that assesses suicidal thoughts and behaviors. It consists of four items, with a total score ranging from 0 (no suicidal thoughts or behaviors) to 14. Items cover topics such as suicidal ideation (including ideation within the past year), suicide attempts, threats of suicide attempts, and self-reported likelihood of future suicidal behavior. It was

developed by Linehan et al. (16), and the Turkish version was validated by Bayam et al. (17).

Tinnitus Handicap Inventory

The THI is a 25-item questionnaire used to assess the severity of tinnitus-related handicap. Each item is scored as yes (4 points), sometimes (2 points), or no (0 points), with total scores ranging from 0 to 100. Higher scores indicate greater tinnitus-related handicap. The THI includes three subscales: functional (11 items), emotional (9 items), and catastrophic (5 items). It was developed by Newman et al. (18), and its Turkish version was validated by Aksoy et al. (19).

Statistical Analysis

The demographic characteristics of the cases evaluated in the study were analyzed using descriptive statistics (such as frequencies, percentages, means, and standard deviations). Proportions of demographic characteristics were compared between groups using the chi-square test. Mean scores for age, ASI, and SSAS were compared between the patient and control groups using the independent-samples t-test. The Mann-Whitney U test was used to compare median SBQ scores between groups.

In the patient group, correlations among THI, ASI, SSAS, and SBQ were examined using Pearson and Spearman correlation analyses. We evaluated the effectiveness of ASI and SSAS in explaining tinnitus symptoms, and that of THI, ASI, and SSAS in explaining SBQ scores in the patient group, using multivariate linear regression analysis. The significance level was set at $p<0.05$ for all analyses. The normality of the data was assessed using skewness and kurtosis, with acceptable values within ± 1.5 . All analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Sociodemographic and Clinical Data Form

The sample consisted of 90 individuals: 44.4% ($n=40$) male and 55.6% ($n=50$) female. The mean age of the participants was 41.99 ± 13.46 years. There were no significant differences between the tinnitus and control groups in terms of age, sex, marital status, education, or employment status. However, educational level ($p=0.013$) and history of psychiatric treatment ($\chi^2=6.64$; $p=0.036$) significantly differed between groups. Detailed sociodemographic and clinical data are shown in Table 1.

In the patient group, 11.1% reported a family history of tinnitus. The onset was predominantly gradual (62.2%).

Stress (26.7%) and exposure to loud noise (13.3%) were the most frequently reported precipitating factors. Almost all participants perceived tinnitus in one or both ears; only 4.4% localized it to the head. The symptom pattern was intermittent in 53.3% of participants and continuous in 46.7%. Stress was identified as the most common aggravating factor (64.4%), followed by head or neck movements (33.3%), which appeared to modulate tinnitus perception. Loud sounds exacerbated symptoms in 55.6% of patients, had no effect in 37.8%, and had an uncertain effect in 6.7%. The influence of daytime naps was less consistent, as 11.1% reported worsening, 22.2% reported improvement, and 66.7% reported no change. The average duration of tinnitus in the patient group was 25.49 ± 35.69 months. The mean scores of the THI and its subscales (functional, emotional, and catastrophic) as well as the total THI score are presented in Table 2.

No statistically significant differences were observed between the patient and control groups in any ASI-3 subscale or total score, nor in SSAS or SBQ scores, as determined by the independent-samples t-test and the Mann-Whitney U test. Table 3 presents the comparative results.

According to the Pearson correlation analysis, total THI scores showed significant positive correlations with ASI-3 physical ($r=0.416$; $p=0.004$), social ($r=0.516$; $p<0.001$), cognitive ($r=0.530$; $p<0.001$), total ($r=0.553$; $p<0.001$), and SSAS ($r=0.474$; $p=0.001$) scores in the patient group. Similar positive correlations were observed between the THI subscales (functional, emotional, and catastrophic) and ASI-3 dimensions and SSAS scores (all $p<0.05$). Furthermore, SSAS scores were strongly correlated with ASI-3 subscales, particularly ASI-physical ($r=0.584$; $p<0.001$) and ASI-total ($r=0.576$; $p<0.001$). According to the Spearman correlation analysis, SBQ scores were positively correlated with THI total ($r=0.724$; $p<0.001$) and its subscales, and with ASI-3 and SSAS measures ($r=0.356$ - 0.572 ; all $p<0.05$). Table 4 presents the detailed correlation coefficients.

Multivariate linear regression analysis indicated that total THI scores accounted for 44% of the variance in SBQ scores in the patient group ($F=34.37$; $p<0.001$).

After ASI scores were added to model 1, 49% of the variance in SBQ scores was explained by total THI and ASI scores, a statistically significant proportion ($F=20.22$; $p<0.001$).

Table 1. Sociodemographic features of patients and healthy controls

Features		Patient group (n=45)	Healthy controls (n=45)	p
Age [†] (mean)		43.82	40.16	
Sex [†]	Female	25 (27.8)	25 (27.8)	1.00
	Male	20 (22.2)	20 (22.2)	
Education [†]	Primary school	17 (18.9)	4 (4.4)	0.013
	Secondary school	6 (6.7)	10 (11.1)	
	High school	14 (15.6)	18 (20)	
	University	8 (8.9)	13 (14.4)	
Marital status [§]	Single	12 (13.3)	14 (15.6)	0.820
	Married	32 (35.6)	29 (32.2)	
	Widowed	0 (0)	1 (1.1)	
	Divorced	1 (1.1)	1 (1.1)	
Occupation [§]	Unemployed	15 (16.7)	9 (10)	0.218
	Employee	6 (6.7)	9 (10)	
	Officer	4 (4.4)	8 (8.9)	
	Independent	3 (3.3)	6 (6.7)	
	Housewife	10 (11.1)	11 (12.2)	
	Retired	7 (7.8)	2 (2.2)	
Chronic disease [†]	Yes	19 (21.1)	13 (14.5)	0.186
	No	26 (28.9)	32 (35.6)	
History of psychiatric [†] treatment	Yes	18 (20)	16 (17.8)	0.036
	No	27 (30)	29 (32.2)	
Suicide attempt [§]	Yes	1 (1.1)	0 (0)	1.00
	No	44 (48.9)	45 (50)	

$p<0.05$ was considered statistically significant

[†]: Independent samples t-test, [‡]: Pearson chi-square test, [§]: Fisher's exact test

Table 2. Descriptive statistics for tinnitus duration and THI scores

Variable	Mean±SD	Min-max
Tinnitus duration	25.49±35.69	1.00-180.00
THI functional	17.64±11.30	0.00-42.00
THI emotional	14.47±9.68	0.00-36.00
THI catastrophic	7.87±5.68	0.00-20.00
THI total	39.98±24.34	2.00-88.00

THI: Tinnitus Handicap Inventory, Min-max: Minimum-maximum, SD: Standard deviation

Table 3. Comparison of patient and control groups on suicidal behavior and anxiety sensitivity measures

Variable	Patient mean±SD	Control mean±SD	p
SBQ	0.87±1.65	0.64±1.19	0.465
ASI physical	7.78±6.24	7.40±4.15	0.736
ASI social	7.22±5.87	7.60±4.26	0.728
ASI cognitive	5.38±5.08	5.56±3.96	0.854
ASI total	20.38±15.05	20.60±10.70	0.936
SSAS	26.20±8.20	25.00±6.26	0.437

p<0.05 was considered statistically significant
 ASI: Anxiety sensitivity index, SSAS: Somatosensory amplification scale, SBQ: Suicidal behaviors questionnaire, SD: Standard deviation

Table 4. Correlation between THI, ASI, SSAS, and SBQ in patients group

		1	2	3	4	5	6	7	8	9
1) THI total	r	-								
	p	-								
2) THI functional	r	0.922								
	p	<0.001								
3) THI emotional	r	0.943	0.776							
	p	<0.001	<0.001							
4) THI catastrophic	r	0.845	0.638	0.794						
	p	<0.001	<0.001	<0.001						
5) ASI physical	r	0.416	0.314	0.474	0.352					
	p	0.004	0.036	0.001	0.018					
6) ASI social	r	0.516	0.474	0.488	0.437	0.628				
	p	<0.001	0.001	0.001	0.003	<0.001				
7) ASI cognitive	r	0.530	0.485	0.526	0.411	0.593	0.732			
	p	<0.001	0.001	<0.001	0.005	<0.001	<0.001			
8) ASI total	r	0.553	0.479	0.564	0.455	0.860	0.898	0.869		
	p	<0.001	0.001	<0.001	0.002	<0.001	<0.001	<0.001		
9) SSAS	r	0.474	0.383	0.475	0.462	0.584	0.393	0.534	0.576	
	p	0.001	0.010	0.001	0.001	<0.001	0.008	<0.001	<0.001	
10) SBQ	rho	0.724	0.596	0.708	0.689	0.397	0.476	0.572	0.502	0.356
	p	<0.001	<0.001	<0.001	<0.001	0.007	0.001	<0.001	<0.001	0.017

r: Pearson correlation analysis, rho: Spearman correlation analysis, THI: Tinnitus Handicap Inventory, ASI: Anxiety sensitivity index, SSAS: Somatosensory amplification scale, SBQ: Suicidal behaviors questionnaire

Upon examining model 2, only total THI scores [$p<0.001$; 95% confidence interval (CI): 0.017-0.053] had a statistically significant effect on SBQ scores. When SSAS scores were added to the model, the explained variance increased slightly to 50% ($F=13.55$; $p<0.001$). However, SSAS was not a significant predictor ($p=0.443$), whereas THI ($p<0.001$) and ASI ($p=0.043$) remained significant (Table 5).

According to the multivariate linear regression analysis, it was found that 31% of the variance in tinnitus symptoms was statistically significantly explained by ASI scores ($F=18.91$; $p<0.001$).

When SSAS scores were added to model 1, ASI and SSAS scores together accounted for 34% of the variance in tinnitus symptoms ($F=10.91$; $p<0.001$). Upon examining model 2, only ASI scores ($p=0.009$, 95% CI: 0.177-1.176) were found to have a statistically significant effect in explaining tinnitus symptoms, as shown in Table 6.

Based on these findings, a mediation analysis was conducted to examine whether ASI-3 and SSAS mediate the relationship between THI and SBQ. The mediation model indicated that ASI-3 partially mediated the relationship between THI and SBQ, whereas SSAS did not have a significant indirect effect. Standardized path coefficients are presented in Figure 1.

Table 5. The effectiveness of THI, ASI, and SSAS scores in explaining SBQ in patients

Model		Unstandardized coefficients		t	p	95% CI	
		B	SE			B	SE
1	(Constant)	-0.935	0.359	-2.606	0.013	-1.659	-0.212
	THI total	0.045	0.008	5.862	<0.001	0.030	0.061
2	(Constant)	-1.125	0.361	-3.117	0.003	-1.853	-0.397
	THI total	0.035	0.009	3.963	<0.001	0.017	0.053
	ASI	0.028	0.014	1.955	0.057	-0.001	0.057
3	(Constant)	-0.732	0.623	-1.174	0.247	-1.990	0.527
	THI total	0.037	0.009	4.017	<0.001	0.018	0.056
	ASI	0.034	0.016	2.091	0.043	0.001	0.066
	SSAS	-0.022	0.028	-0.775	0.443	-0.078	0.035

Model 1: $R^2=0.44$, $F=34.37$, $p<0.001$; Model 2: $R^2=0.49$, $F=20.22$, $p<0.001$; Model 3: $R^2=0.50$, $F=13.55$, $p<0.001$

THI: Tinnitus Handicap Inventory, ASI: Anxiety sensitivity index, SSAS: Somatosensory amplification scale, SE: Standard error, SBQ: Suicidal behaviors questionnaire, CI: Confidence interval

Table 6. The effectiveness of ASI and SSAS in explaining tinnitus symptoms

Model		Unstandardized coefficients		t	p	95% CI	
		B	SE			B	SE
1	(Constant)	21.768	5.186	4.198	<0.001	11.311	32.226
	ASI	0.894	0.205	4.349	<0.001	0.479	1.308
2	(Constant)	8.030	10.352	0.776	0.442	-12.861	28.922
	ASI	0.676	0.247	2.733	0.009	0.177	1.176
	SSAS	0.693	0.454	1.526	0.135	-0.224	1.611

Model 1: $R^2=0.31$, $F=18.91$, $p<0.001$; Model 2: $R^2=0.34$, $F=10.91$, $p<0.001$

ASI: Anxiety sensitivity index, SSAS: Somatosensory amplification scale, SE: Standard error, CI: Confidence interval

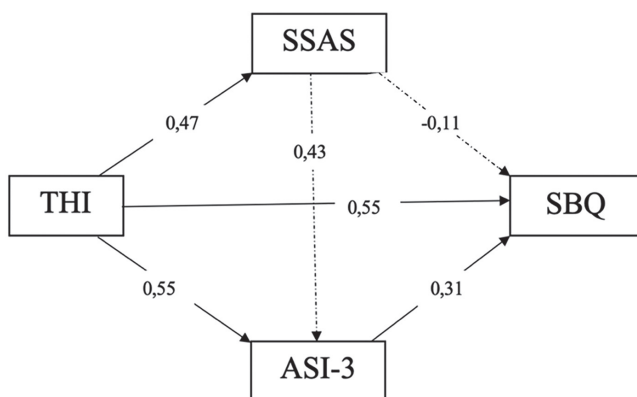


Figure 1. Mediation model demonstrating the indirect effects of ASI-3 and SSAS on the relationship between THI and suicidal behavior SBQ. All coefficients are standardized (β). Solid lines represent significant paths ($p<0.05$), while the dashed line indicates a non-significant path. THI: Tinnitus Handicap Inventory, ASI-3: Anxiety sensitivity index-3, SSAS: Somatosensory Amplification scale, SBQ: Suicidal behaviors questionnaire

DISCUSSION

This study examined the relationships among tinnitus severity, anxiety sensitivity, somatosensory amplification, and suicidal behavior. No significant differences were observed between patients and controls in anxiety sensitivity, somatosensory amplification, or suicidal behavior scores. In the tinnitus group, however, tinnitus severity was positively correlated with anxiety sensitivity, somatosensory amplification, and suicidal behavior. Regression analyses showed that tinnitus severity significantly predicted suicidal behavior, with anxiety sensitivity partially mediating this relationship, while somatosensory amplification did not have a significant effect. These findings suggest that anxiety sensitivity plays a more prominent role than somatic amplification in the psychological distress and suicidal tendencies associated with tinnitus.

Previous studies with comparable sample sizes to ours similarly found no significant differences in anxiety and depression levels between tinnitus patients and healthy controls (7,20). In contrast, a recent population-based cohort study reported significantly higher rates of anxiety, depression, and somatic symptom disorders among individuals with tinnitus compared to those without, highlighting the considerable psychological burden associated with the condition (21). The discrepancy between these results and ours may be partly explained by methodological differences, particularly our smaller sample size and the inability to categorize participants according to tinnitus severity or disease duration. However, tinnitus represents a heterogeneous condition, a recent population-based cohort study reported that only a minority of individuals with tinnitus experienced tinnitus-related distress, emphasizing that the psychological impact of tinnitus is more closely associated with its perceived severity than with its mere presence (22). Moreover, several studies have demonstrated a significant positive association between self-reported tinnitus severity and stress levels, and patients with severe tinnitus, especially those presenting with comorbid anxiety or depression, are considered to be at elevated risk for suicidal ideation and behavior (21,23).

Studies have found a significant association between tinnitus severity and suicidal ideation; a recent meta-analysis has provided robust evidence supporting this association. The analysis demonstrated that individuals with tinnitus had nearly double the risk of suicidal ideation and suicide attempts compared to those without tinnitus, with a clear dose-response relationship indicating that higher tinnitus severity was associated with greater suicidality (23). However, a large-scale study of veterans showed that suicide rates were lower among veterans with tinnitus than among those without, possibly reflecting better coping mechanisms or increased healthcare engagement among individuals who seek treatment for tinnitus, which may confer some protection against suicidality (10). Although our study found no significant difference in SBQ scores between the tinnitus and control groups, suicidal thoughts were positively correlated with tinnitus severity, suggesting that the relationship between tinnitus and suicidality may differ across clinical subgroups and symptom profiles.

Study Limitations

The findings of our study should be interpreted in light of its limitations. It was a cross-sectional study with a small sample size. Therefore, causality cannot be established, and the small sample size reduces the power of the study. Additionally, other psychological factors, especially

depression, known to be related to tinnitus, were not examined in this study. Future studies should include larger samples, classify participants by tinnitus severity, and examine a wider range of psychological factors to better elucidate the relationship between tinnitus and psychiatric symptoms.

CONCLUSION

In conclusion, although patients with tinnitus did not differ from healthy controls in anxiety sensitivity, somatosensory amplification, or suicidal behavior, greater tinnitus severity was associated with higher suicidal behavior scores. Anxiety sensitivity appeared to play a relevant role in this association and partially mediated the relationship between tinnitus severity and suicidal behavior, whereas somatosensory amplification showed no significant mediating effect. These findings highlight the importance of considering anxiety sensitivity and suicidality in the clinical assessment of patients with more severe tinnitus. Further longitudinal studies with larger samples are needed to clarify the direction and mechanisms of these associations.

ETHICS

Ethics Committee Approval: The study received ethical approval from the Recep Tayyip Erdoğan University Faculty of Medicine, Non-Interventional Clinical Research Ethics Committee (approval no: 2019/202, date: 12.12.2019).

Informed Consent: Written informed consent was obtained from all participants prior to enrollment.

FOOTNOTES

Authorship Contributions

Concept: G.V.Ç., A.E.K., E.D., Ç.H., Z.Ö.C., Design: G.V.Ç., A.E.K., E.D., Ç.H., Z.Ö.C., Data Collection or Processing: G.V.Ç., A.E.K., Analysis or Interpretation: G.V.Ç., A.E.K., Ç.H., Z.Ö.C., Literature Search: G.V.Ç., A.E.K., Ç.H., Writing: G.V.Ç., A.E.K., Ç.H., Z.Ö.C.

Conflict of Interest: No conflict of interest was declared by the authors.

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