

Is there a relationship between childhood traumatic experiences, somatoform dissociation, and subjective tinnitus?

Somatoform dissociation and subjective tinnitus

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Abstract

Aim: This study aimed to reveal the existence of childhood traumatic experiences representing the symptoms of somatoform dissociation in patients with subjective tinnitus.

Material and Methods: One hundred forty patients with cases of tinnitus for more than six months and 118 healthy volunteers between the ages of 18 and 35 were admitted. Researchers employed the Childhood Trauma Questionnaire (CTQ), Somatoform Dissociation Questionnaire (SDQ), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI) in cases with tinnitus and control subjects, and Tinnitus Handicap Inventory (THI) solely in the tinnitus group.

Results: We found very high levels of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, SDQ, BDI, and BAI in patients with subjective tinnitus. However, there was a statistically significant positive correlation between SDQ and THI. When patients with tinnitus were separated using the SDQ cutoff score, very high levels of emotional abuse, physical abuse, emotional neglect, and physical neglect were found in patients with SDQ \geq 35 scores. We also found the high-level THI predicted the SDQ.

Discussion: We have determined that tinnitus is associated with a strong effect to integrate childhood traumatic experiences and somatoform dissociation. Trauma-oriented psychotherapies may be useful for patients with subjective tinnitus to manage trauma-related symptoms.

Keywords

Tinnitus, Psychological Trauma, Dissociative Disorders, Psychosomatic

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Introduction

Many people report noticing certain sounds without any external stimuli, defined as tinnitus. Clinicians can list tinnitus as subjective or objective. Vascular irregularities or myoclonus of palatal muscles may cause objective tinnitus. Objective tinnitus is a rare clinical condition. In subjective or idiopathic tinnitus, patients perceive many sounds in their head and/or in one or both ears. Data suggest that subjective tinnitus may occur specifically in adults [1]. Tinnitus is a frequent symptom, and it is estimated that in about 15% to 20% of the adult community may exist briefly or enduringly [2]. Persistent tinnitus (more than six months) is regularly associated with emotional disorders, damaged sleep quality, and social recession [3]. There are speculative comments about the etiopathogenesis of these complaints in subjective or idiopathic tinnitus.

Many studies have been published examining the relationship between tinnitus and psychiatric disorders and symptoms. In one of these, the authors demonstrated a strong relationship between subjective tinnitus and psychiatric comorbidity and symptoms. In this study, 26.70% of patients with tinnitus had at least one psychiatric diagnosis. The authors also found that anxiety disorders and somatoform disorders were significantly higher in tinnitus patients than in normal subjects [4]. Research in the field of tinnitus is expanding. There have been some controversial findings of whether psychiatric symptoms are causal or consequential seen in patients with tinnitus. If a relationship between childhood trauma and tinnitus can be demonstrated, a causal relationship can also be designed.

Extensive research has advanced our knowledge of the relationships between childhood traumatic experiences and psychological problems later in life. After checking for other psychosocial risk determinants, childhood trauma has been associated with the evolution of most mental health difficulties, including mood and anxiety disorders, eating disorders, personality disorders, dissociative disorders, substance addiction, and psychosis [5]. Furthermore, childhood trauma is associated with an array of further problems in those serving mental health settings, including somatoform symptoms, and interpersonal problems [6]. In addition, interestingly, a study suggested that, in patients receiving the subjective tinnitus diagnosis, childhood traumatic experiences were a factor that impacted the severity of clinical status. In this study, high rates of emotional abuse, emotional neglect, and physical neglect were found, in addition to high rates of physical abuse and sexual abuse [7].

The relationship between tinnitus and stress can also include a link between inner ear sensitivity and neuroendocrinological, immune, and toxic alterations connected to stress activation [8]. In another study, authors suggested that somatization and stress could be considered as a determinant influencing injury and dysfunction of the auditory device. They also suggested that the vulnerability to neurotic disorders and lack of coping abilities could perform a crucial function in the clinical records of patients affected by severe tinnitus [3]. If childhood traumatic experiences are a risk factor in the precipitation of tinnitus, somatoform dissociative symptoms may exist that identify a vulnerable traumatic stress in patients with tinnitus.

The answers to these questions are important for understanding

the role of the childhood traumatic experiences in programming tinnitus after adverse early life events, because this may have important implications for understanding the pathogenesis of subjective tinnitus. We hypothesized that there may be childhood traumatic experiences that represent symptoms of somatoform dissociation in patients with subjective tinnitus.

Material and Methods

Participants and study design

Researchers designed the study prospectively. The study example consisted of patients who presented to the Otorhinolaryngology clinic, between November 2019 and July 2021. The researchers added one hundred forty patients who had complaints of tinnitus for more than six months and one hundred eighteen healthy volunteers between the ages of 18 and 35. Patients underwent a complete ear-nose-throat, internal medical, and neuropsychiatric examination. The researchers offered audiometry, whole blood tests, and biochemical analysis. Hence, they eliminated the possible diseases.

The researchers recruited control subjects in part from their social environment. Control subjects were not from the same family. The researchers specifically excluded those with current and past history of tinnitus complaints. The researchers also excluded all individuals with significant medical and/or psychiatric pathologies such as schizophrenia, manic-depressive psychosis, and behavioral disorders with social withdrawal or suicidal risk. Especially young adults were included in the study. Thus, organic diseases were tried to be excluded as much as possible.

Researchers employed the Childhood Trauma Questionnaire (CTQ), Somatoform Dissociation Questionnaire (SDQ), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI) in cases with tinnitus and control subjects. The researchers also conducted the Tinnitus Handicap Inventory (THI) solely in the tinnitus group because researchers did not add the individuals with symptoms of tinnitus to the control group.

Written informed consent was obtained from each subject after a full description of the study's goals and protocol. The research contract was carried out following the ethical policies declared in the Helsinki Declaration and signed by the Ethics Board of Bagcilar Training and Research Hospital, Istanbul (Document no: 2020.07.2.15.116). Informed consent was obtained from all members who joined the study.

Measurements

Tinnitus and psychiatric evaluations were based on:

The Turkish version of the Tinnitus Handicap Inventory (THI), which is a highly reliable questionnaire for examining reproductions; it is not influenced by age, sex, and hearing loss, provides clear outcomes, simple to practice, and offers more psychometric measures. Each of the 25 questions in this questionnaire has three answer options: Yes, Sometimes, and No, and the numbers are measured using 4, 2, and 0 respectively. In this way, the results were evaluated with the lowest being 0 and the highest 100 points [9].

The Childhood Trauma Questionnaire (CTQ) is a 28-item self-report instrument. Bernstein et al developed this scale. It assesses emotional, physical, and sexual abuse, as well as physical and emotional neglect in childhood [10]. The sum of

the scores obtained from each type of trauma gives a total score ranging from 25 to 125. Some researchers practiced the Turkish variant of the scale in many studies [11].

The Somatoform Dissociation Questionnaire (SDQ) is a 20-item self-report tool that assesses the severity of somatoform dissociation. Nijenhuis et al developed this scale [12]. Sar et al. modified the Turkish version of the scale [13].

The Beck Depression Inventory (BDI) was revealed by Beck et al. [14] to evaluate signs of depression. Rates range from 0 to 63, with higher scores indicating more severe depression. The Turkish account of the scale was modified by Hisli [15].

The Beck Anxiety Inventory (BAI) was produced by Beck et al. [16] to evaluate symptoms of anxiety. The numbers range from 0 to 63, with higher scores showing more severe anxiety. The Turkish translation of the scale was adapted by Ulusoy et al. [17].

Statistical Analysis

Descriptive statistics were presented as median values and interquartile ranges (IQR) (25% to 75%) or mean, and standard deviation for quantitative variables, and frequencies and percentages for categorical variables. The Chi-square test or Fisher Exact test were used to determine possible differences between groups in terms of categorical variables. Normality tests were carried out using one-sample Kolmogorov–Smirnov and Shapiro-Wilk tests and through histogram graphs. Student's t-test was used for comparisons of variables when parametric assumptions were met. The Mann–Whitney U test was utilized for comparing continuous variables between the two groups. Multiple linear regression models were used to investigate potentially predictive factors for the SDQ in the tinnitus patients. The variables evaluated were determined as significant variables derived from our results and literature review, in accordance with clinical experience. The tests for assumptions-linearity, homoscedasticity, and multicollinearity were carried out by the authors (the assumptions met). All the analyses were two-sided with alpha of 0.05, and were performed with SPSS statistical software (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.).

Results

The analyzes in the study were conducted with a total of 258 participants, 140 of whom were tinnitus patients and 118 were healthy controls. Eighty (57.1%) of 140 patients were

female and the mean age was 27.13 (SD=6.03) years. Sixty-one (51.7%) of the 118 controls were female and the mean age was 26.92 (SD=5.85) years. Seventy-five (53.6%) of the patients in the patient group and 65 (55.1%) in the control group were married. In the patient group, 36 (25.7%) were primary school graduates, 71 (50.7%) were high school graduates, 33 (23.6%) were university graduates or higher. Twenty-five (21.2%) primary school graduates, 65 (55.1%) high school graduates, 28 (23.7%) university and higher graduates made up the control group. Sixty (42.9%) people were employed and 80 (57.1%) were unemployed in the patient group. Sixty (50.8%) people were employed and 58 (49.2%) people were unemployed in the control group. There was no statistically significant difference between patients and controls in terms of age, gender, marital status, education level, and employment status (for all $p>0.05$). According to tinnitus lateralization, 94 (67.1%) unilateral and 46 (32.9%) bilateral tinnitus were described. The mean THI total score of the patients was 58.97 (SD=12.12), the mean age of disease onset (years) was 26.15(SD=6.18), and the mean disease duration (months) was 13.25(SD=16.90).

When the researchers compared CTQ scores of the patients with tinnitus group and control subjects, they found the patients with the tinnitus group's CTQ averages on emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect score to be significantly higher than in the control subjects ($p<0.001$ for all). When they also compared the the SDQ, BDI, and BAI scores of the patients with tinnitus group and control subjects, they found the patients in the tinnitus group had significantly higher SDQ, BDI, and BAI scores than the control subjects ($p<0.001$ for all). These data are summarized in Table 1.

Tinnitus patients were divided into two groups according to the cut-off score of the SDQ. When the CTQ scores of the SDQ ≥ 35 group and SDQ < 35 groups in tinnitus patients were compared, the SDQ ≥ 35 group's CTQ averages on emotional abuse, physical abuse, emotional neglect, and physical neglect score were found to be significantly higher than those of the control subjects ($p<0.001$ for all). When the THI, BDI, and BAI scores of the SDQ ≥ 35 group and SDQ < 35 groups were compared, the patients with the SDQ ≥ 35 group's THI, BDI, and BAI scores were found to be significantly higher than those of the SDQ < 35 groups ($p<0.001$ for all). These data are summarized in Table 2.

Table 1. Result of comparison analysis for SDQ, CTQ, BDI and BAI between tinnitus patients group and healthy control group

	Total (n=258)	Patients (n=140)	Control (n=118)	Differences Between Groups [95% CI]	p	η^2
	median (IQR)	median (IQR)	median (IQR)			
SDQ	31 (24-40)	37 (31-47.75)	24 (21-28.25)	13 [7.5 to 16]	<0.001	0.451
BDI	14 (7-26.25)	23 (14-33)	7.5 (4-11.25)	15.5[10 to 22.5]	<0.001	0.419
BAI	15 (9-28.25)	26.5 (15-35.75)	9 (3-13)	17.5 [12 to 22]	<0.001	0.427
Physical abuse	5 (5-8)	7 (5-10)	5 (5-6)	2 [1 to 3]	<0.001	0.180
Emotional abuse	8 (5-14)	13 (9-15)	5 (5-8)	8 [7 to 9]	<0.001	0.426
Physical neglect	7 (6-12)	11 (7-14.75)	6 (5-7)	5 [4 to 7]	<0.001	0.396
Emotional neglect	14 (9-17.25)	16 (14-20)	9 (6-13)	7 [4 to 10]	<0.001	0.432
Sexual abuse	5 (5-5)	5 (5-5)	5 (5-5)	0 [0 to 0]	<0.001	0.027
CTQ-total	42 (31.75-58.25)	53 (42-64.75)	31 (26-36)	22 [13 to 29]	<0.001	0.530

IQR: Interquartile range 25%-75%; η^2 : Eta squared. SDQ: Somatoform Dissociation Questionnaire, CTQ: Childhood Trauma Questionnaire, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory.

Table 2. Result of comparison analysis for THI, CTQ, BDI, BAI, age, ages of onset for tinnitus and tinnitus duration between SDQ \geq 35 group and SDQ < 35 group in tinnitus patients

	Total (n=140)	SDQ \geq 35 (n=81)	SDQ < 35 (n=59)	Differences Between Groups [95% CI]	p	η^2
	-100% median (IQR)	(57.9%)median (IQR)	(42.1%) median (IQR)			
THI	37 (31-47.75)	63 (56-71)	56 (46-62)	7 [1 to 16]	<0.001	0.101
BDI	23 (14-33)	32 (24-37.75)	15 (11-19)	17 [13 to 20.5]	<0.001	0.395
BAI	26.5 (15-35.75)	34 (28-40.75)	14 (11-22)	20 [12 to 24.5]	<0.001	0.487
Physical abuse	7 (5-10)	9 (7-11)	5 (5-7)	4 [2 to 5]	<0.001	0.220
Emotional abuse	13 (9-15)	15 (13-17)	9 (7-12)	6 [4 to 8]	<0.001	0.368
Physical neglect	11 (7-14.75)	13 (11-16)	8 (6-10)	5 [3.5 to 8]	<0.001	0.305
Emotional neglect	16 (14-20)	19 (16-21)	14 (11-15)	5 [4 to 7]	<0.001	0.313
Sexual abuse	5 (5-5)	5 (5-6)	5 (5-5)	0 [0 to 0]	0.096	0.011
CTQ-total	53 (42-64.75)	62 (54.25-69)	42 (38-59)	20 [5 to 25]	<0.001	0.386
Age	27 (21-33)	27.5 (21.25-33)	27 (21-34)	0.5 [-5 to 7.5]	0.780	0.001
Ages of onset	27 (21-33)	27 (21-32)	26 (20-31)	1 [-4 to 4]	0.481	0.004
Tinnitus duration	6 (3.96-12)	6 (3.96-12)	6.96 (3.96-12)	-0.96 [-2.52 to 0.96]	0.315	0.009

IQR: Interquartile range 25%-75%; THI: Tinnitus Handicap Inventory, SDQ: Somatoform Dissociation Questionnaire, CTQ: Childhood Trauma Questionnaire, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory.

Table 3. Multiple linear regression analyses for SDQ

	Unstandardized Coefficients					95% CI	
	B	SE	β	t	p	Lower Bound	Upper Bound
Age	-0.033	0.173	-0.016	-0.192	0.848	-0.375	0.309
Sexa	-1.304	2.045	-0.052	-0.637	0.525	-5.349	2.742
THI	0.402	0.088	0.375	4.552	<0.001	0.227	0.576
Tinnitus duration	-0.027	0.039	-0.059	-0.700	0.485	-0.104	0.049
Tinnitus lateralityb	-1.053	1.214	-0.070	-0.867	0.387	-3.453	1.348

THI: Tinnitus Handicap Inventory, SDQ: Somatoform Dissociation Questionnaire. a: 0=female, 1=male; b: 0=unilateral, 1=bilateral

Multiple linear regressions were calculated to predict SDQ, based on age, gender, THI, tinnitus duration, and tinnitus laterality (Table 3). A significant regression equation was found [$F(5, 133) = 4.934, p = .000$] with an R^2 of .156 for SDQ. As a result of entering method evaluation, it was detected that SDQ was significantly predicted by the high THI level ($p < 0.001$).

Discussion

In our paper, we first argue that childhood traumatic experiences are an attribution or causal explanation for events, deriving from a search for meaning that reflects an interaction between somatoform dissociation and subjective tinnitus. Many researchers noted the importance of psychiatric comorbidity, and they examined psychiatric comorbidity, they often found the possibly linked to the experience of depression and anxiety. They did not examine the causative importance of childhood traumatic experience for whether it was effective in the emergence of tinnitus. For this goal, researchers included young adults to study, because it might not be simple to eliminate organic causes in older patients. We found very high levels of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, SDQ, BDI, and BAI in patients with subjective tinnitus. However, there was a statistically significant positive correlation between SDQ and THI. When the researchers divided the patients into two groups according to the cut-off score of the SDQ, they found very high levels of emotional abuse, physical abuse, emotional neglect,

and physical neglect in patients with the SDQ \geq 35 score. Indeed, the relationship between SDQ and childhood traumatic experiences is well-known, it is a classic fact. Interestingly, we also found the high-level THI predicted the SDQ.

A study of a specific effect of childhood traumatic experiences on subjective tinnitus has been proposed in a recent study by Belli et al. [7], which emphasizes the importance of THI severity, physical abuse, emotional abuse, physical neglect, and emotional neglect. They have also emphasized that childhood traumatic experiences may affect the pathological process and may predispose to developing tinnitus, depression, and anxiety. Considering this study, based on our study, which argues that subjective tinnitus is associated with a strong effect to integrate childhood traumatic experiences and somatoform dissociation, we can suggest that subjective tinnitus may be a form of trauma-based memory and its related somatization. High levels of childhood traumatic experiences, particularly in the triggering of the pathological process and the formation of the somatization stage, may be common in persons who go on to develop subjective tinnitus. An important study reported that anxiety, depression, somatization, and other psychiatric symptoms increased during subjective tinnitus [4]. It could be argued that tinnitus may serve to bind or contain overwhelming childhood traumatic experiences.

Many authors describe somatoform dissociation as somatic symptoms that cannot be explained by a medical condition. As for the source of dissociation, many studies have marked that it is significantly connected with traumatic experiences, particularly when they are severe, persistent, connected to interpersonal trauma, and happen in childhood [18, 19]. Yet, other researchers have identified the relationship between traumatic experiences and somatoform dissociation [20,21]. Interestingly, in our study, we found that high levels of THI predicted SDQ. However, we detected significant childhood traumas and SDQ levels in the group with objective tinnitus. We can construct a causal explanation based on these findings. We are also aware that these explanations are insufficient. Studies with a larger sample are needed to strengthen the discussion. Dissociation questions the individual's perception of being in

control, which is associated with self-esteem and a feeling of identity. The extent of self-esteem was found to be a predictor of the action of the hypothalamic-pituitary-adrenal axis [22]. Reports from two investigations confirm that dissociative disorder is associated with raised circulating cortisol levels after a certain traumatic event [23,24]. The relationship between tinnitus and stress may also include the link between inner ear sensitivity and stress-related neuroendocrinological, immune, and toxic variations [8]. Two authors suggested the role of psychosomatic and stress reactions in the development of tinnitus, supported by the neurophysiological model. According to this model, tinnitus becomes chronic and decompensated as a result of faulty circuits in a complex neural network that includes sensory, limbic, and autonomic components [25]. These findings and discussions may be related to the hypothalamic-pituitary-adrenal axis and cortisol secretion in programming the brain after adverse early life events, because this may make important contributions to understanding the pathogenesis of subjective tinnitus.

Childhood adverse experiences may be thought to sensitize some medical pathologies during adult life. Some psychotherapy approaches such as trauma-oriented psychotherapies and clinical practice may offer a different perspective for the understanding of some symptoms that have been defined as tinnitus. Those approaches reprocessing of adverse or traumatic experiences and even directly targeting tinnitus symptoms may reduce the level of pathology. Trauma-oriented psychotherapies may be useful for patients with tinnitus to process trauma memories, manage trauma-related symptoms, and deal with depression and anxiety symptoms. While the debate over the relevance of childhood traumatic experiences and somatoform dissociation in the development of subjective tinnitus is conceptually important, exploring the effectiveness of trauma-oriented psychotherapies in treatment outcome studies in patients with subjective tinnitus may help address more clinically relevant questions.

Our study was restricted to a comparatively small example and cross-sectional procedure, and larger studies involving more patients and better-structured researches are required. In addition, the study method is quite selective. It is known that tinnitus is often accompanied by other psychiatric disorders and symptoms, but these comorbidities have not been diagnosed. This may be a weakness. Only depression and anxiety symptoms have been screened in the study.

Conclusion

We have determined that tinnitus is associated with a strong effect to integrate childhood traumatic experiences and somatoform dissociation. Trauma-oriented psychotherapies may be useful for patients with subjective tinnitus to manage trauma-related symptoms.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical

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Conflict of interest

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