Perception of, and Reaction to, Tinnitus

The Depression Factor

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KEYWORDS

• Tinnitus • Depression • Counseling • Cognitive behavior therapy • Antidepressants

KEY POINTS

- Although most adults reporting chronic tinnitus learn to habituate to the condition, a minority find it bothersome or "severe," adversely affecting concentration, communication, sleep, and emotion processing.
- Depression often co-occurs with severe tinnitus.
- Similar neural networks may be engaged in the conditions of depression and bothersome tinnitus.
- Cognitive behavior therapy, which has shown to help with chronic depression, also seems to help with tinnitus.
- Antidepressants may help with the depression co-occurring with tinnitus in some cases, but their routine use to treat tinnitus-related distress is not necessary.

INTRODUCTION

It may be obvious that tinnitus and depression are linked, but as any clinician treating patients with tinnitus knows it is also obvious that most individuals presenting with tinnitus do not report symptoms of depression. This article reviews evidence on the interactive association between depression and tinnitus severity and evidence that typical treatments for depression may reduce symptoms of tinnitus severity.

In the context of this review, it is useful to define subjective tinnitus as both the perception of a sound in the absence of an external source, and the psychological reaction to the sound itself. The sound or sounds range from tonal or narrowband with a defined pitch, to hissing, to whooshing, to sounding like cicadas. The psychological reaction to the tinnitus sound, ranging from communication difficulties, sleep problems, challenges with concentration, to affective disorders, is collectively termed tinnitus-related distress or severity. The great majority of those who report tinnitus, have subjective tinnitus, that is, it can only be perceived by

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them and the clinician relies on self-report from the patient. In contrast, a minority of tinnitus is classified as objective, meaning it can also be perceived by others, but this population is not the focus of this paper. As acute tinnitus becomes chronic, 70% to 80% of those with chronic subjective tinnitus habituate to it,[1,2] with the typical time period of such habituation being around 6 months.[3] A minority (20%–30%) will exhibit distressing reactions related to tinnitus, making sleep difficult and making intellectual work challenging, which can lead to depression or anxiety.[1,2] One factor that may exacerbate tinnitus severity after onset is depression, with a subgroup with a certain level of depression reporting worse symptoms at 6 months than at onset.[3]

Tinnitus severity is captured by many psychometrically validated questionnaires often used in the clinic or the laboratory, for example, the Tinnitus Handicap Inventory (THI)[4], the Tinnitus Functional Index (TFI)[5], and the Tinnitus Primary Function Questionnaire (TPFQ).[6] These questionnaires probe the patient's reaction along the various dimensions of tinnitus distress, with the responses often weighted as to the severity of the impact of these dimensions. A composite score, ranging from 0 to 100, is generated, which serves as an index of tinnitus severity. The developers of such questionnaires have also divided these scores into clinically relevant categories, ranging from mild to most bothersome, with the intention that those scoring in the more bothersome categories require the most medical assistance. Apart from probing various dimensions of tinnitus, the questionnaires ask some questions about depressive symptoms in general (eg, TFI and THI), or as related specifically to tinnitus (eg, TPFQ). However, these are not comparable with full-fledged questionnaires, such as the Beck Depression Inventory[7] or the Hospital Anxiety and Depression Scale.[8] When assessing depression in individuals with tinnitus, depression-specific questionnaires are often used concurrently with tinnitus severity measures, as discussed in the next section.

PREVALENCE OF DEPRESSIVE SYMPTOMS IN INDIVIDUALS REPORTING TINNITUS

It has been known for some time that individuals with tinnitus often report anxiety and depressive symptoms.[9] One of the first large-scale studies to investigate their comorbidity was Bartels and colleagues,[10] who assessed tinnitus severity, anxiety, depression, coping style, and quality of life in 265 individuals reporting having tinnitus. Although the authors did not find a significant effect of either anxiety or depression alone, they observed an additive effect of both on the quality of life in those with tinnitus. Bhatt and colleagues[11] found a greater prevalence of both anxiety and depression in the tinnitus population (26.1% and 25.6%, respectively), compared with the general population (9.2% and 9.1%, respectively). A recent study[12] explored gender differences in psychiatric distress and tinnitus severity. Of the 134 female and 114 male patients who had accessed care at an otology outpatient clinic in Seoul, tinnitus severity, as measured by the THI, did not significantly differ between the 2 groups. However, further statistical testing revealed that depressive symptoms (as measured by the Beck Depression Inventory), stress within the past month (measured by the Korean version of the Brief Encounter Psychosocial Instrument[13]), and the effect on life (as measured by a Likert or visual analog scale) were significantly associated with tinnitus severity in men, whereas only depressive symptoms and tinnitus annoyance (assessed using a visual analog scale) were related to tinnitus severity in female patients.

The aforementioned studies help us better understand the prevalence of anxiety and depression in the tinnitus population. Both appear to show similar levels of prevalence, but their additive effect needs to be clinically addressed. Furthermore, although the Han and colleagues[12] study incorporated hearing loss in their statistical

models (they did not find a differential impact of it on the two genders), other studies have not considered the effect of comorbid hearing loss, which may also contribute to feelings of depression and anxiety.[3]

Suicidal ideation has been reported in patients who have severe tinnitus accompanied by different psychiatric comorbidities, including severe anxiety or depression; such patients require prompt identification and intervention. A recent article[14] reviewed 10 publications (of the 22 that were initially identified) that reported on expressed suicidal behavior and ideation in adults with tinnitus. Whereas depression and suicidal ideation were reported at higher rates in the tinnitus population in several of these studies, the authors could not unequivocally identify an association between suicidal ideation and tinnitus. This was primarily because of methodological differences in the various studies, differences in the reported comorbid factors (eg, inclusion of patients with posttraumatic stress disorder), and as yet unknown relationship between tinnitus, stress, and psychiatric disorders (eg, differing cortisol levels).

Prevalence studies have also noted common personality factors between tinnitus and depression,[15] with a consistent pattern of those seeking more help with tinnitus also suffering from depression and other mood disorders.[16] In the study by Langguth and colleagues,[15] agreeableness negatively correlated with tinnitus severity as measured by THI and the anxiety trait of neuroticism correlated both with depressive symptomatology and tinnitus handicap, as measured by the Tinnitus Questionnaire,[17,18] but not with THI. In another study,[19] the authors focused on parsing the impact of type D personality (a framework used to study personality in depression) on both health-related quality of life and tinnitus distress. They found that those who had type D personality tended to be more anxious and depressed, with low health-related quality of life and higher tinnitus severity. This impact was mediated both by anxiety and depressive symptomology and by a direct influence on the outcomes.

NEURAL NETWORKS OF DEPRESSION AND TINNITUS

There are parallels in the pathophysiology of depression and tinnitus—similar neural networks appear to be affected in both conditions[20] when compared with age-matched healthy controls. Some of these networks are more evident in individuals reporting bothersome or severe tinnitus and include, default mode, attention, salience, and emotion-processing networks.[21–23] Similarly, altered functional connectivity of the default mode, salience networks, emotion processing, and cognitive control (part of attention processing) networks[24,25] are implicated in major depressive disorder. However, it is unclear if this constitutes a genuine overlap between 2 different traits or whether depression is part of the tinnitus condition. It should be further noted that, like depression, the psychological impact of tinnitus is along a continuum and it may be difficult to completely describe the overlap or to completely dissociate the 2 conditions. One major difference in the brain imaging results is the role played by the auditory cortex. Whereas activation patterns of the auditory cortex and its connectivity have been noted in most brain imaging studies of tinnitus (eg, Husain[21]), it has not been similarly reported in the brain imaging literature on depression.

PHARMACOLOGIC TREATMENTS OF DEPRESSION AND TINNITUS

Given the greater prevalence of anxiety and depression in the tinnitus population, it may not be surprising to see greater use of antianxiety and antidepression medications in this group. Yet, Tunkel and colleagues[26] do not recommend routine use of antidepressants, among other pharmaceutical agents that are sometimes used to treat symptoms of tinnitus. To make this determination, they relied on the outcome of

randomized-controlled trials, in particular the meta-review from the Agency for Healthcare Research and Quality,[27] which analyzed 13 published studies. They concluded that, given the potential for some antidepressants to worsen tinnitus, the small effect sizes and studies with small sample sizes, the injurious side-effects and the cost for such medications, the harm far outweighed any benefits at the group level.

In a 2012 Cochrane review,[28] Baldo and colleagues[28] reviewed 6 trials that had enrolled 610 patients with tinnitus. They found the trial quality to be generally low, primarily because of high attrition rates, suboptimal outcome measures, and, interestingly enough, a "failure to separate the effects on tinnitus from the effects on symptoms of anxiety and depression". However, a trial using a selective serotonin reuptake inhibitor in a group of 120 patients, found significant effects in a subgroup of patients, suggesting a deeper investigation into its effects is needed.[28]

Do some antidepressants make tinnitus worse? Certainly there are several reported side-effects of antidepressants that affect quality of life (eg, sexual dysfunction, drowsiness), which may in turn affect tinnitus-related distress. Tinnitus itself is commonly reported as a rare side effect of all available antidepressants,[26,29] but more research needs to be conducted in determining which type of antidepressants has more of a detrimental effect on tinnitus relative to others.

PSYCHOLOGY-BASED TREATMENTS OF DEPRESSION AND TINNITUS

Given the high prevalence of depressive symptoms in those reporting severe tinnitus, it is not surprising that cognitive behavior therapy (CBT)[30,31] has gained popularity as a successful management strategy for bothersome tinnitus. In fact, CBT is currently the only treatment option to have the highest degree of evidence (ie, grade A, based on multiple systematic reviews of randomized-controlled trials) among all tinnitus management strategies, including drugs.[26,32] Although CBT consists of 4 general principles,[30] when adapted to tinnitus[31] it has been modified to include 3 tiers: (1) cognitive restructuring; (2) attentional control training, and (3) relaxation training.

In recent years, CBT has been successfully implemented, both via in-person guidance and via online classes. In one of the earliest large-scale studies,[33] CBT was shown to have better outcomes in terms of reducing tinnitus severity in 245 patients compared with 247 patients who underwent usual care. These improvements seemed to persist at 12 months, roughly eight months after end of treatment.

Internet-based CBT has also shown promise and it may be the treatment of choice for some patients. A recent randomized-controlled trial did not find significant difference between Internet-based CBT and two-to-three, in-person, individualized meetings in the clinic.[34] The ameliorating effects of being exposed to CBT seem to persist even a year after cessation of treatment.[35] Some caveats to consider include that dropout rates for treatment are fairly high (see Andersson[36]) and that some patients may need additional monitoring. Plausible risk factors for the attrition have not been worked out yet.

CBT is not the only counseling-based therapy to show success with managing tinnitus distress. Other therapies include mindfulness-based stress reduction,[37,38] mindfulness-based cognitive therapy,[39–41] and acceptance and commitment therapy.[42] Of these, more evidence has been collected for the mindfulness-based therapies. Acceptance and commitment therapy, although only recently being applied to tinnitus, has shown promise in ameliorating tinnitus-related distress.[43,44]

Counseling, whether using the tenets of CBT or not, plays a central role in comprehensive tinnitus management programs, such as tinnitus retraining therapy,[45] progressive tinnitus management,[46] and tinnitus activities treatment.[47] These comprehensive

programs incorporate assessment of tinnitus severity and tailored treatment strategies based on individual severity, including sound devices (hearing aids, sound generators) and a variety of counseling techniques from information (present in all management strategies), to directive (in tinnitus retraining therapy), to collaborative (in tinnitus activities treatment), to applying principles of CBT (in progressive tinnitus management).

In essence, these tinnitus management frameworks seek to improve self-efficacy in patients with tinnitus allowing them to control their reactions to the chronic internal sound and thereby habituate better. For the purposes of its relation to tinnitus, self-efficacy can be considered the extent to which patients believe they are in control of factors affecting their life.[48,49] Low self-efficacy is seen to be associated with increased levels of depression and anxiety regardless of tinnitus status. Treatments that seek to improve self-efficacy in patients with tinnitus facilitate habituation and improve quality of life.

CAVEATS AND FUTURE DIRECTIONS

It is imperative that any tinnitus patient reporting a high-level of distress and bothersome symptoms is identified and provided with immediate care. Furthermore, those not reporting severe-enough symptoms may yet benefit from psychology-based therapies or tinnitus management plans. This article reviewed one aspect of tinnitus severity, manifesting as clinically defined depression. However, depression is not the only mental health concern noted in patients with tinnitus. Anxiety typically also co-occurs with depression. Recently, tinnitus has also been noted as a common symptom of traumatic brain injury and posttraumatic stress disorder, especially in the military and veteran population.[50,51] Future studies should parse out the overlap between tinnitus and several mental health conditions and specifically, the contribution of tinnitus itself to the severity of these conditions and vice-versa. This is important both for the optimal, individualized treatment of patients with tinnitus and to improve our understanding of the neural mechanisms of the disorder. In the clinic, those who report severe or bothersome tinnitus, as classified by one of the tinnitus questionnaires (eg, TFI), should be further screened for anxiety and depression and appropriate treatment plans should be initiated, if warranted.

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