

Original Research Article

Correlation of severity of tinnitus with severity of anxiety and depression in adults in a tertiary care hospital at Bhuj, Gujarat, India

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ABSTRACT

Background: Tinnitus may be objective or subjective. Subjective tinnitus is the type most commonly associated with psychosocial co-morbidities. This study was conducted with an aim to assess the severity of tinnitus and to know its correlation with anxiety and depression in adult population of Western Gujarat region.

Methods: This prospective observational study was conducted in a tertiary care teaching hospital of Western Gujarat from December 2016 to July 2017. Patients with tinnitus were screened for anxiety and depression using tinnitus handicap inventory (THI, validated in Gujarati language), generalized anxiety disorder (GAD-7) and patient health questionnaire (PHQ-9). Severity of anxiety and depression was further evaluated using The Hamilton anxiety rating scale (HAM-A) and the Hamilton rating scale for depression (HRSD, also called HAM-D) respectively.

Results: 68 patients fulfilled the inclusion criterion. Maximum patients (30.9 %) had moderate tinnitus, followed by severe (26.4 %), catastrophic (19.1 %), mild (16.2 %) and slight (7.4 %). There was a strong and significant correlation between the average THI scores and average GAD-7 scores ($r=0.9708$, $p<0.00001$) and average THI scores and average PHQ-9 scores ($r=0.9906$, $p<0.0001$) suggesting that patients with tinnitus were very likely to have anxiety as well as depression. However, irrespective of the severity of tinnitus, most patients had only mild anxiety ($r=0.9403$, $p<0.00001$) and mild depression ($r=0.6758$, $p=0.001$).

Conclusions: The patients with tinnitus are very likely to suffer from mild anxiety as well as mild depression.

Keywords: Anxiety, Depression, Gujarati, THI, Tinnitus, Tinnitus handicap inventory

INTRODUCTION

The word tinnitus refers to perception of noises in absence of any external sound. This noise is described by patients as ringing, grinding, whistling, humming, roaring, chirping, howling, buzzing or clicking sounds. Tinnitus may result from various pathological states and it may be objective or subjective. Objective tinnitus is pulsatile tinnitus which is perceptible to patient and other people. It is rare and it signifies a serious underlying pathology. Subjective tinnitus is idiopathic and

perceptible to patient only. Subjective tinnitus is the type most commonly associated with psychosocial co-morbidities.

Prevalence of tinnitus is 10%-15% among adults, of which 1%-2% have severe tinnitus.¹ Tinnitus prevalence is increasing in young adults and it is linked with noisy environment and exposure to high volume music.^{2,3} Impact of tinnitus on quality of life is highly variable. Many people remain unaffected by these sounds while others may develop psychological morbidity which may lead to suicidal ideations.⁴

Worldwide there are various studies assessing relation of tinnitus with anxiety and depression but we could not find any study done in Western Gujarat, India, on this topic. The problem of tinnitus in India is also as alarming and as severe as in the Western countries; but studies regarding the psychological profiles of individuals with tinnitus are very limited and some studies in India have attempted to reveal the relation between the perceived tinnitus severity and the degree of emotional distress of the individuals.^{5,6} Hence, this study was conducted with an aim to assess the severity of tinnitus and to know its correlation with severity of anxiety and depression in adult population of this region.

Invaluable region specific data regarding correlation of tinnitus severity with anxiety and depression will be provided by this study which will help to understand the impact of tinnitus on the psychological profile of a patient which in turn will help to treat the tinnitus in a better way or at least reduce its impact on the lifestyle of a patient.

Objectives

- To find out the prevalence of anxiety and depression in tinnitus patients.
- To correlate severity of tinnitus with severity of anxiety and depression.

METHODS

Study design

This is a prospective observational (questionnaire based) study.

Place and duration of study

This study was conducted in the outpatient Department of Otorhinolaryngology of Gujarat Adani Institute of Medical Sciences and GK General Hospital at Bhuj, Kutch, Gujarat, from December 2016 to July 2017. Institutional Ethics Committee approval was obtained before starting the study.

Sample size

All consecutive patients with tinnitus of more than three months duration visiting Otorhinolaryngology outpatient Department during the period of study.

Inclusion criteria

Patients above 18 years and below 60 years of age and patients with tinnitus of more than 3 months duration.

Exclusion criteria

Patients with organic cause of tinnitus, pregnant females and lactating mothers.

Written informed consent was taken from each patient. A detailed clinical history and examination of ear, nose and throat was carried out to exclude any organic cause of tinnitus.

Instruments used

1. Tinnitus handicap inventory (THI):⁷ The Tinnitus Handicap Inventory (THI) is a 25 item self-report inventory that has Functional, Emotional and Catastrophic subscales. A score of 4 is given for a "Yes", 2 for "Sometimes" and 0 for "No". Scores between 0-16, 18-36, 38-56, 58-76, and 78-100 are indicative of slight, mild, moderate, severe and catastrophic tinnitus respectively.
2. Generalized anxiety disorder (GAD-7):⁸ It is also a self-report questionnaire for screening of anxiety. GAD-7 has seven items, which measure severity of various signs of anxiety disorders according to reported response categories of "not at all," "several days," "more than half the days," and "nearly every day." Assessment is indicated by the total score, which is made up by adding together the scores for the scales of all seven items. Gujarati version of GAD-7 is validated and available in public domain.
3. Patient health questionnaire (PHQ-9):⁹ The PHQ-9 is a nine item self-report questionnaire in which respondents rate the presence of the 9 core symptoms of a major depressive episode over the preceding two weeks. Each question is scored on a 4 point score where: 0=not at all, 1=several days, 2=more than half the days, and 3=nearly every day. Gujarati version of PHQ-9 is validated and available in public domain.
4. The Hamilton anxiety rating scale (HAM-A):¹⁰ It is a psychological questionnaire used by clinicians to rate the severity of a patient's anxiety. Each of the 14 items contains a number of symptoms, and each group of symptoms is rated on a scale of zero to four, with zero being 'not present' and four being the most severe. This calculation yields a comprehensive score in the range of 0 to 56. A score of 17 or less indicates mild anxiety, score from 18 to 24 indicates moderate anxiety and a score of 25 to 30 indicates severe anxiety.
5. The Hamilton rating scale for depression (HRSD):¹¹ Also called HAM-D, it is a 17 item clinician rated questionnaire used to assess severity of depression and is used as a guide to evaluate recovery. The questionnaire is designed for adults and is used to rate the severity of their depression by probing mood, feelings of guilt, suicide ideation, insomnia, agitation or retardation, anxiety, weight loss, and somatic symptoms. A score of less than 13 is considered to be mild depression. Scores of 19 or higher indicate severe or very severe depression.
6. Those patients who fulfilled the inclusion criterion were given three standard questionnaires; tinnitus handicap inventory (THI) to know the severity of tinnitus, generalized anxiety disorder-7 (GAD-7) to

screen for anxiety and patient health questionnaire-9 (PHQ-9) to screen for depression. Patients whose score was more than the cut off score (for anxiety ≥ 7 and for depression ≥ 9) were further evaluated for severity of anxiety and depression using Hamilton anxiety rating scale (HAM-A) and Hamilton depression rating scale (HAM-D) respectively. THI is available in English language, while GAD-7 and PHQ-9 questionnaires are already available and prevalidated in Gujarati language; which are accessible on internet. THI was translated into Gujarati language using forward-translation (translation and discussion by five independent health professionals proficient in Gujarati language) and blind backward- translation (by an independent translator whose mother tongue was English). It was validated (construct and content) on a small group of subjects (8 patients) before using it in the study. Statistical results obtained for the Gujarati version of THI (THI-Guj) showed a good reliability/ internal consistency (overall Cronbach's alpha score for the inventory was 0.980).¹²

Analysis

The scores of all the questionnaires were tabulated in Microsoft Excel sheet for statistical analysis (Cronbach's alpha, Corrected Item-Total Correlation score and Pearson correlation test).

RESULTS

Of the total patients with tinnitus who visited the Otorhinolaryngology outpatient Department from December 2016 to July 2017, 68 patients fulfilled the inclusion criterion. THI-Guj could classify the patients into slight, mild, moderate, severe and catastrophic tinnitus.¹²

From Table 1, it is evident that 47.05 % of patients with tinnitus had anxiety, while 57.35% of patients with tinnitus had depression. 28 patients with tinnitus had both, anxiety and depression, 4 patients with tinnitus had only anxiety while only depression was seen in 11 tinnitus patients. The severity of anxiety and depression was further evaluated using HAM-A and HAM-D questionnaires respectively.

Table 1: Distribution of patients according to presence of anxiety and depression.

THI score	Category of handicap	Number of patients with only anxiety (GAD-7 score ≥ 7)	Number of patients with only Depression (PHQ-9 score ≥ 9)	Number of patients with anxiety and depression	Average GAD-7 score	Average PHQ-9 score
0-16	Slight (Grade 1)	0	0	0	0.6	0.8
18-36	Mild (Grade 2)	1	1	2	3.6	5.1
38-56	Moderate (Grade 3)	1	4	8	6.3	10.1
58-76	Severe (Grade 4)	1	5	9	8.3	12.7
78-100	Catastrophic (Grade 5)	1	1	9	15.2	16
Total		4	11	28		

Table 2: Distribution of patients according to severity of anxiety.

Number of patients according to severity of Tinnitus (n=68)	Number of patients according to severity of anxiety (n=32)			Number of patients according to severity of depression (n=39)			
	Mild (HAM-A score <17)	Moderate (HAM-A score 18-24)	Severe (HAM-A score 25-30)	Mild (HAM-D score <13)	Moderate (HAM-D score 14-18)	Severe (HAM-D score 19-22)	Very severe (HAM-D score ≥ 23)
Slight (Grade 1)	5	0	0	0	0	0	0
Mild (Grade 2)	11	2	1	2	0	1	0
Moderate (Grade 3)	21	6	3	10	1	1	0
Severe (Grade 4)	18	9	0	13	0	0	1
Catastrophic (Grade 5)	13	8	2	6	1	2	1
Total	68	25	6	31	2	4	2

There was a strong and significant correlation between the average THI scores and average GAD-7 scores ($r=0.9708$, $p<0.00001$) and average THI scores and average PHQ-9 scores ($r=0.9906$, $p<0.0001$) suggesting that patients with tinnitus were very likely to have anxiety as well as depression.

Table 2 shows that out of 68 patients with tinnitus, 25 patients had mild anxiety ($r=0.9403$, $p<0.00001$). Although there was a positive correlation between average THI score and number of patients with moderate and severe anxiety, the relationship was weak and not significant (For moderate anxiety: $r=0.3535$, $p=0.49$; for severe anxiety $r=0.3591$).

Similarly, out of 68 patients with tinnitus, 31 patients had mild depression ($r=0.6758$, $p=0.001$), suggesting a strong correlation. However, correlation between average THI scores and number of patients with moderate and severe depression was moderate and not significant.

Hence, tinnitus is more commonly associated with mild anxiety and mild depression only.

DISCUSSION

Tinnitus is a significant condition that may be a burden for people affected. Various tools have been designed to evaluate the effect of tinnitus; some of these are tinnitus handicap questionnaire, tinnitus severity questionnaire, tinnitus handicap inventory (THI) and tinnitus functional index. THI is a very useful tool to measure the degree of handicap due to tinnitus. It is easy to administer and interpret, broad in scope, and psychometrically robust. The first THI was developed by the British Association of Otolaryngologist, Head and Neck Surgeons which consists of 50 questions. Newman et al developed the 25-item inventory which was grouped appropriately into three subscales (functional, emotional, and catastrophic). Functional subscale had 11 questions, emotional had 9, while catastrophic had 5 questions. Since then, THI has been adapted in various languages - Hebrew, Mandarin, Hungarian, French and Russian, to mention just the most recent.¹³⁻¹⁷

Various studies have demonstrated that patients with tinnitus have life time prevalence of psychiatric morbidity higher than general population.¹⁸ Belli et al found anxiety disorder in 28% and somatoform and mood disorder in 15% of tinnitus patients compared to 6% of controls.¹⁹ Marciano et al has reported development of psychiatric disorder even a few years before the development of tinnitus.²⁰ Tinnitus and psychological comorbidity share dual relationship. Tinnitus induced distress leads to deterioration in psychological well being hampering the enjoyment of affected individual.²¹ Severity of tinnitus increases during periods of poor psychological well being.²²

Fagelson et al found that tinnitus severity ratings strongly correlated with level of psychological distress which indicates that it may worsen mental illness.²³ In a USA based study, Folmer et al studied tinnitus severity with measures of anxiety, depression and obsessive compulsiveness and found that tinnitus severity was positively correlated with quantitative measure of anxiety and depression.²⁴ In another study, Zoger et al also found that severity of tinnitus is correlated with severity of anxiety and depression.²⁵

The present study reveals a strong correlation between occurrence of tinnitus with anxiety and depression. A recent review of 56 abstracts conducted by Ziai et al concluded that there is mounting evidence supporting the association of tinnitus with depression and anxiety.²⁶ In the present study we have also tried to correlate the severity of tinnitus with severity of anxiety and depression; however, irrespective of the severity of tinnitus, most patients had only mild anxiety and depression. Thus, tinnitus should be understood as a neuropsychiatric or somatoform disorder syndrome.

Research is being done to explore the molecular basis of correlation between tinnitus and psychosomatic disorders. Role of a glucocorticoid receptor in the inner ear in tinnitus patients has been evaluated. Correspondingly, patients with anxiety and depression also exhibit higher levels of cortisol, leading to the possibility of a positive feedback loop exacerbating tinnitus.²⁷

Optimal treatment of tinnitus requires evaluation of perceptual, emotional, and behavioral parameters because pharmacotherapy alone has produced unsatisfactory results in chronic tinnitus. Oto-psychiatric treatment ultimately aims at helping patients direct their attention away from the tinnitus and putting negative cognitive processes under control. Cognitive behavioral therapy (CBT) focuses on sensory, perceptual and psychological factors together for amelioration of distress thus improving quality of life by restructuring thought patterns and habituation. Other forms of therapy like tinnitus retraining therapy (TRT), consisting of educational counseling and sound therapy is also used to treat this symptom. However, efficacy of this form of treatment remains to be proved by randomized controlled trials. Biofeedback; masking and relaxation modalities aim to teach the patients to focus on adapting to the tinnitus to improve quality of life but do not eliminate tinnitus completely. The treatment of tinnitus overlaps with that of the associated neuropsychiatric disorders, thus, benzodiazepines, antidepressant, antipsychotics, and mood stabilizers have been used.

Many diseases are associated with psychiatric disturbances which is often mild. Mild anxiety and mild depression associated with tinnitus; irrespective of its severity, shows that tinnitus per se is not the cause of psychiatric disturbance. Further studies, in India, with large sample size are required to further evaluate the association of tinnitus with anxiety and depression.

CONCLUSION

The patients with tinnitus are very likely to suffer from anxiety as well as depression. However, irrespective of the severity of tinnitus, there is only mild anxiety and depression. Management of tinnitus is multidimensional. It requires not only assessment of underlying etiological factor and magnitude of structural damage but also psychological assessment of patients.

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