

## THE ASSOCIATION OF ANXIETY AND DEPRESSION WITH TINNITUS

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### HIGHLIGHTS

- The current study finds the association of depression and anxiety with tinnitus.
- An analytic cross-sectional study design was performed on a sample of 150 adult both male and female have diagnosed with tinnitus.
- Beck Anxiety scale, Beck Depression inventory and Tinnitus Handicap inventory was used to collect data.
- 65.3% low level Anxiety due to tinnitus increase and also 58.0% moderate depression increases.
- As level of tinnitus increases, level of Anxiety and Depression was also increase. Patients suffering with tinnitus have high risk of Depression than Anxiety.

### Abstract

**Background:** Anxiety and Depression were linked to an increase in tinnitus. Other than anxiety, depression was associated with tinnitus. Tinnitus causes changes in neural circuits in the brainstem and cortex, which are linked to a number of co morbid diseases. Tinnitus is thought to be a symptom of auditory nerve failure. Subjective and objective tinnitus is two forms of tinnitus.

**Objective:** To find the association of depression and anxiety with tinnitus.

**Methodology:** An analytic cross-sectional study design was performed on a sample of 150 adult both male and female have diagnosed with tinnitus having age from 25 to 45 age limit with non-probability sampling technique. Data was collected from October 2021 to March 2022 and Beck Anxiety scale, Beck Depression inventory and Tinnitus Handicap inventory was used to collect data. The data was analyzed and evaluated by using statistical package for social sciences version 25. Pearson Chi-square test was used to determine association of depression and anxiety in tinnitus patients. The significant level was set as equal as or less than  $p < 0.05$ .

**Results:** A Total of 150 adult both male and female assessed to know the association of depression and anxiety with tinnitus. Of these, 65.3% low level anxiety due to tinnitus increase and also 58.0% moderate depression increases. Significant values have been seen ( $p < 0.082$ ) in anxiety and ( $p < 0.005$ ) in association of depression and anxiety with tinnitus.

**Conclusions:** As level of tinnitus increases, level of anxiety and depression was also increase.

Patients suffering with tinnitus have high risk of depression than anxiety. As results showed tinnitus cause depression great than Anxiety.

**Key words:** Tinnitus, Depression, Anxiety.

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## Introduction

Tinnitus is the sense of sound in the absence of external auditory stimulation, and it affects 8% to 25.3% of the global population.<sup>1</sup> Anxiety and depression are prevalent psychiatric diseases in persons who have chronic tinnitus, and these symptoms have been shown to increase morbidity and the risk of suicide in those who have tinnitus.<sup>2</sup> However, it can have an adverse influence on the quality of life of certain people, causing concerns like depression, anxiety, and insomnia.<sup>3</sup> Tinnitus affects 10 to 15% of the population. As people age, tinnitus becomes increasingly frequent. Tinnitus affects 1% of adults under 45 and 9% of those over 65.<sup>4</sup> Tinnitus can be influenced by a variety of factors, including gender, race, socioeconomic status, hearing loss, and noise exposure. Tinnitus has an etiologic basis in just 5% of cases.<sup>5</sup>

Tinnitus can manifest itself in a variety of ways, depending on the sound's direction, amplitude, and nature.<sup>6</sup> Tinnitus, on the other hand, has a wide variety of consequences on one's quality of life, ranging from little annoyance to significant functional impairment.<sup>7</sup> As a result, describing and quantifying the level of pain and impairment suffered by chronic pain sufferers throughout the cognitive, functional, and psychiatric spectrum has long been an active and important study area. Tinnitus has been linked to a variety of psychological and mental diseases, the most common of which is depression, according to several research.<sup>8</sup>

Tinnitus has been related to a variety of neurological conditions. Tinnitus has been linked to sadness and anxiety, two common neuropsychiatric illnesses.<sup>9</sup> They observed that anxiety, followed by depressive symptoms, is the most important psychological predictor of tinnitus severity.<sup>10</sup> According to one study, 26.1% of tinnitus patients showed anxiety symptoms in the prior 12 months, while another revealed a lifetime incidence of anxiety disorders (ADs) of 45 percent to 45.8 percent among patients with tinnitus.<sup>11</sup> Depression is one of the most commonly identified psychopathologies in tinnitus sufferers. Persons who are depressed have a more negative explaining style than people who are not depressed.<sup>12</sup> Depression is linked to a negative, depressing approach to explaining and understanding failure. Several studies have also demonstrated that environmental and social variables can help people cope better with environmental stressors by changing stressors and their effects on them.<sup>13</sup> The availability of social support also helps people cope better with environmental stressors.<sup>14</sup>

Distressing or severe tinnitus is often followed by one or more of the following symptoms: sleep disturbances, concentration issues, hearing impairments, disturbance of daily activities, irritation and annoyance, anxiety, and sadness.<sup>15</sup> Tinnitus frequently coexists with personality characteristics and psychiatric illnesses, particularly sadness and anxiety, and may serve as indicators of tinnitus intensity.<sup>16</sup> Insomnia, feelings of despair, irritation, impatience, concentration difficulties, psychosomatic symptoms, interpersonal issues, and social withdrawal are all signs of tinnitus and depression. Small clinical research has revealed that a significant number of tinnitus patients (18%–80%) suffer from depression.<sup>17</sup> This wide range of depression prevalence rates among

tinnitus patients is most likely due to the fact that prior research used small sample sizes rather than a large representative general population sample. Apart from the link between tinnitus and depression, it has also been suggested that tinnitus may have a role in the risk of suicide.<sup>18</sup>

**Material and Methods**

An analytic cross-sectional study was performed on a sample of 150 adult both male and female have diagnosed with tinnitus having age from 25 to 45 age limit with non-probability sampling technique. Data was collected from The University of Lahore teaching Hospital Audiology clinic and ENT department, Mayo Hospital Lahore Audiology and ENT department. Patients diagnosed with tinnitus included in this study and both male and female were included in this study and also 25 to 45 years of age were included in this study. Data was collected from October 2021 to March 2022 and Beck Anxiety scale, Beck Depression inventory and Tinnitus Handicap inventory was used to collect data. Patient having hearing loss of any type were excluded and other co-morbidities having hearing loss or ear pathology were excluded. The ears were checked by otoscope, tympanometer, and assessed with standard pure tone audiometer. Otoscopic procedure was performed to see the outer ear canal and tympanic membrane and tympanometry procedure was checked the middle ear status of adult. Pure tone audiometry checked the tinnitus matching of patients and tinnitus handicap inventory was used to fill out the questionnaires and determine the degree of tinnitus. Beck depression inventory process was used to fill out the patient questionnaires in order to determine the percentage of patients that were depressed and also Beck anxiety inventory technique was used to assess the patients' questions and determine the proportion of anxiety. Pearson Chi-square test was used to determine

association of depression and anxiety in tinnitus patients. The significant level was set as equal as or less than  $p < 0.05$ .

**Results**

Table 1 shows frequencies and percents of slight or no handicap (Grade 1) tinnitus have low level anxiety 5.1% only and there was no single participant high level anxiety and also potentially concerning levels of anxiety. Frequencies and percents of mild handicap (Grade 2) tinnitus have low anxiety level 2.0% only there was no single participant high level anxiety and potentially concerning levels of anxiety. Frequencies and percents of moderate handicap (Grade 3) tinnitus out of 100% participants have 67.4% have tinnitus with low level anxiety 29.6%, high-level anxiety 26.0% but majority anxiety in potentially concerning levels of anxiety 50.0%. Frequencies and percents of severe handicap (Grade 4) tinnitus out of 100% participants have 62.2% tinnitus with low level anxiety 62.2%, majority participants in high-level anxiety 72.0% and also in potentially concerning levels of anxiety 50.0%. Frequencies and percents of catastrophic handicap (Grade 5) tinnitus have low level anxiety 1.0% only, high level anxiety 2.0% only and also there was no single participant potentially concerning levels of anxiety.

Table 1: Status Tinnitus \* Status Anxiety

|                 |                                 | Status Anxiety           |                |  | P Value        |       |
|-----------------|---------------------------------|--------------------------|----------------|--|----------------|-------|
|                 |                                 | Low Anxiety              | High Anxiety   | potentially concerning levels of anxiety |                |       |
| Status Tinnitus | Slight or no handicap (Grade 1) | Count                    | 5 <sub>0</sub> | 0 <sub>0</sub>                           | 0 <sub>0</sub> | 0.082 |
|                 |                                 | Expected Count           | 3.3            | 1.7                                      | .1             |       |
|                 |                                 | % Within Status Tinnitus | 100.0%         | 0.0%                                     | 0.0%           |       |
|                 |                                 | % Within Status Anxiety  | 5.1%           | 0.0%                                     | 0.0%           |       |
|                 |                                 | % Of Total               | 3.3%           | 0.0%                                     | 0.0%           |       |
|                 | Mild handicap (Grade 2)         | Count                    | 2 <sub>0</sub> | 0 <sub>0</sub>                           | 0 <sub>0</sub> |       |
|                 |                                 | Expected Count           | 1.3            | .7                                       | .0             |       |
|                 |                                 | % Within Status Tinnitus | 100.0%         | 0.0%                                     | 0.0%           |       |
|                 |                                 | % Within Status Anxiety  | 2.0%           | 0.0%                                     | 0.0%           |       |
|                 |                                 | % Of Total               | 1.3%           | 0.0%                                     | 0.0%           |       |

|                                 |                          |                 |                 |                |
|---------------------------------|--------------------------|-----------------|-----------------|----------------|
| Moderate handicap (Grade 3)     | Count                    | 29 <sub>a</sub> | 13 <sub>a</sub> | 1 <sub>a</sub> |
|                                 | Expected Count           | 28.1            | 14.3            | .6             |
|                                 | % Within Status Tinnitus | 67.4%           | 30.2%           | 2.3%           |
|                                 | % Within Status Anxiety  | 29.6%           | 26.0%           | 50.0%          |
|                                 | % Of Total               | 19.3%           | 8.7%            | 0.7%           |
| Severe handicap (Grade 4)       | Count                    | 61 <sub>a</sub> | 36 <sub>a</sub> | 1 <sub>a</sub> |
|                                 | Expected Count           | 64.0            | 32.7            | 1.3            |
|                                 | % Within Status Tinnitus | 62.2%           | 36.7%           | 1.0%           |
|                                 | % Within Status Anxiety  | 62.2%           | 72.0%           | 50.0%          |
|                                 | % Of Total               | 40.7%           | 24.0%           | 0.7%           |
| Catastrophic handicap (Grade 5) | Count                    | 1 <sub>a</sub>  | 1 <sub>a</sub>  | 0 <sub>a</sub> |
|                                 | Expected Count           | 1.3             | .7              | .0             |
|                                 | % Within Status Tinnitus | 50.0%           | 50.0%           | 0.0%           |
|                                 | % Within Status Anxiety  | 1.0%            | 2.0%            | 0.0%           |
|                                 | % Of Total               | 0.7%            | 0.7%            | 0.0%           |
| Total                           | Count                    | 98              | 50              | 2              |
|                                 | Expected Count           | 98.0            | 50.0            | 2.0            |
|                                 | % Within Status Tinnitus | 65.3%           | 33.3%           | 1.3%           |
|                                 | % Within Status Anxiety  | 100.0%          | 100.0%          | 100.0%         |
|                                 | % Of Total               | 65.3%           | 33.3%           | 1.3%           |

Table 2 shows frequencies and percents of slight or no handicap (Grade 1) tinnitus out of 100% participants have 60.0% have tinnitus with normal depression 16.7%, mild mood disturbance 25.0%, there was no single participant borderline clinical depression, moderate depression, severe depression and also extreme depression. Frequencies and percents of mild handicap (Grade 2) tinnitus out of 100% participants have 50.0% tinnitus with normal depression 5.6%, borderline clinical depression 3.2%, there was no single participant mild mood disturbance, moderate depression, severe depression and also extreme depression. Frequencies and percents of moderate handicap (Grade 3) tinnitus out of 100% participants have 4.7% have tinnitus with Normal depression 11.1%, but majority depression in Mild mood disturbance 62.5%, Borderline clinical depression 38.7%, Moderate depression 23.0%, Severe depression 60.0% and also Extreme depression 100.0%. Frequencies and percents of Severe handicap (Grade 4) tinnitus out of 100% participants have 10.2% have tinnitus with Normal depression 55.6%, Mild mood disturbance 12.5%, Borderline clinical depression 58.1%, but majority depression in Moderate depression 77.0%, Severe depression 40.0% and there was no single participant in Extreme depression. Frequencies and percents of Catastrophic handicap (Grade 5) tinnitus have 11.1% Normal depression, and there was no single participant in Mild mood disturbance Borderline clinical depression, Moderate depression, Severe depression and also Extreme depression.

**Table 2: Status Tinnitus \* Status Depression**

|                                 |                                 | Status Depression          |                       |                                |                     |                   |                    | P Value          |       |
|---------------------------------|---------------------------------|----------------------------|-----------------------|--------------------------------|---------------------|-------------------|--------------------|------------------|-------|
|                                 |                                 | Normal                     | Mild mood disturbance | Borderline clinical depression | Moderate depression | Severe depression | Extreme depression |                  |       |
| Status Tinnitus                 | Slight or no handicap (Grade 1) | Count                      | 3 <sub>a</sub>        | 2 <sub>a</sub>                 | 0 <sub>a,b</sub>    | 0 <sub>b</sub>    | 0 <sub>a,b</sub>   | 0 <sub>a,b</sub> | 0.005 |
|                                 |                                 | Expected Count             | .6                    | .3                             | 1.0                 | 2.9               | .2                 | .0               |       |
|                                 |                                 | % Within Status Tinnitus   | 60.0%                 | 40.0%                          | 0.0%                | 0.0%              | 0.0%               | 0.0%             |       |
|                                 |                                 | % Within Status Depression | 16.7%                 | 25.0%                          | 0.0%                | 0.0%              | 0.0%               | 0.0%             |       |
|                                 |                                 | % Of Total                 | 2.0%                  | 1.3%                           | 0.0%                | 0.0%              | 0.0%               | 0.0%             |       |
| Mild handicap (Grade 2)         | Count                           | 1 <sub>a</sub>             | 0 <sub>a</sub>        | 1 <sub>a</sub>                 | 0 <sub>a</sub>      | 0 <sub>a</sub>    | 0 <sub>a</sub>     |                  |       |
|                                 | Expected Count                  | .2                         | .1                    | .4                             | 1.2                 | .1                | .0                 |                  |       |
|                                 | % Within Status Tinnitus        | 50.0%                      | 0.0%                  | 50.0%                          | 0.0%                | 0.0%              | 0.0%               |                  |       |
|                                 | % Within Status Depression      | 5.6%                       | 0.0%                  | 3.2%                           | 0.0%                | 0.0%              | 0.0%               |                  |       |
|                                 | % Of Total                      | 0.7%                       | 0.0%                  | 0.7%                           | 0.0%                | 0.0%              | 0.0%               |                  |       |
| Moderate handicap (Grade 3)     | Count                           | 2 <sub>a</sub>             | 5 <sub>a</sub>        | 12 <sub>a</sub>                | 20 <sub>a</sub>     | 3 <sub>a</sub>    | 1 <sub>a</sub>     |                  |       |
|                                 | Expected Count                  | 5.2                        | 2.3                   | 8.9                            | 24.9                | 1.4               | .3                 |                  |       |
|                                 | % Within Status Tinnitus        | 4.7%                       | 11.6%                 | 27.9%                          | 46.5%               | 7.0%              | 2.3%               |                  |       |
|                                 | % Within Status Depression      | 11.1%                      | 62.5%                 | 38.7%                          | 23.0%               | 60.0%             | 100.0%             |                  |       |
|                                 | % Of Total                      | 1.3%                       | 3.3%                  | 8.0%                           | 13.3%               | 2.0%              | 0.7%               |                  |       |
| Severe handicap (Grade 4)       | Count                           | 10 <sub>a,b</sub>          | 1 <sub>b</sub>        | 18 <sub>a,b</sub>              | 67 <sub>a</sub>     | 2 <sub>a,b</sub>  | 0 <sub>a,b</sub>   |                  |       |
|                                 | Expected Count                  | 11.3                       | 5.2                   | 20.3                           | 56.8                | 3.3               | .7                 |                  |       |
|                                 | % Within Status Tinnitus        | 10.2%                      | 1.0%                  | 18.4%                          | 68.4%               | 2.0%              | 0.0%               |                  |       |
|                                 | % Within Status Depression      | 55.6%                      | 12.5%                 | 58.1%                          | 77.0%               | 40.0%             | 0.0%               |                  |       |
|                                 | % Of Total                      | 6.7%                       | 0.7%                  | 12.0%                          | 44.7%               | 1.3%              | 0.0%               |                  |       |
| Catastrophic handicap (Grade 5) | Count                           | 2 <sub>a</sub>             | 0 <sub>a,b</sub>      | 0 <sub>a,b</sub>               | 0 <sub>b</sub>      | 0 <sub>a,b</sub>  | 0 <sub>a,b</sub>   |                  |       |
|                                 | Expected Count                  | .2                         | .1                    | .4                             | 1.2                 | .1                | .0                 |                  |       |
|                                 | % Within Status Tinnitus        | 10.0%                      | 0.0%                  | 0.0%                           | 0.0%                | 0.0%              | 0.0%               |                  |       |
|                                 | % Within Status Depression      | 11.1%                      | 0.0%                  | 0.0%                           | 0.0%                | 0.0%              | 0.0%               |                  |       |
|                                 | % Of Total                      | 1.3%                       | 0.0%                  | 0.0%                           | 0.0%                | 0.0%              | 0.0%               |                  |       |
| Total                           | Count                           | 18                         | 8                     | 31                             | 87                  | 5                 | 1                  |                  |       |
|                                 | Expected Count                  | 18.0                       | 8.0                   | 31.0                           | 87.0                | 5.0               | 1.0                |                  |       |
|                                 | % Within Status Tinnitus        | 12.0%                      | 5.3%                  | 20.7%                          | 58.0%               | 3.3%              | 0.7%               |                  |       |
|                                 | % Within Status Depression      | 10.0%                      | 100.0%                | 100.0%                         | 100.0%              | 100.0%            | 100.0%             |                  |       |
|                                 | % Of Total                      | 12.0%                      | 5.3%                  | 20.7%                          | 58.0%               | 3.3%              | 0.7%               |                  |       |

**Table 3: Frequencies and percentage of gender**

| Statistics | Frequency | Percent |
|------------|-----------|---------|
| Male       | 86        | 57.3    |
| Female     | 64        | 42.7    |
| Total      | 150       | 100.0   |

Table 3 shows Frequencies and percentage were carried out of demographical variables. Total sample consisted of 150 individuals in whom there were, majority of the individuals (86) were in male, and (64) individuals were in female.

### Discussion

Previous research by Jinwei Hu, et al had 79.1% of the 91 tinnitus sufferers had a diagnosis of anxiety, 59.3% had depression, and 58.2% suffered from both anxiety and depression. Mohsin raza et al indicated that 150 diagnose with tinnitus had low level anxiety 65.3%, high level anxiety 33.3%, potentially concerning levels of anxiety 1.3%, normal depression 12.0%, Mild mood disturbance 5.3%, Borderline clinical depression 20.7%, Moderate depression 58.0%, Severe depression 3.3% and also Extreme depression 0.7%.<sup>19</sup>

Research by Fetoni AR, et al in which we administered to all patients the Italian versions of Tinnitus Handicap Inventory (THI) and Hospital Anxiety and Depression Scale (HADS). Furthermore, we investigated the correlation among patient's discomfort, severity of hearing loss and age. The result of this research was average THI score was 40.85, meaning moderate degree of discomfort; 57.5% of the patients showed HADS scores consistent with high risk of psychiatric comorbidities. A significant linear correlation between THI and HADS scores was demonstrated. Mohsin raza et al that 150 diagnose with tinnitus had low level anxiety 65.3%, high level anxiety 33.3%, potentially

concerning levels of anxiety 1.3%, normal depression 12.0%, Mild mood disturbance 5.3%, Borderline clinical depression 20.7%, Moderate depression 58.0%, Severe depression 3.3% and also Extreme depression 0.7%.<sup>20</sup>

Results of Özgül Karaaslan, et al was aimed to evaluate the anxiety sensitivity, levels of anxiety and depression, and personality traits of patients with chronic subjective tinnitus. On the other hand, the study included 42 patients, who visited the Otorhinolaryngology Clinic, complained of having tinnitus for at least 1 year and did not have any previous peripheral vestibular diseases or psychiatric treatment history. Forty-five healthy individuals volunteered to be in the control group. We administered the Tinnitus-Severity-Index (TSI), Anxiety-Sensitivity-Index-3 (ASI-3), Beck-Anxiety Inventory (BAI), Beck Depression-Inventory (BDI) and Eysenck-Personality-Questionnaire (EPQ) to the study participants. The result of this research, the BDI score was significantly higher in the patient group. Mohsin raza et al that 150 diagnose with tinnitus had low level anxiety 65.3%, high level anxiety 33.3%, potentially concerning levels of anxiety 1.3%, normal depression 12.0%, Mild mood disturbance 5.3%, Borderline clinical depression 20.7%, Moderate depression 58.0%, Severe depression 3.3% and also Extreme depression 0.7%.<sup>21</sup>

Yaping Xu, et al conducted research in which aimed to investigate the relationship between quality of sleep and psychiatric disorders including anxiety and depression in patients with subjective tinnitus. Early intervention is associated with improved therapeutic outcomes. We used Pittsburgh sleep quality index (PSQI), self-rating anxiety scale (SAS), self-rating depression scale (SDS) and tinnitus handicap inventory (THI) in 543 patients [224 male (41.3 %); 319 female (58.7 %)] with subjective tinnitus

enrolled in the ENT outpatient clinic from 2013 to 2015. Tinnitus characteristics and hearing status were recorded. A binary step-wise logistic regression analysis was performed. Two hundred cases (36.8 %) including 65 men (32.5 %) and 135 women (67.5 %) were diagnosed with sleep disorders. The PSQI score was the highest in patients with anxiety plus depression. This study shows that 150 diagnose with tinnitus had low level anxiety 65.3%, high level anxiety 33.3%, potentially concerning levels of anxiety 1.3%, normal depression 12.0%, mild mood disturbance 5.3%, borderline clinical depression 20.7%, moderate depression 58.0%, severe depression 3.3% and also extreme depression 0.7%.<sup>22</sup>

### Conclusion

As level of tinnitus increases, level of anxiety and depression were also increased. Patients suffering with tinnitus have high risk of depression than anxiety. As results showed that tinnitus cause depression greater than anxiety.

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