

# The Effect of COVID-19 Pandemic on the Quality of life of Patients with Chronic Tinnitus

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## ABSTRACT

**Background:** To assess the effect of the anxiety associated with COVID-19 pandemic on the quality of life of patients with chronic tinnitus.

**Patients and Methods:** Study assessed the effect of the anxiety associated with COVID-19 pandemic on the quality of life of 68 patients with chronic tinnitus and normal hearing, utilizing the Hamilton Anxiety (HAM-A) and the Tinnitus Handicap Inventory (THI) scales with a comparison of their scores that were collected retrospectively from their database before the COVID -19 pandemic and their scores that were collected electronically during the pandemic.

**Results:** The Hamilton Anxiety scale and Tinnitus Handicap Inventory scale scores showed significantly higher scores during COVID-19 pandemic in comparison to their scores before it.

**Conclusion:** Coronavirus (COVID-19) pandemic may result in increasing the anxiety and stress in patients with chronic tinnitus with subsequent worsening of their quality of life, which shed light on the importance of psychiatric consultation for the affected patients.

**Key Words:** Anxiety, COVID-19, stress, tinnitus.

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## INTRODUCTION

In the wake of 2020, the COVID-19 is a distinct strain of the coronavirus causing the acute respiratory syndrome, appeared in Wuhan city of China, and quickly extended across the world.<sup>[1]</sup> Its case fatality rate is 2.3% greater than that of Influenza, and it is more contagious in comparison to the severe acute respiratory syndrome (SARS).<sup>[2]</sup> Currently, with no appropriate cure, several countries are responding to the COVID-19 pandemic through a combination of curfew and mitigation strategies.<sup>[3]</sup> These strategies have disrupted the psychosocial life of the population with the creation of an impending sense of fear, anxiety, and similar mental issues, and most countries have difficulties to deal with the resulting social and financial crises.<sup>[4]</sup> Third world countries which have a considerable percentage of the population consisting of labors and people with low wages are facing the full burden of the pandemic with complete closedown of many cities within the country expecting more anxiety, depression and several other psychological disorders.<sup>[4]</sup>

Chronic tinnitus is the perception of sound without the presence of any external auditory stimulation that lasts for more than 6 months. It affects 5–10 % of the population, with a significant impact on the quality of life of those

patients.<sup>[5, 6]</sup> Chronic tinnitus is highly associated with psychological comorbidities including depression and anxiety disorders. However, the relationship between anxiety and stress on one aspect and the tinnitus on another aspect is a matter of debate, as we are unable to determine whether the anxiety and stress symptoms preceded or followed the onset of tinnitus. The anxiety can modify symptom perception in tinnitus, conversely the presence of tinnitus itself may predispose to significant psychiatric distress that can be measured by anxiety symptoms.<sup>[7,8,9,10]</sup>

We received many feedbacks from the patients with tinnitus during the COVID-19 pandemic declaring worsening of their symptoms, so we planned current study to evaluate the impact of the COVID-19 associated anxiety on those patients by comparing their quality of life before and during the COVID-19 pandemic utilizing the Tinnitus Handicap Inventory (THI) and Hamilton Anxiety (HAM-A) Scales that collected electronically.

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## PATIENTS AND METHODS:

Current study included 82 patients with chronic idiopathic bilateral tinnitus for at least six months duration; they were recruited from the database of the otology outpatients' clinic at the University of Tanta.

The medical records of our participants collected before the COVID-19 pandemic demonstrated bilateral normal peripheral hearing and normal function of the middle ear evidenced by otological examination, pure tone audiometry and immittance. They had normal general and otolaryngologic examination with no systemic diseases (e.g. anemia, hormonal disturbance, cervical diseases). Their investigations were normal including blood glucose level, lipid profile, liver function tests, renal function tests and thyroid function tests.

The Hamilton Anxiety (HAM-A) and Tinnitus Handicap Inventory (THI) scores were collected from patients who visited the outpatient clinic within the nine months before the spread of the COVID-19 pandemic, to avoid other confounding factors of anxiety and tinnitus. Then, they were asked to fill out these scores again electronically via E-mail or a message, to compare the differences in their scores pre- and during the Covid-19 pandemic.

The study protocol was approved by the institutional ethics committee in the Faculty of Medicine, Tanta University. All patients were informed about the purpose of the study and were asked to confirm their willingness to participate in the study. Authors sent the information letter, the consent form, and the questionnaires electronically E-mail or a message.

#### ***The Arabic version of the Hamilton anxiety scale (HAM-A):***

The validated Arabic HAM-A scale<sup>[11]</sup> is a tool to measure the severity of the anxiety in the control and the tinnitus groups. It consists of 14 items, each item comprises a group of symptoms which is graded on a scale of zero to four, where zero indicates no symptoms, and four indicates very severe symptoms, with the total score ranging between 0 and 56. Scores of 0-13, 14-17, 18-24, more than 25 indicate no anxiety, mild anxiety, moderate anxiety, and severe anxiety, respectively.

#### ***The Arabic version of the Tinnitus Handicap Inventory (THI):***

The validated Arabic version of the Tinnitus Handicap Inventory (THI)<sup>[12]</sup> is a subjective tool to evaluate the severity of tinnitus and its impact on the quality of life of the patients with tinnitus. The THI is a 25-items survey consisting of functional, emotional, and catastrophic subscales with the total scores ranging from 0 to 100, it reflects the psychological, social, and functional symptoms. Each item can be answered by yes (scored as 4), sometimes (scored as 2), or no (scored as 0). Scores of 0 -16, 18-36, 38-56, 58-76, and 78-100 indicate light or no handicap, mild handicap, moderate handicap, severe handicap, and catastrophic handicap, respectively.

#### **STATISTICS:**

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Data were analyzed using Statistical Program for Social Science (SPSS) version 20. Quantitative data were expressed as mean  $\pm$  standard deviation (SD). We used the t-test to compare the scores in the patients with tinnitus before and during the COVID-19 pandemic. P values of less than 0.05 were considered statistically significant. Pearson correlation test was used for the correlation between HAM-A and THI scores during COVID-19 pandemic in the subjects with tinnitus.

#### **RESULTS:**

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Current study included 82 patients with chronic tinnitus, their Hamilton Anxiety (HAM-A), and Tinnitus Handicap Inventory (THI) scores were collected before and during the COVID-19 pandemic. Fourteen out of 82 patients did not respond to the messages during the COVID-19 pandemic. So, sixty-eight patients (37 males and 31 females) with chronic tinnitus for at least 6 months duration ( $14.32 \pm 6.68$  months) were included in the study. They filled out both scores electronically. The mean age was  $28.85 \pm 7.92$  (18-42 years). All subjects included in the study had bilateral normal peripheral hearing; the PTA thresholds were  $10.83 \pm 5.65$ . During the COVID-19 pandemic, none of our research patients complained of newly developed hearing impairment or medical illness that may affect the tinnitus. As well as, there was no positive history of COVID-19 infection among them or their families.

Previous to the COVID-19 pandemic, the Hamilton anxiety (HAM-A) scale showed that 51 patients (75%) had the HAM-A score more than 13 [31 patients with mild anxiety, 15 patients with moderate anxiety and 5 patients with severe anxiety]. While during the COVID-19 pandemic, there were 59 patients (86.8%) with the HAM-A score of more than 13 (34 patients with mild anxiety, 18 patients with moderate anxiety, and 7 patients with severe anxiety] (Table 1).

Tinnitus Handicap Inventory (THI) scores demonstrated that previous to COVID-19 pandemic 20 patients had no or slight handicap, 33 patients had a mild handicap, 12 patients had a moderate handicap, and 3 patients showed severe handicap. During the COVID-19 pandemic, there was an increase in the Tinnitus Handicap Inventory (THI) scores where 11 patients only have no or slight handicap, 38 patients had a mild handicap, 14 patients had a moderate handicap, and 5 patients showed severe handicap (Table 2).

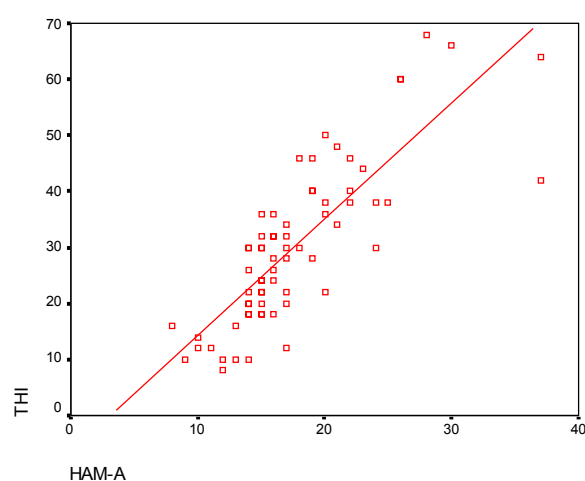
There was a significant increase ( $p\text{-value} \leq 0.05$ ) in the HAM-A scale and THI scale mean scores before and during the COVID-19 pandemic as shown in table 1 and table 2, respectively. There was a highly significant positive correlation ( $r= 0.810, p= 0.001$ ) between HAM-A scale and THI scale mean scores for tinnitus patients during COVID-19 pandemic (Figure 1).

**Table 1:** Comparison of the HAM-A scores before and during the COVID-19 pandemic for tinnitus patients

HAM-A	Before COVID-19		During COVID-19		t. test	p. value
	Number of patients	Mean $\pm$ SD (Range)	Number of patients	Mean $\pm$ SD (Range)		
No anxiety	17	10.35 $\pm$ 1.73 (8 – 13)	9	11.89 $\pm$ 1.05 (10 – 13)	2.423	0.023*
Mild anxiety	31	15.29 $\pm$ 1.10 (14 – 17)	34	16.15 $\pm$ 0.86 (15 – 17)	3.516	0.001*
Moderate anxiety	15	20.53 $\pm$ 1.81 (18 – 24)	18	22.39 $\pm$ 1.42 (20 – 24)	3.304	0.002*
Severe anxiety	5	29.20 $\pm$ 4.76 (25 – 37)	7	42.00 $\pm$ 8.23 (30 – 52)	3.101	0.011*

**Table 2:** Comparison of the THI scores before and during the COVID-19 pandemic for tinnitus patients

THI	Before COVID-19		During COVID-19		t. test	p. value
	Number of patients	Mean $\pm$ SD (Range)	Number of patients	Mean $\pm$ SD (Range)		
No or slight handicap	20	11.80 $\pm$ 2.50 (8-16)	11	14.00 $\pm$ 2.28 (10-16)	2.412	0.022*
Mild handicap	33	26.12 $\pm$ 5.52 (18-36)	38	29.18 $\pm$ 4.34 (19-36)	2.616	0.011*
Moderate handicap	12	42.33 $\pm$ 4.33 (38-50)	14	47.43 $\pm$ 4.72 (40-54)	2.849	0.009*
Severe handicap	3	64.67 $\pm$ 4.16 (60-68)	5	72.60 $\pm$ 3.36 (67-75)	2.977	0.025*

**Fig. 1:** Correlation between Hamilton-anxiety scale and Tinnitus Handicap inventory for tinnitus patients during COVID-19 pandemic

## DISCUSSION

COVID-19 pandemic is a major health problem that affects several countries. It has also incited fears of an impending economic crisis and recession. Social distancing, quarantine, and travel restrictions forced a decrease in the labor force across all economic sectors and caused many jobs to be lost. Schools have closed down, and the need for manufactured products

has decreased. The need for medical supplies has significantly increased; the food sector has seen a great demand due to the panic-buying and stockpiling of food products.<sup>[13]</sup> All the fore-mentioned sequelae of the COVID-19 resulted in adverse effects on the mental health and psychological distress of the population. Preliminary evidence demonstrated that symptoms of anxiety, depression, and self-reported stress are common psychological reactions to the COVID-19 pandemic.<sup>[14]</sup>

During the Ebola outbreaks in Sierra Leone in 2014 and the Democratic Republic of the Congo in 2018, the medical staff reported high levels of anxiety and stress among those who were in contact with infected patients.<sup>[15]</sup> Medical staff that performed the Middle East Respiratory Syndrome coronavirus (MERS- CoV) related tasks showed post-traumatic stress disorder symptoms after the Korean outbreak of 2015.<sup>[16]</sup>

Kang *et al.*<sup>[17]</sup> emphasized that the mental health problems resulting from the COVID-19 pandemic not only affect the attention and decision-making capacity of the population, but they could also have a lasting effect on their overall well-being.

It had been suggested that tinnitus may be linked with anxiety and stress.<sup>[18,19]</sup> Tinnitus may cause anxiety and stress to the affected patients with subsequent disturbance of their quality of life including e.g. sleep,

reading, work, and social interactions.<sup>[20]</sup> As well as it can cause significant emotional (include irritation, annoyance, anxiety, and depression) and somatic distress (headache, neck pain, and jaw pain).<sup>[21]</sup>

The causal relationship between tinnitus and anxiety is not yet fully understood. It is unclear whether patients report higher levels of symptoms of tinnitus because of the anxiety, or the effects of tinnitus on the quality of life contribute to the anxiety. What is clear, however, is that the anxiety is quite common in patients with tinnitus. of the 68 patients with tinnitus included in the study, there was a significant increase in both the HAM-A scale and the THI scale mean scores during the COVID-19 pandemic in comparison to their scores before the pandemic, and the correlation between HAM-A scale and THI scale mean scores for tinnitus patients during COVID-19 pandemic was highly significant (Figure 1). This indicated that the prevalence of the anxiety increased in the patients with tinnitus during the COVID-19 pandemic as part of increased anxiety reported worldwide reference with consequent more affection of the quality of life.

Literature review demonstrated numerous articles correlating the tinnitus with anxiety and stress. Gomaa *et al.* (2014)<sup>[22]</sup> studied the co-morbid depression, anxiety, and stress associated with tinnitus. They applied the Depression, Anxiety and Stress Scale (DASS) on 196 subjects: 100 patients suffering from subjective tinnitus associated with hearing loss (tinnitus group), 45 patients were only suffering from hearing loss (hearing loss group) and 50 healthy subjects (control group) to evaluate the negative emotional status of the depression, anxiety, and stress. They reported that the duration of the tinnitus correlated with the severity of depression and stress. In addition to the study conducted by Kim *et al.* (2014),<sup>[23]</sup> who found that the levels of the stress hormones were elevated in 344 patients with tinnitus than in 87 normal controls.

Jastreboff (1999)<sup>[24]</sup> described the neurophysiological model. He proposed that the subcortical level and the conscious cortex play an important role for tinnitus chronic perception and emotional reaction, so if the tinnitus is considered to be threatening, attention is focused on this perception, and habituation mechanisms are stopped. The connections between the auditory pathways and the limbic system are responsible for tinnitus emotional response and autonomic nervous system reaction: anxiety, depression, and sleep disorders that are commonly seen in these patients.

Tinnitus retraining therapy (TRT) is a form of habituation therapy which is based on the

neurophysiologic model, it was designed to reduce the patients' negative reaction to the tinnitus and reduce its perception.<sup>[25]</sup> Tinnitus retraining therapy uses two elements, the first one is an appropriate medical counseling about tinnitus etiology, mechanisms of habituation, positive prognosis, and other cognitive strategies to reduce the patient's aversive reaction to the symptom. The second one is the use of a sound therapy crucial for tinnitus reduction. Sound therapy which is aimed at weakening tinnitus related neuronal activity.<sup>[26]</sup>

Duan and Zhu, 2020<sup>[27]</sup> pointed out that the Western countries have incorporated psychological interventions into their protocols for the COVID-19 pandemic for individuals with a suspected infection and under quarantine or at home, this has not yet happened in developing countries, leading to the development and persistence of anxiety and stress-related disorders in the affected patients. So we recommend close collaboration with psychiatrists in the management of tinnitus during and after the COVID-19 pandemic. Crocetti, *et al*<sup>[28]</sup> and Cho, *et al*<sup>[29]</sup> recommended the psychological counseling for the patients whose THI score is greater than 38 (classified as moderate handicap or more).

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## CONCLUSION

COVID-19 pandemic associated anxiety had a deleterious effect on the quality of life of patients with tinnitus which shed light on the importance of psychiatric consultation in those patients during the pandemic.

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## CONFLICT OF INTEREST

There are no conflicts of interest.

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