



## PHYSIOPSYCHOSOCIAL IMPACT OF TINNITUS ON QUALITY OF LIFE- A HOSPITAL BASED OBSERVATIONAL STUDY IN LUCKNOW

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Conflicts of Interest: Nil

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### Abstract:

**Background:** Tinnitus is a very common auditory disorder affecting approximately 10-15% of the population. Although tinnitus is commonly caused by auditory system damages, the role of emotional and psychological factors inducing and maintaining annoyance has been proven in recent tinnitus studies.

**Objective:** To evaluate the presence of sign and symptoms of stress in the patients with chronic, subjective tinnitus, and correlate its presence to annoyance associated with tinnitus.

**Methods:** This is a cross-sectional observational study. A questionnaire about medical history (including tinnitus) and sociopsychological exposure was taken as an interview. This analysis was restricted to the 560 subjects with self-reported tinnitus data. All scores were calculated according to the recommended guidelines and algorithms. Audiologic tests included pure-tone air and bone-conduction audiometry.

**Results:** Of the 560 patients included in the study, There was a predominance of females in the sample. Higher prevalence of tinnitus was seen in 50 years and above age group. The mostly observed medical condition was arthritis, followed by regular aspirin use and sinusitis. The least affecting conditions were cancer, followed by emphysema and ear infection in past years.

**Conclusion:** Age, gender, past medical history of arthritis, TMD and longer intake of aspirin and other NSAIDs directly affect the thresholds of high frequency audiometry. The hearing loss caused by tinnitus is moderate among individuals with hearing impairment. Thus tinnitus can cause psychosocial deformity with negative effects on quality of life.

**Keywords:** Arthritis, Hearing Disorders, Tinnitus, Psychosocial Stress, Quality of Life.

### Introduction

Tinnitus is defined as a sensation of sound perceived by an individual in the absence of an external sound source, and it affects approximately 15% of the population worldwide.<sup>1-3</sup>

In the neurophysiologic model<sup>5</sup>, tinnitus results from abnormal processing of sound generated in the auditory system. This erroneous processing occurs before the sound is perceived centrally. Tinnitus is the result of continuous firing of

cochlear fibers to the brain due to hyperactivity of the hair cells, or permanent damage to these cells, which creates a phantom sound transmitted to the brain that is heard as a real sound. Tinnitus can have a significant effect on quality of life. In its more severe forms, tinnitus can be accompanied by depression, anxiety, concentration difficulties, insomnia, or headaches.<sup>4,6</sup>

Tinnitus is a subjective symptom and is characterized by the presence of one or more sounds

Perceived in the ears or head in the absence of corresponding external sound stimulus. It affects

Approximately 17% of the general population and 33% of the elderly population, being severe in 20% of cases.<sup>5,7,8</sup>

Emotional stress is frequently associated with otologic symptoms as tinnitus and dizziness. Stress can contribute to the beginning or worsening of tinnitus. Tinnitus can affect, directly or indirectly, personal, professional and leisure activities, interfere in family and social relationships, and in extreme cases, even lead to suicide.<sup>6-8</sup>

In the neurophysiologic model<sup>5</sup>, tinnitus results from strange preparing of sound created in the sound-related framework. This incorrect preparing happens before the sound is seen halfway. Tinnitus is the consequence of persistent terminating of cochlear strands to the cerebrum because of hyperactivity of the hair cells, or changeless harm to these cells, which makes an apparition sound transmitted to the mind that is heard as a genuine sound.<sup>9-11</sup>

The most important psychoacoustic characteristics of tinnitus are frequency (pitch) and intensity (loudness). Frequency is measured with respect to a range of frequencies (low, medium or high), while intensity corresponds to the volume of the tinnitus sound. Frequency and intensity for tinnitus can be studied by acuphenometry.<sup>6,9,12</sup>

Tinnitus is a side effect that can go with different sicknesses or clutters of the outside, center, or internal ear, mind stem, and cerebral cortex. More than one reason for tinnitus might be available in the equivalent patient.<sup>10</sup> Sicknesses that are essentially otological, or infections that optionally influence the ear and have tinnitus as a side effect, are metabolic, cardiovascular, neurological, pharmacological, mental and denta.<sup>16-20</sup> Among the dental ailments, temporomandibular joint disorder (TMD) is an aggregate term covering a wide scope of clinical joint and muscle issues in the orofacial territory. These scatters are for the most part portrayed by agony in the joint, sounds, and sporadic or boundless mandibular function.<sup>11</sup> TMD can likewise produce optional sound-related side

effects, for example, ear infection, tinnitus, vertigo, discombobulation, hearing misfortune, alluded torment or headaches<sup>12-28</sup>. Of the all inclusive community, 40-75% hint at TMD, and 33% have no less than one indication. Likewise, 10% have hearing misfortune and 7-15% grumble of tinnitus<sup>29</sup>. Nerve pressure is one of the reasons for TMD; the chorda tympani is a part of the seventh cranial nerve (facial nerve) and the auricular nerve, a touchy part of the mandibular nerve, which is a part of the fifth cranial nerve (trigeminal nerve). Pressure of these nerves can cause genuine consequences<sup>30</sup>. Compressions in the bilaminar zone can prompt sound-related indications usually saw in patients with TMD (muscle and additionally joint starting point) and might be identified with weight on the auricular district. The primary driver of auricular nerve and chorda tympani pressure are poor dental impediment and craniocervical pose alterations.<sup>30</sup> However, there is no proof that demonstrates association just among TMD and otological symptoms<sup>28</sup>. An inclination of the relationship among TMD and otological indications in females has been observed.<sup>7,9,15,30</sup> Numerous reports of help from or improvement in otological side effects happen after treatment for arthritis.<sup>7,11</sup> Investigations of long term aspirin and NSADs use by patients demonstrate some mental contribution with indications regularly meddling with every day activities<sup>31</sup>. The equivalent can be said for tinnitus.<sup>3,4,6,23</sup>

The aim of our study was to compare quality of life, high-frequency audiometry, and loudness-pitch match in individuals with tinnitus with and without hearing loss, according to age group and causative factors.

## MATERIALS AND METHODS

This Prospective observational study was performed on 560 cases who visited to the Department of Otolaryngology, Balrampur Hospital, Lucknow, U.P., in the period of four months from November 2018 to March 2019. Approval from Institutional ethical committee was taken before initiation of the study. Written informed consent was taken from all the study participants.

The study included 560 determinations that had tinnitus problem, between 10-70 years age group. We collected epidemiological data (age and gender) and laboratory data from the hospital database of patients who attended outpatient clinics in the above period.

Inclusion criteria: Age between 10 and 70 years, Complaint of tinnitus, Absence of conductive hearing impairment and/or history of middle-ear abnormalities (otitis, otological surgery, etc.), Bilateral type A tympanometric curve, Absence of syndromes, cognitive deterioration, or apparent psychiatric abnormalities, Hearing threshold below 25 dB or mean of 500, 1,000, and 2,000 to 25 dB for the group with normal Hearing, Mild to severe neurosensory hearing impairment for the group with hearing deficiency.

The exclusion criteria: Mild and Severe cognitive impairment, Diagnosis of central nervous system tumors, including cerebellum-pontine angle (CPA) tumors, Recent surgery or otologic procedure, including implantable hearing devices, Presence of psychiatric disorders diagnosed by the Mini International Neuropsychiatric Interview (MINI).

All the patients with above selection criteria were followed with the thorough case history which included general questions and information on tinnitus characteristics,

A questionnaire about medical history (including tinnitus) and sociopsychological exposure was taken as an interview. This analysis was restricted to the 560 subjects with self-reported tinnitus data.

At both the baseline and five-year examinations, participants were asked about buzzing, ringing, or noise in ears in the past years. Answers were recorded in terms of 'yes' or 'no.' where tinnitus was mentioned as "yes" response.

Participants responding positively to this question were then asked about the intensity of the noise in its worst form. Which were in the form of mild/moderate/ severe or unknown?

Another questions were added like noise irritation which can be in the form of none/ slightly/moderately/ severely or unknown, and the duration of the noise usually last longer than 5

minutes the answers may be in the form of no/ yes or unknown.

Health-related quality of life was ascertained using the SF-36 questions which assess function, well-being, disability, and personal evaluation for both physical and mental health. The eight domains can also be combined into two summary scales: the Physical Component Summary scale (PCS) and the Mental Component Summary scale (MCS), which have been shown to be accurate summary measures of the eight domains. A questionnaire about medical history (including tinnitus) and sociopsychological exposure was taken as an interview. This analysis was restricted to the 560 subjects with self-reported tinnitus data. All scores were calculated according to the recommended guidelines and algorithms. Audiologic tests included pure-tone air and bone-conduction audiometry.

Sociodemographic and health characteristics examined for their potential association with both quality of life and reported tinnitus severity included age, sex, current use of antidepressant medications, regular use of aspirin, history of arthritis, cancer, cardiovascular disease like myocardial infarction, stroke, angina, history of head injury like skull fracture, concussion, broken nose, whiplash or other serious neck injury, history of previous ear infection, emphysema, hearing loss, history of sinus infection and smoking status. The sleep problems like difficulty getting to sleep, waking up and having a hard time getting back to sleep, and waking up repeatedly.

560 patients were categorized into six age groups as 10-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years and 61-70 years. Statistical analyses were completed with SPS version 21. All clinical and case history findings tabulated according to age group and gender wise. The unadjusted association between sex and tinnitus severity was tested with the chi-square test for general association. The unadjusted association between tinnitus severity and use of antidepressant medication was tested. The level of significance was set at 0.05, with 95% confidence intervals.

## RESULTS

There was a predominance of females in the sample (67.86%). The average age of the sample was 42.34 years (range 10-70 years).

**Table 1: Demographic Characteristics of Patients (N=560)**

Characteristics	Group	No. of patients	Percentage
Age	10-20	24	4.28
	21-30	46	8.21
	31-40	62	11.07
	41-50	85	15.2
	51-60	185	33.03
	61-70	158	28.0
Gender	Male	180	32.14
	Female	380	67.86

According to Table 1, Higher prevalence seen in 50 years and above age group, lowest prevalence was observed in 10-20 year of age group. There was a female prevalence in tinnitus study as a result of higher incidence of chronic disorders, mental stress and physical weakness.

**Table 2: Past Medical History**

Disorders	No of Patients	Percentage
Arthritis	219	39.1
Cancer	12	2.4
Cardiovascular Disease	88	15.8
Emphysema	23	4.1
Head Injury	123	22
Sinusitis	196	35
Regular Aspirin Use	207	36.96
Antidepressant Medication	47	8.5
Ear Infection In Past Year	28	5

In case of tinnitus patients, when past medical history was recorded, acute and chronic diseases observed to be like arthritis, cancer, cardiovascular disease, emphysema, head injury, sinusitis, chronic use of aspirin and antidepressant drugs, ear infection in past years. The mostly observed medical condition was arthritis in 219 [39.1%] individuals followed by individuals having regular aspirin use in 207 [36.96%] and sinusitis in 196 [35%] individuals. The least affecting conditions were cancer in 12 [2.4%] subjects followed by emphysema in 23 [4.1%] patients and ear infection in past years in 28 [5%] individuals. This data was explained in Table 2.

**Table 3: Other Factors.**

Variables		No. of patients	Percentage
Number of sleep problems	0	264	47.3
	1	154	27.6
	2	82	16.4
	3	60	10.7
Smoking status	Never	234	41.8
	Past	216	38.6
	Current	108	19.4
Tinnitus in past year		176	31.5

Three sleep problems enumerated were difficulty getting to sleep, waking up and having a hard time getting back to sleep and waking up repeatedly. 264 [47.3%] individuals had no problem in sleep, three problems were occurred in only 60 [10.7%] individuals, single sleep problem was observed in 154 [27.6%] subjects. Most of the patients had smoking history in present and past time i.e. in 216 [38.6%] patients. 176 [31.5%] patients had tinnitus in past time as shown in Table 3.

**Table 4: Results related to tinnitus characteristics according to duration and frequency.**

	Group	No of patients	Percentage
Duration	Days	170	30.32
	Hours	86	15.33
	Minutes	98	17.5
	Seconds	179	32.06
	Other	27	4.85
Frequency	No	111	19.8
	Mild	197	35.3
	Moderate	143	25.4
	Severe	109	19.5

Most of the subjects had tinnitus for multiple days i. e. in 170 [30.32%], some patients i. e. 179 [32.06%] had tinnitus for few seconds. Highest number of individuals had mild frequency of tinnitus sound i.e. 197 [35.3%], severe frequency was observed in 109 [19.5%] patients. These findings were enumerated in Table 4.

## DISCUSSION

A study carried out on 560 individuals in Government hospital of Lucknow city, all were reported with hearing problem, between 10-70 years age group. These were categorized into six age groups as 10-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years and 61-70 years. A questionnaire about medical history (including tinnitus) and occupational and leisure time noise exposure was administered as an interview. This analysis was restricted to the 560 with self-reported tinnitus data. We collected data from the MINI questionnaire, clinical and physical case history of patients who attended outpatient clinics in the above period.

There was a predominance of females in the sample (67.86%). The average age of the sample was 42.34 years (range 10-70 years).

The results presented show a high occurrence of stress symptoms in tinnitus patients evaluated in a reference tinnitus clinic, especially in the more advanced phases, the resistance and exhaustion phases. We observed a clear increase in stress symptoms in patients with higher THI scores, being stress present in all patients with catastrophic tinnitus. There is enough evidence supporting the understanding that tinnitus induces stress. However, still little is known about stress being responsible for the appearance or worsening of tinnitus. It has been frequently observed that many tinnitus patients present with psychological or psychiatric distress before or during the onset and evolution of tinnitus.<sup>8</sup> It is obvious to believe that stress is related to tinnitus and directly associated to its annoyance.

According to John Harrison Curtis, in his study stated same evidence between the onset of tinnitus to psycho-social distress was caused by death of a close family member.<sup>9</sup> Another two large studies published important epidemiological information concerning the association of psychosocial stress with tinnitus.<sup>9,10</sup>

In case of tinnitus patients, when past medical history was recorded, acute and chronic diseases observed to be like arthritis, cancer, cardiovascular disease, emphysema, head injury, sinusitis, chronic use of aspirin and antidepressant drugs, ear infection in past years. The mostly observed medical condition was arthritis in 219 [39.1%] individuals followed by individuals

having regular aspirin use in 207 [36.96%] and sinusitis in 196 [35%] individuals. The least affecting conditions were cancer in 12 [2.4%] subjects followed by emphysema in 23 [4.1%] patients and ear infection in past years in 28 [5%] individuals. Likewise our investigation showed that the likelihood of creating tinnitus was roughly the equivalent for profoundly focused on people all things considered for people presented to noise related problems,<sup>9</sup> chronic diseases and other factors appears as significant as noise-related harm for causing tinnitus.

For some patients, with expanded reactivity to stretch, tinnitus may fill in as a caution motion, at any rate at its beginning, educating the patient that something could not be right or that something possibly risky could be going on and stress factors are plainly identified with this response. Viewpoints concerning this peril alert and the manner in which patients respond to and face the manifestation can clarify the epidemiological contrasts between the frequency of alluded tinnitus (10– 15%) and that of crippling tinnitus (2%). As it were, tinnitus turns into a crippling indication in subjects incessantly presented to pressure who are unfit to turn off the alert flag or to kill the impact of the stress related problems. In different people, similar elements or illnesses could incite tinnitus without actuating disturbance or trouble on the grounds that these subjects are talented to adapt to tinnitus as a stressor, with a genuine ability to reestablish typical body security. Singular ability to kill pressure factors is carefully explicit for each subject: the movement from alert to fatigue pressure stages is explicit for every patient. In a referral tinnitus facility, one would expect a higher number of patients in opposition and weariness stages, as found in our investigation. It is requesting to distinguish the pressure signals amid the caution stage to anticipate a movement toward the obstruction stage and, particularly, depletion stage. These later stages can prompt endless severe problems of tinnitus, in which there are a significant enthusiastic full of feeling enactment.<sup>12,13</sup>

Three sleep problems enumerated were difficulty getting to sleep, waking up and having a hard time getting back to sleep and waking up repeatedly. 264 [47.3%] individuals had no

problem in sleep, three problems were occurred in only 60 [10.7%] individuals, single sleep problem was observed in 154 [27.6%] subjects. Most of the patients had smoking history in present and past time i.e. in 216 [38.6%] patients, expecting that tinnitus patients have a more prominent measure of pressure reactivity, maladjustment to day by day pressure circumstances could be an outcome. It has been exhibited that decompensated tinnitus patients utilize increasingly maladaptive adapting techniques contrasted with controls.<sup>14-17</sup> concerning the physiological elements, maladaptive pressure reactivity in incessant tinnitus patients should prompt over the top reactivity in the independent sensory system. A few investigations tended to and confirm the job of anomalous physiological pressure responses in the beginning and support of tinnitus side effects.<sup>18-20</sup> The high adequacy of psychotherapy in the treatment of tinnitus sufferers contends for pressure reactivity identified with tinnitus trouble, taking into account that the majority of these treatment programs address adapting methodologies to stretch. Additionally, considers testing the impact of unwinding preparing underscore psycho physiological factors in incessant tinnitus patients.<sup>22,23</sup> Numerous patients may likewise profit by the utilization of medications focusing on the focal sensory system so as to decrease tension and stress related side effects.<sup>24</sup> The data collected here for the prerequisite for mental evaluation amid the analysis of tinnitus patients. Mental mediation with an objective of stress-the board procedures seems, by all accounts, to be a fundamental component in tinnitus treatment, particularly essential to use in all around beginning periods of tinnitus, before the chronification of permanent changes has occurred, taking into account that pressure is profoundly related to tinnitus, as a reason or impact. Here, we discuss a limitation of our study, the lack of a control group. Our intention was solely to describe the presence of stress and to stratify its stages and correlate with tinnitus annoyance in a selected group of patients referred to a specialized tinnitus clinic.

## CONCLUSION

This study concluded that, individuals with tinnitus have higher high-frequency thresholds, with complete hearing loss at some frequencies, as compared to those without hearing loss. Age have direct impact on hearing and frequency of tinnitus. Age, gender, past medical history of arthritis, TMD and longer intake of aspirin and other NSAIDs directly affects the thresholds of high frequency audiometry. The hearing loss caused by tinnitus is moderate among individuals with hearing impairment. Thus tinnitus can cause psychosocial deformity with negative effects on quality of life.

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