

Tinnitus in Fibromyalgia

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Objective: To assess the impact of tinnitus in fibromyalgia.

Methods: A quantitative controlled study was carried out. The 25-item Tinnitus Handicap Inventory (THI) and the Revised Fibromyalgia Impact Questionnaire (FIQR) were administered to 27 patients who fulfilled the revised diagnostic criteria for fibromyalgia of the American College of Rheumatology and to 26 healthy controls who had no history of suffering from fibromyalgia or any other rheumatological or neurological illness.

Results: The two groups were matched for age, sex and ethnicity. The fibromyalgia patients were significantly more likely to suffer from tinnitus than the controls: 16 (59.3%) of the patients suffered from tinnitus, compared with two (7.7%) of the controls ($p < 0.001$). The median (interquartile range) total THI score for the fibromyalgia group was 6 (44), which was significantly higher than that of 0 (0) for the control group ($p < 0.001$). The fibromyalgia group scored significantly higher than the control group for 24 of the 25 THI items. The total THI score across all subjects was positively correlated with the FIQR scores ($r_s = 0.408$, $p = 0.002$).

Conclusion: Fibromyalgia is associated with a relatively high prevalence of tinnitus.

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Key words: Fibromyalgia, Tinnitus, Daily living, Tinnitus Handicap Inventory

Primary tinnitus and pain are both subjective phenomena (1). Primary tinnitus is defined by the American Academy of Otolaryngology – Head and Neck Surgery Foundation as ‘idiopathic and may or may not be associated with sensorineural hearing loss’ (2). The prevalence of tinnitus is reported to be between 10 and 17% (1). Fibromyalgia is also of unknown aetiology; widespread pain is a characteristic feature and it affects up to 2-8% of people (3). Other symptoms which commonly affect fibromyalgia patients include fatigue, sleep disturbance and memory difficulties (3).

Two recent studies have indicated that tinnitus may be relatively common in patients suffering from fibromyalgia; tinnitus may seriously and adversely affect the quality of life of sufferers (4). In the first study, published in 2018, Koca and colleagues compared 44 patients diagnosed with fibromyalgia syndrome with an equal number of healthy volunteers, and reported that 64% of the patient group suffered from tinnitus compared with 27% of the controls (5). Although this study assessed the impact of dizziness, using the Dizziness Handicap Inventory (DHI), it did not formally assess the impact of other tinnitus-related symptoms on quality of life (5, 6). In the second study, published in 2020, Cil and colleagues assessed 101 patients diagnosed as suffering from fibromyalgia, and reported that 74% also suffered from tinnitus (7). Rather than use the DHI, they made use of the Tinnitus Handicap Inventory (THI) (8). The THI was published six years after the DHI, by the same authors as those who created the DHI, and is a 25-item inventory which specifically assesses the impact of tinnitus on daily living (8).

In the present study, a quantitative controlled study of the impact of tinnitus on fibromyalgia patients was carried out, using the THI and including a control group.

Materials and Methods

The design was a quantitative cross-sectional controlled study. The full 25-item THI (8) was used to assess the impact of tinnitus on daily living in 27 patients diagnosed as suffering from fibromyalgia syndrome, who fulfilled the revised diagnostic criteria for fibromyalgia of the American College of Rheumatology (9), and in 26 control subjects who had no history of suffering from fibromyalgia or any other rheumatological or neurological illness. The controls were healthy subjects who volunteered to take part in this study. The severity of fibromyalgia symptoms was assessed across all subjects using the Revised Fibromyalgia Impact Questionnaire (FIQR) (10). All 53 subjects underwent a physical examination.

Ethical approval was obtained from the CPUREC Research Ethics Committee. All participants gave full written informed

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consent. The study was carried out in accordance with the Declaration of Helsinki.

Parametric and non-parametric group comparisons were respectively carried out using the *t*-test and the Mann-Whitney test; when the groups had significantly different variances, the Student *t*-test was replaced by the Welch *t*-test. Contingency tables were analysed using the chi-squared test or Fisher's exact probability test. All tests were two-tailed. Statistical analyses were carried out using R v. 3.4.4, with and without JASP 0.11.1, running on a 64-bit x86_64-pc-linux-gnu platform (11, 12). Graphs were created using R v. 3.4.4 (11).

Results

The mean age (standard error (SE)) of the patients was 49.6 (2.1) years and did not differ significantly from that of 48.8 (2.4) years of the control subjects ($t = 0.375$, $df = 51$, $p = 0.709$). The male : female ratio for the patient group was 1 : 26, while that for the controls was 1 : 25; these did not differ significantly ($p = 1$, Fisher's exact probability test). All the patients and all the normal controls were white Caucasian, so that the groups were matched for ethnicity ($p = 1$, Fisher's exact probability test). In addition to being matched in respect of diseases such as the prevalence of type 2 diabetes mellitus and hypertension, the two groups were matched regarding smoking (patients v. controls: 2/25 v. 2/26; χ^2 with continuity correction = 2.51×10^{-32} , $p = 1$), a history of middle ear infections (2/26 v. 4/25; χ^2 with continuity correction = 0.236, $p = 0.627$), the presence of ear wax in the external auditory meatus (0/26 v. 1/25; χ^2 with continuity correction = 3.92×10^{-4} , $p = 0.984$) and a history of exposure to loud noise (4/26 v. 8/24; χ^2 with continuity correction = 1.330, $p = 0.249$).

Sixteen of the patients suffered from tinnitus compared with two of the controls. The tinnitus was chronic rather than temporary. In particular, the duration of tinnitus in the patients ranged from four years to over 20 years. The corresponding prevalence rate for tinnitus in the patients, of 59.3%, was higher than that of 7.7% in the controls ($\chi^2 = 15.704$, $df = 1$, $p < 0.001$).

Boxplots of the total THI score for both groups are shown in Fig. 1. The median (interquartile range) total THI score of the patient group was 6 (44), which was significantly higher than the corresponding score of 0 (0) for the control group ($U = 163$, $p < 0.001$). The respective corresponding mean (SE) values for the patients and controls were 21.63 (4.71) and 1.46 (1.08) (Welch *t*-test, $t = 4.170$, $df = 28.743$, $p < 0.001$).

The mean score for each of the THI symptoms was higher in the patients than

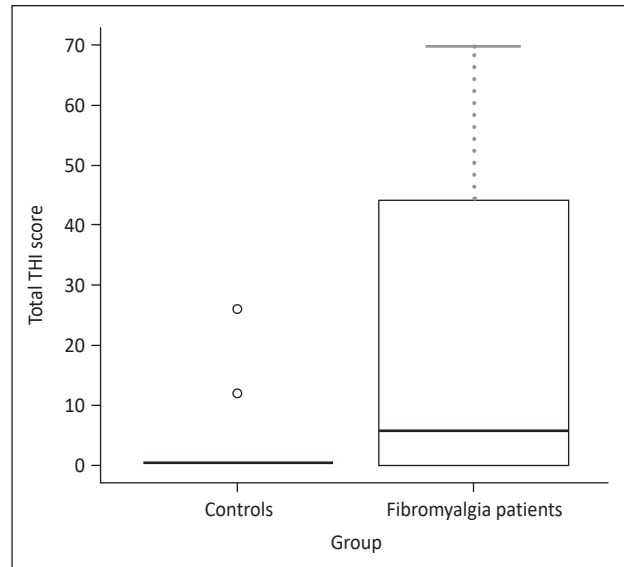


Figure 1. Boxplots of the total THI scores for the patients and controls.

in the controls. In all but one case, the group differences were significant ($p < 0.05$). In the case of THI symptom number 23, the group difference was borderline significant ($p = 0.052$). The results for all 25 THI symptoms are shown in Table 1. Finally, the total THI score across all subjects was positively correlated with the FIQR scores ($r_s = 0.408$, $p = 0.002$). However, the median FIQR score in the 16 patients with tinnitus (145) did not differ significantly from that in the

Table 1. The mean THI sub-scores for each group; standard errors are given in parentheses.

	Fibromyalgia n = 27	Controls n = 26	p-value
Affecting concentration	1.48 (0.29)	0.08 (0.08)	< 0.001
Difficulty hearing people	1.11 (0.31)	0.15 (0.11)	0.009
Causing anger	0.74 (0.22)	0.08 (0.08)	0.007
Causing confusion	0.52 (0.20)	0 (0)	< 0.001
Causing desperation	0.37 (0.15)	0 (0)	< 0.001
Complaining a great deal about tinnitus	0.52 (0.23)	0 (0)	< 0.001
Causing initial insomnia	1.33 (0.30)	0.15 (0.11)	< 0.001
Feeling unable to escape from tinnitus	1.41 (0.35)	0.15 (0.15)	0.002
Interfering with the ability to enjoy social activities	0.89 (0.27)	0 (0)	< 0.001
Causing frustration	1.26 (0.31)	0.08 (0.08)	< 0.001
Feeling of having a terrible disease	0.22 (0.16)	0 (0)	< 0.001
Making it difficult to enjoy life	0.52 (0.20)	0 (0)	< 0.001
Interfering with job or household responsibilities	0.52 (0.20)	0 (0)	< 0.001
Causing irritability	0.67 (0.26)	0.08 (0.08)	0.047
Difficulty reading	0.96 (0.27)	0.15 (0.11)	0.010
Causing one to be upset	0.74 (0.22)	0.08 (0.08)	0.007
Placing stress on relationships	0.44 (0.20)	0 (0)	< 0.001
Difficulty focusing attention away from tinnitus	0.82 (0.22)	0.15 (0.11)	0.011
Feeling of no control over tinnitus	1.63 (0.37)	0.08 (0.08)	< 0.001
Feeling tired often because of tinnitus	1.19 (0.29)	0 (0)	< 0.001
Making one feel depressed	0.89 (0.31)	0 (0)	< 0.001
Making one feel anxious	0.96 (0.31)	0 (0)	< 0.001
Feeling unable to cope any longer with tinnitus	0.44 (0.16)	0.08 (0.08)	0.052
Tinnitus gets worse when under stress	1.41 (0.33)	0.15 (0.15)	< 0.001
Making one feel insecure	0.59 (0.23)	0 (0)	< 0.001

remaining 11 patients without tinnitus (159; Mann-Whitney test, $U = 120.5$, $p = 0.114$).

Medications being taken by the fibromyalgia group are listed in Table 2.

Discussion

This is the first quantitative controlled study of the impact of tinnitus on daily living in patients with fibromyalgia. The prevalence of tinnitus found in this patient group, namely 59%, is comparable to the prevalence rates previously reported of 64% and 74% (5, 7). One of these two previous studies included a control group; that control group had a higher rate of tinnitus (27%) than was the case in the present control group (8%). The prevalence of tinnitus found in the present study in fibromyalgia is much higher than that of 10 to 17% reported in the general population (1).

The question arises as to whether tinnitus in the fibromyalgia group was associated with medication being taken by the patients. Table 2 shows that 12 out of the 16 fibromyalgia patients with tinnitus (75%) were taking regular medication compared with nine out of the 11 fibromyalgia with no history of tinnitus (81%). It is necessary to consider the types of medication being

taken. According to the British Tinnitus Association, proper scientific scrutiny leads to the conclusion that “the number of drugs that genuinely cause tinnitus is extremely small” (13). An updated peer-reviewed list of ototoxic drugs has recently been published by Altissimi and colleagues (14) and consists of certain antibiotics, platinum-based chemotherapeutics, loop diuretics, antimalarials and non-steroidal anti-inflammatory drugs (NSAIDs). From Table 2, three of the 16 patients with tinnitus were taking NSAIDs compared with two of the 11 fibromyalgia patients without tinnitus. In the extreme case in which the tinnitus in former group were to be attributed to the NSAID therapy, and the fact that NSAIDs did not cause tinnitus in patients in the second group were to be ignored, then the proportion of non-pharmacological tinnitus in the patient group would be reduced from 16/27 to 13/27. This lower proportion is still highly significantly greater than the proportion of normal controls who developed tinnitus (2/26) (χ^2 with continuity correction = 8.783, $p = 0.003$). Thus, it is unlikely that the present finding was secondary to pharmacotherapy.

The present study needs to be repeated with a much larger number of patients and controls.

In conclusion, this study indicates that fibromyalgia is associated with an increased likelihood of patients suffering from tinnitus. It is recommended that tinnitus should be routinely assessed in fibromyalgia patients.

Table 2. Medications being taken by the fibromyalgia patients at the time of the study

Patient number	History of tinnitus	Regular medication
1	Yes	Nil
2	No	Nil
3	Yes	Nil
4	No	Nil
5	Yes	Duloxetine
6	No	Thyroxine
7	Yes	Amitriptyline, diazepam, melatonin, sodium valproate, zopiclone
8	Yes	Diazepam, fentanyl, fexofenadine, oxycodone
9	Yes	Cetirizine, melatonin, omeprazole, propranolol, sertraline
10	Yes	Levothyroxine, paroxetine
11	No	Naproxen, paracetamol
12	No	Ferrous fumarate, levothyroxine, liothyronine, loratadine
13	Yes	Atomoxetine, diazepam, dihydrocodeine, duloxetine, lamotrigine, paracetamol, propranolol, ranitidine, sumatriptan
14	Yes	Diazepam, naproxen, omeprazole, paracetamol, pregabalin, salbutamol, sertraline, tramadol
15	Yes	Bisoprolol
16	No	Amitriptyline, hormone replacement therapy
17	Yes	Buprenorphine, hyoscine butylbromide, levothyroxine, mirabegron, mirtazapine, naproxen, omeprazole, paracetamol, prochlorperazine
18	No	Levothyroxine
19	Yes	Valproic acid
20	Yes	Nil
21	No	Paroxetine
22	Yes	Citalopram, diazepam, ibuprofen, naproxen, paracetamol
23	Yes	Nil
24	Yes	Alendronic acid, nortriptyline
25	No	Chlorphenamine maleate, fentanyl, levothyroxine, mirtazapine, morphine sulfate, pregabalin, solifenacin, zopiclone
26	No	Aripiprazole, bisoprolol, co-codamol 30/500, hormone replacement therapy, paracetamol, sertraline
27	No	Amitriptyline, atenolol

Resumen

Objetivo: Evaluar el impacto del tinnitus en la fibromialgia. **Métodos:** Se realizó un estudio cuantitativo controlado. El Tinnitus Handicap Inventory (THI), que consta de 25 preguntas, y el Revised Fibromyalgia Impact Questionnaire (FIQR) se administraron a 27 pacientes cumpliendo los criterios de diagnóstico revisados para la fibromialgia de l'American College of Rheumatology y a 26 controles sanos que no tenían antecedentes de padecer fibromialgia o cualquier otra enfermedad reumatológica o neurológica. **Resultados:** Los dos grupos se emparejaron por edad, sexo y etnia. Los pacientes con fibromialgia eran significativamente más propensos a sufrir tinnitus que los controles: 16 (59.3%) de los pacientes sufrieron de tinnitus, comparado con dos (7.7%) de los controles ($p < 0.001$). La mediana (rango intercuartílico) puntaje THI total para el grupo de fibromialgia estaba 6 (44), que fue significativamente mayor que la de 0 (0) para el grupo de control ($p < 0.001$). El grupo de fibromialgia puntuó significativamente más alto que el grupo de control para 24 de los 25

preguntas del THI. El puntaje THI total en todos los sujetos se correlacionó positivamente con los puntajes FIQR ($r_s = 0.408$, $p = 0.002$). Conclusión: La fibromialgia se asocia con una prevalencia relativamente alta de tinnitus.

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