Original Article

Dyslipidemia in Patients with Subjective Tinnitus

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Abstract

Background: Tinnitus is the perception of sound without an external source, and it can lower one's quality of life. A metabolic disease called dyslipidemia is brought on by uneven and excessive meals as well as sedentary lifestyle. Reduced hearing and tinnitus can result from altered cochlear blood flow and fluidity caused by high blood lipid levels. **Aim and Objectives:** The objective of this study To examine whether or not tinnitus was associated with increased level of total cholesterol (TC), triglycerides (TRG), low density lipoprotein (LDL), and high-density lipoprotein. **Patients and Methods:** Patients were split into two groups for this case–control research at Benha University Hospital: in Group A: 100 sufferers made up the tinnitus group, whereas 100 healthy individuals made up the control group in Group B. All patients had a thorough history-taking process, a physical examination, laboratory tests, and imaging. **Results:** Regarding TRGs, there were a lot of differences between the two groups. **Conclusion:** The findings showed that patients with subjective tinnitus had significantly higher levels of TC, TRG, and LDL. This rise suggests that hyperlipidemia, which is accompanied by altered lipid metabolism, may play a role in the genesis of tinnitus. These variables can serve as a brand-new tinnitus marker. These results lead us to propose that serum lipid levels may be helpful in the routine clinical diagnosis and prognosis of subjective tinnitus, and that patients with dyslipidemia should receive the proper care.

Keywords: Dyslipidemia, high-density lipoprotein, low-density lipoprotein, tinnitus

Introduction

The sense of sound without accompanying external auditory stimuli is known as tinnitus. Millions of people are affected by this condition.[1] Tinnitus sufferers do not find the noise bothersome and do not go to the doctor. Others may experience a reduction in the quality of life.[2] In a calm environment, almost everyone will hear a faint ringing sound known as "normal tinnitus," but this is only cause for concern if it is annoying, impairs normal hearing, or is associated with other issues.[3] Patients with tinnitus report the noise as ringing, although it can also sound such as clicking, buzzing, hissing, or roaring.[4] Tinnitus can be caused by a variety of underlying conditions and is a symptom rather than a sickness that can arise at any level of the auditory system as well as in structures outside of it. The most frequent causes include hearing injury, noise-induced hearing loss, and presbycusis, an age-related hearing loss. Other factors include ear infections, heart or blood vessel problems, Meniere's disease, brain tumors, exposure to certain medications, a history of head trauma, ear wax, and occasionally, tinnitus is unexpectedly felt during a time of emotional stress.[5] The sound may be low pitched or high pitched, gentle or loud, and frequently seems to be emanating from one or both ears or the head itself. Certain people may find the sound distracting, and in some circumstances, it has been linked to anxiety and sadness.[4]

It is widespread, affecting approximately 10%–15% of people, but the majority of them tolerate it well, and only about 1% of people find it to be seriously problematic.[6] It is encouraging to know that evidence suggests that tinnitus and hearing loss may both be linked to changeable lifestyle choices such as noise exposure, smoking, drinking alcohol, exercising, and eating, opening the door to prevention. Diet may have an effect on how sensitive the inner ear is to noise and on the aging processes that cause hearing loss and tinnitus.[7]

Infections, ototoxic drug usage, psychological stress, and a variety of medical problems that might impair hearing function are all linked to an increased prevalence of tinnitus, as is

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hearing loss, which can be detected in up to 90% of tinnitus sufferers.[8]

The organ of Corti becomes dysfunctional as a result of the variations in blood flow in the cochlea and the minimal impairment of perfusion, which causes tinnitus. Tinnitus may be the first sign of atherosclerosis, and hyperlipidemia may aggravate it by impairing cochlear blood flow, which in turn may produce tinnitus.[9] The purpose of the study was to look at the relationship between tinnitus and blood levels of total cholesterol (TC), triglycerides (TRG), low-density lipoprotein (LDL), and high-density lipoprotein (HDL) in the Egyptian population. Based on the discovery that hypolipidemic medications reduced serum cholesterol levels and also improved tinnitus scores, it may also be worthwhile to try and capitalize on this relationship between tinnitus and hyperlipidemia. This will be more advantageous to the patient who is the target of this relationship.

Patients and Methods

At the Benha University Hospital, a case–control study was done, reviewing 100 patients and 100 healthy people.

All patients were chosen from the Benha University Hospital's ORL clinic. Cases were divided into two categories for us:

Group A: Based on inclusion and exclusion criteria, 100 patients were included in the tinnitus group. Group B: There were 100 healthy individuals in the control group.

Inclusion criteria

Patients and healthy volunteers with normal air and bone thresholds, laboratory results, and findings from otolaryngologic examinations were included in the study. Patients' ages ranged from 17 to 90 years.

Exclusion criteria

All types of outer, middle, or inner ear disease, all types of hearing loss, uncontrolled systemic diseases, malignancies, acute and chronic inflammatory diseases, the presence of acoustic trauma, patients under the age of 17 or older than 90 years old, and patients with a chronological age of ≤90 years were excluded from the study.

Sample method

History

Tinnitus and important medical history: onset, location, pattern, characteristics (Pitch), associated vertigo or aural fullness or hearing loss, exposure to ototoxic medication or factors, exacerbating or alleviating factors, hyperlipidemia or thyroid disorders, Vitamin B12 deficiency and anemia, and other like significance to a patient depend on how the tinnitus affects the patient quality of life.

Physical examination

In an ENT clinic, an otologic examination can be performed: if there are any indications of cerumen impaction, perforation, or infection, the external canal and tympanic membrane need to be examined. It is important to look for any signs of hearing loss or brain stem injury in the cranial nerves. It is important to perform auscultation throughout the neck, periauricular region, orbits, and mastoid. Compression of the ipsilateral jugular vein can decrease tinnitus of venous etiology. The next step in the assessment involves performing specific testing for conductive or sensorineural hearing loss. Testing has traditionally been carried out with a 512-Hz or 1024-Hz tuning fork. The most popular tuning fork tests are the Weber and Rinne tests.

Diagnostic tests

Since the subjective complaint typically has poor correlation with actual acoustic parameters, all tinnitus sufferers should have an audiometric evaluation. Audiography, speech discrimination tests, and tympanometry should all be part of the diagnostic evaluation. If there is any indication that the patient may have a medical condition, thyroid investigations, a hematocrit assessment, full blood chemistry, and a lipid profile (the serum levels of TC, TRG, LDL, and HDL) should be performed. The level of suspicion generated by the history, physical examination, and audiometric profile should determine how much more research is needed. Contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI) of the brain are the preferred imaging studies. The preferred imaging procedure for those with nonpulsatile (continuous) tinnitus is gadolinium-enhanced MRI. To properly assess disease and anatomy in the two groups, many patients need both an MRI and a CT scan.

Sample size

The sample size was 100 patients and 100 volunteers.

Ethical consideration

The Benha University Research Ethics Committee approved the studies with the utmost integrity. Each participant provided their willing and informed consent.

Statistical analysis

The SPSS 22.0 program was used to analyze the data (IBM, Armonk, NY, USA). The terms mean and standard deviation (SD) were used to describe descriptive statistics for numerical variables, whereas frequencies and percentages were used to describe categorical variables. The independent samples *t*-test was used to analyze numerical variables that adhere to parametric assumptions, and the Chi-square test was used to examine categorical variables. Shapiro–Wilk test was used to control the assumptions made about the parameters. Using skewness and kurtosis values, the tests' normalcy was determined. It was noted that they were regularly distributed because all values fell between −1.5 and +1.5. Between the tinnitus and control groups, the serum concentrations of TC, TRG, LDL, and HDL were compared. $P = 0.05$ or lower was considered statistically significant.

Results

Table 1 shows that there was an insignificant difference between both the groups as regards age, sex, or body mass index (BMI).

Table 2 shows that the mean hearing levels at 512 Hz were 23.9 (±12.9 SD), the mean hearing levels at 1024 Hz were 21.0 (±13.8 SD), the mean pure-tone average (PTA) (dB HL) at right was 17.01 (±6.57 SD), the mean PTA (dB HL) at left was 16.05 (±6.05 SD), and the mean tinnitus time (month) was 7.17 (±10.52 SD).

Table 3 shows that there was a significant difference between both the groups as regards platelet distribution width (PDW) (%).

Table 4 shows that there was a highly significant difference between both the groups as regards TRG.

Table 5 shows that there was a significant difference between both the groups as regards TSH.

Discussion

Tinnitus is a symptom of an underlying condition rather than being an illness in itself. Tinnitus can have psychological repercussions that substantially interfere with a person's ability to function in their personal, social, and professional lives, or it might have very minor impacts. Patients may have tinnitus unilaterally or bilaterally, at the back, middle, side, inside, or outside the head.[10] Only 1% of patients have tinnitus beyond the head, compared to 52% who have bilateral tinnitus, 37% who have unilateral tinnitus, and 10% who have it initially. The patient only experiences subjective tinnitus as sound. Sounds detected by auscultation are considered objective tinnitus (Y). While sounds from any area of the body can create lens tinnitus, subjective tinnitus refers to the perception of insignificant sounds in the absence of actual sound.[11] The goal of the study was to determine whether there was a relationship between tinnitus and serum levels of TC, TRG, LDL, and HDL in the Egyptian population. Take advantage of the association between tinnitus and hyperlipidemia based on the observation that hypolipidemic medications lower blood cholesterol levels while simultaneously improving tinnitus scores, which will be more advantageous to the patient. This study showed that there was no statistically significant difference in either group when it came to age, sex, or BMI. Erdogdu[12] analyzed the data from 6472 individuals with idiopathic tinnitus and 6470 participants in the control group. Thirty percent of the men and 70% of the women in each group were female. Patients with idiopathic tinnitus are 56.85 years old on average, whereas people in the control group are 48.80 years old on average.

Regarding age ($P = 0.855$) and sex ($P = 0.956$), Avcı[13] showed that there was no discernible difference between the tinnitus and control groups. According to Etemadi *et al*.,[14] 76 patients who complained of tinnitus in the ENT clinic at Taleghani Hospital, Shahid Beheshti University of Medical Sciences, in 2018 were chosen. They were also checked, and blood samples were taken to analyze their lipid profiles, after recording a history of the severity and beginning of their problem. Finally, a statistical analysis was performed on the laboratory test findings, the degree and timing of their problem, as well as their age and sex. They evaluated 76 people who had idiopathic tinnitus. Males made up 52.6% of them, whereas females made up 47.4%. These 76 individuals had an average age of 64.50 13.74, with men having a mean age of 63.87 13.96 and females having a mean age of 65.19 13.65.

This study showed that there were 53 people with unilateral tinnitus, 47 people with bilateral tinnitus, 85 people with tinnitus in the ear, 15 people with tinnitus in the head, 81 people with continuous tinnitus, 19 people with intermittent tinnitus, and 15 people with exposure to ototoxic medication.

Kojima *et al*.[15] showed that although the effect magnitude was minor, people with hyperacusis were substantially more

Table 1: Comparison between the studied groups as regards demographic data

	Group A ($n=100$)	Group B ($n=100$)	Test	*P*
Age, mean±SD	42.55±5.54	42.9±5.44	t=1.03	0.85
Sex				
Male	55	54	χ^2=0.02	0.88
Female	45	46		
BMI	24.5±2.8	24.9±2.9	1.072	0.72

*Statistically significant at $P \leq 0.05$. *P*: *P* value for comparing different categories, *t*: Two-sample independent *t*-test, χ^2: Chi-square test, BMI: Body mass index, SD: Standard deviation

Table 2: Pure-tone average and hearing levels (dB) of studied cases

	512 Hz	1024 Hz
Hearing levels (dB)	23.9±12.9	21.0±13.8
PTA (dB HL)		
Right	17.01±6.57	
Left	16.05±6.05	
Tinnitus time (month)	7.17±10.52	

PTA: Pure-tone average

Table 3: Comparison between the studied groups as regards hematologic blood parameter

	Group A	Group B	Test	*P*
Platelet count (×10³/mm³)	259.4±61.5	248.5±57.0	1.164	0.451
Mean platelet volume (fL)	8.66±1.02	8.34±1.08	1.12	0.57
Hemoglobin (g/dL)	5.14±0.52	5.23±0.46	1.27	0.22
Hematocrit (%)	44.5±5.49	45.2±4.78	1.31	0.17
Red cell distribution width (%)	14.1±1.34	13.6±1.07	36.80	<0.00001*
Platelet distribution width (%)	16.6±0.34	16.2±1.03	1.692	0.01*

*Statistically significant at $P \leq 0.05$. *P*: *P* value for comparing different categories, *t*: Two-sample independent *t*-test

Table 4: Comparison between the studied groups as regards lipid profile

	Group A	Group B	Test	*P*
TC (mg/dL)	200.57±41.06	179.0±39.03	1.106	0.614
TRG (mg/dL)	177.76±86.94	124.43±61.44	2.003	0.0006*
HDL (mg/dL)	50.25±13.60	53.46±12.66	1.15	0.47
LDL (mg/dL)	115.88±32.56	101.31±34.42	1.117	0.58

*Statistically significant at $P \leq 0.05$. *P*: *P* value for comparing between different categories, *t*: Two-sample independent *t*-test, TC: Total cholesterol, TRG: Triglyceride, HDL: High-density lipoprotein, LDL: Low-density lipoprotein

Table 5: Comparison between the studied groups as regards abdominal ultrasonography

	Group A	Group B	Test	*P*
Thyroid disease	14	11	0.411	0.52
TSH (mU/L)	1.71±1.7	1.5±1.4	1.47	0.05*

*Statistically significant at $P \leq 0.05$. *P*: *P* value for comparing between different categories, χ^2: Chi-square test, *t*: Two-sample independent *t*-test, TSH: Thyroid-stimulating hormone

likely to experience pulsatile tinnitus ($P = 0.003$, $d = 0.28$). Patients with hyperacusis were considerably more likely to have trouble tolerating sound symptoms, notice the impact of noise, and recognize the impact of noise sleep ($P = 0.014$, $d = 0.01$) and naps ($P = 0.003$, $d = 0.32$) on their symptoms. Patients with hyperacusis reported considerably worse tinnitus severity on their symptoms. According to this study, the mean hearing levels at 512 Hz were 23.9 (12.9 SD), the mean hearing levels at 1024 Hz were 21.0 (13.8 SD), the mean PTA (dB HL) at right was 17.01 (6.57 SD), the mean PTA (dB HL) at left was 16.05 (6.05 SD), and the mean tinnitus time (month) was 7.17 (10.52 SD).

According to the medical histories of the patients, Etemadi *et al*.[14] stated that the average amount of time from the onset of tinnitus was 6 months in 46% of the patients, a year in 17% of them, 1.5 years in 11% of them, and 2 years in 9 patients (11.8%). According to the patients' medical histories, mild, moderate, and severe tinnitus symptoms were present in 26.3%, 48.7%, and 25% of the patients, respectively.

AQ12 Ristovska *et al*.[16] the 125–8000 Hz range of hearing thresholds. Normal hearing thresholds have long been thought to be a sign that there is no cochlear damage. According to this study, there were notable differences in PDW (%) between the two groups. Düzenli *et al*.[17] showed that there was no statistical difference and that the red blood cell, hemoglobin, and hematocrit counts were comparable between the two groups. Although the platelet count of tinnitus sufferers was higher than that of the healthy group, there was no statistically significant difference. Tinnitus patients had higher mean platelet volume levels than healthy controls; however, this difference was not statistically significant ($P = 0.323$). In the tinnitus group, PDW was counted more frequently, and this difference was statistically significant ($P = 0.041$). In the group with tinnitus, the neutrophil-to-lymphocyte ratio (NLR) was statistically lower.

Bayram *et al*.[18] discovered no connection between NLR and tinnitus. Koçak *et al*.[19] found that 87 healthy people who visited our hospital for a routine health assessment and had normal audiometry and otoscopy results, as well as 89 patients with idiopathic tinnitus diagnosed on an outpatient basis between March 2015 and June 2016, were included in the study. The mean monocyte count was 634.3 ± 213.8 and 447.2 ± 157.8 in the study group and control group, respectively.

This study illustrated that there was a highly significant difference between both the groups as regards TRG.

Koçak *et al*.[19] found that the HDL level was 45.4 ± 10.2 and 49.5 ± 7.6 in the study group and control group, respectively. Avcı[13] showed that no significant difference was detected between the tinnitus and control groups in point of HDL levels ($P > 0.05$). The serum levels of TC, TRG, and LDL were significantly higher in the tinnitus group ($P < 0.05$). In the tinnitus group, TC and TRG levels were >200 mg/dL in 44 (48.3%) and 30 (33.0%) patients, respectively. In the same group, LDL level was >130 mg/dL in 28 (31.0%) patients and HDL level was <45 mg/dL in 38 (41.7%) patients. Etemadi *et al*.[14] showed that the mean of serum LDL among all the patients and among males and females separately was 125.62 ± 17.54, 123.75 ± 16.22, and 127.69 ± 18.91, respectively. The differences between the male and the female groups were shown to be not significant. In the study by Basut AQ13 *et al.* on 52 patients in Turkey, a low-carb and low-fat diet had been effective in the reduction of the severity of tinnitus. To explain their result, Etemadi *et al*.[14] could point out the fact that this reduction in severity could be due to the reduction in the carbohydrates of the patients' diet, but their study had not evaluated the role of a diet change in the matter. The findings of the investigation conducted by Evans *et al*.[19] AQ14 in Houston, AQ15 USA, are now finally explained by Etemadi *et al*.[19] The study, which was conducted in 2013 and divided into two parts – one on human participants and the other on animal samples – found a significant correlation between higher TRG levels and a decline in auditory function in the human portion, but it found no correlation between auditory function and serum HDL and LDL levels. Accordingly, the findings of Etemadi AQ15 *et al*.[19] could be interpreted as suggesting that tinnitus may not be a part of auditory processes, and as a result, the study is unable to demonstrate how dyslipidemia affects this illness. Cai *et al*.[20] demonstrated that rats given a high-fat diet and AQ6 treated with simvastatin had their hearing functions intact. They attributed this result to the hyperlipidemia treatment. M-Shirazi *et al*.[21] found no discernible difference in the prevalence of dyslipidemia between tinnitus patients and healthy people. In contrast, Yüksel *et al*.[9] were comparable to our study that tinnitus patients' serum levels of TRG, LDL, and TC were significantly greater than those of healthy people, and that tinnitus patients also had a higher incidence of dyslipidemia. Furthermore, Cai *et al*.[20] suggested that the tinnitus intensity

returns to normal when serum lipid level is lowered. Although the findings of our study contradicted those of Shirazi *et al.*, they supported the findings presented by Yüksel *et al*.[9] This discrepancy could be explained by the fact that none of the earlier investigations assessed postprandial serum lipid and food profiles, which could affect inner ear processes and tinnitus. The results of this investigation revealed a substantial difference in TSH levels between the two groups. Hsu *et al*.[22] demonstrated that reports of tinnitus and other variables, including hypothyroidism, were made. Age greatly increased the prevalence of tinnitus. In addition, patients with tinnitus had a noticeably increased risk of developing it compared to those who did not have vertigo, sleeplessness, anxiety, or hearing loss.

Conclusion

Patients with subjective tinnitus had significantly higher levels of TC, TRG, and LDL. This rise suggests that altered lipid metabolism and hyperlipidemia may play a role in the genesis of tinnitus.

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Conflicts of interest

There are no conflicts of interest.

References

1. McCormack A, Edmondson-Jones M, Somerset S, Hall DA. Corrigendum to "A systematic review of the reporting of tinnitus prevalence and severity" [Hear. Res. 337 (2016) 70-79]. Hear Res 2016;339:219.
2. Nondahl DM, Cruickshanks KJ, Dalton DS, Klein BE, Klein R, Schubert CR, *et al.* The impact of tinnitus on quality of life in older adults. J Am Acad Audiol 2007;18:257-66.
3. ENT Kent "Tinnitus – Noises in the Ears or Head". Available from: ???. [Last retrieved on 2021 Jan 20].
4. NIH- National Institute on Deafness and Other Communication Disorders (NIDCD); 2017. Available from: ???. [Last accessed on 2019 Apr 03, Last retrieved on 2019 Sep 20].
5. Han BI, Lee HW, Kim TY, Lim JS, Shin KS; 2009.
6. Langguth B, Kreuzer PM, Kleinjung T, De Ridder D. Tinnitus: Causes and clinical management. Lancet Neurol 2013;12:920-30.
7. Miller JS, le Prell CG, Rybak L. The role of nutrition in healthy hearing: Human evidence. In: Free Radicals in ENT Pathology. Cham, Switzerland: Springer International Publishing; 2015.
8. Shore SE, Roberts LE, Langguth B. Maladaptive plasticity in tinnitus – Triggers, mechanisms and treatment. Nat Rev Neurol 2016;12:150-60.
9. Yüksel F, Karataş D, Türkdoğan FT, Yüksel Ö. Increased atherosclerosis correlates with subjective tinnitus severity. Indian J Otolaryngol Head Neck Surg 2018;70:119-24.
10. Cima RF, Mazurek B, Haider H, Kikidis D, Lapira A, Noreña A, *et al.* A multidisciplinary European guideline for tinnitus: Diagnostics, assessment, and treatment. HNO 2019;67:10-42.
11. Fife TD, Tourkevich R. Tinnitus, hyperacusis, otalgia, and hearing loss. Continuum (Minneap Minn) 2021;27:491-525.
12. Erdogdu S. What is the prevalence of dyslipidemia in patients with idiopathic tinnitus? ??? 2020;???:???.
13. Avcı D. Increased serum lipid levels in patients with subjective tinnitus. Iran J Otorhinolaryngol 2021;33:31-6.
14. Etemadi K, Tabrizi AG, Fahimi M. Dyslipidemia prevalence among tinnitus patients of a referral ENT clinic in Tehran, Iran, 2018. Int Clin Neurosci J 2019;6:59.
15. Kojima T, Kanzaki S, Oishi N, Ogawa K. Clinical characteristics of patients with tinnitus evaluated with the tinnitus sample case history questionnaire in Japan: A case series. PLoS One 2017;12:e0180609.
16. Ristovska L, Jachova Z, Filipovski R, Atanasova N. Audiometric findings in patients with subjective tinnitus. Croat Rev Rehabil Res 2016;52:???.
17. Düzenli U, Bozan N, Aslan M, Özkan H, Turan M, Kiroğlu AF. A retrospective analysis of haemotologic parameters in patients with bilateral tinnitus. East J Med 2018;23:264.
18. Bayram A, Yasar M, Dogan M, Güneri E, Özcan I. Assessment of neutrophil-tolymphocyte ratio, platelet-to-lymphocyte ratio and mean platelet volume in patients with tinnitus. ENT Updates 2015;5:103.
19. Koçak HE, Acıpayam H, Kaya KH. A new hematological marker for idiopathic tinnitus: Monocyte/HDL ratio. Pol Przegl Otorynolaryngologiczny 2017;6:30-5.
20. Cai Q, Du X, Zhou B, Cai C, Kermany MH, Zhang C, *et al.* Effects of simvastatin on plasma lipoproteins and hearing loss in apolipoprotein E gene-deficient mice. ORL J Otorhinolaryngol Relat Spec 2009;71:244-50.
21. M-Shirazi M, Farhadi M, Jalessi M, Kamrava SK, Behzadi AH, Arami B. Prevalence of dyslipidemia among Iranian patients with idiopathic tinnitus. J Res Med Sci 2011;16:890-6.
22. Hsu A, Tsou YA, Wang TC, Chang WD, Lin CL, Tyler RS. Hypothyroidism and related comorbidities on the risks of developing tinnitus. Sci Rep 2022;12:3401.

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