



Original Research Article

Determining the prevalence of dyslipidemia in patients with subjective Tinnitus – A Hospital Based Observational Study

Article History:

Name of Author:

Dr Rati Bhan Singh¹, Dr Kuldeep², Dr Jaypal Singh³

Affiliation: ¹Assistant Professor, Department of ENT, GMC, Orai, Jalaun, UP, India

²Assistant Professor Internal Medicine, GMC, Orai, Jalaun, UP, India

³Assistant Professor, Department of ENT, GMC, Orai, Jalaun, UP, India

Corresponding Author:

Dr Jaypal Singh

Received: 11-11-2025

Revised: 19-11-2025

Accepted: 09-12-2025

Published: 31-12-2025

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Noncommercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Abstract: Tinnitus is a common neurosensory disorder that may lead to significant morbidity, including stress, sleep disturbances, and reduced quality of life. Although its exact pathophysiology remains unclear, several studies have suggested a possible association between tinnitus and dyslipidemia. This study aimed to evaluate the relationship between tinnitus and dyslipidemia by analyzing serum lipid profiles in patients with idiopathic tinnitus. **Methods:** This case-control study was conducted in the Department of ENT, GMC, Orai, Jalaun, Uttar Pradesh, India. Patients presenting with idiopathic tinnitus between December 2024 and November 2025 were included. Serum lipid profiles of 132 patients with tinnitus were analyzed and compared with those of 250 age- and sex-matched controls without tinnitus. Parameters assessed included total cholesterol, LDL, HDL, and triglyceride levels. Statistical analysis was performed to determine the association between tinnitus and dyslipidemia. **Results:** Among patients with idiopathic tinnitus, hypercholesterolemia was observed in 52.8%, low HDL levels in 10%, and hyperlipidemia in 15.2%. In the control group, hypercholesterolemia was present in 43.2%, low HDL in 15.2%, and hyperlipidemia in 42%. Comparison of total cholesterol, LDL, and triglyceride levels between tinnitus patients and controls revealed a statistically significant difference ($p < 0.005$). However, no statistically significant difference was observed in HDL levels between the two groups ($p > 0.05$). **Conclusions:** A statistically significant association was found between tinnitus and dyslipidemia. Given the role of dyslipidemia in the development of atherosclerosis and its systemic vascular consequences, early detection and management of lipid abnormalities may be beneficial in patients with tinnitus.

Keywords: Dyslipidemia, Hypercholesterolemia, Prevalence, Tinnitus

INTRODUCTION

Tinnitus is the perception of sound in the absence of an external acoustic stimulus. It is a common auditory symptom affecting more than 50 million individuals in the United States, with an estimated prevalence of 10–15% among adults [1]. Tinnitus can occur in both males and females and may present at any age. The onset may be sudden or insidious, and the severity varies widely among individuals. While dyslipidemia does not appear to influence the severity of tinnitus, its role in the etiopathogenesis has been a subject of investigation [2]. Tinnitus can

cause significant distress, including stress, anxiety, sleep disturbances, and impaired quality of life [3].

Tinnitus is not a disease entity itself but rather a symptom of an underlying pathology. Its impact on affected individuals ranges from mild annoyance to severe psychological distress that may significantly interfere with occupational performance, family life, and social interactions. Patients may perceive tinnitus unilaterally or bilaterally, localized to the head or ears. It has been reported that approximately 52% of patients experience bilateral tinnitus, 37% unilateral tinnitus, 10% initially unilateral

progressing to bilateral, and less than 1% perceive tinnitus as originating outside the head [4].

Tinnitus is broadly classified into **subjective** and **objective** types. Subjective tinnitus, the most common form, is perceived only by the patient and has no identifiable external sound source. Objective tinnitus is rare and refers to sounds that can be perceived by the examiner during auscultation, often originating from vascular or muscular sources [5]. Subjective tinnitus represents the perception of meaningless sound without any physical acoustic stimulus. In cases where an underlying cause such as acoustic neuroma, glomus tumor, metabolic, endocrine, or systemic disease is identified, management should be directed toward treating the primary pathology. In patients with associated hearing loss, rehabilitation of hearing loss is an essential component of tinnitus management [6].

Based on rhythmicity, tinnitus is further categorized into **pulsatile** and **non-pulsatile** types. Pulsatile tinnitus may be synchronous or non-synchronous with the patient's arterial pulse and can be either subjective or objective. The majority of patients experience subjective, non-pulsatile tinnitus without an identifiable pathological process, commonly referred to as idiopathic tinnitus, often associated with age-related hearing loss [6]. The psychosocial impact of tinnitus may range from negligible to profoundly disabling.

Cholesterol plays a crucial role in the development of atherosclerosis and coronary artery disease. Total serum cholesterol is composed of lipoprotein fractions including high-density lipoproteins (HDL), low-density lipoproteins (LDL), and very-low-density lipoproteins (VLDL). Lipoproteins are spherical macromolecular complexes composed of cholesterol, triglycerides, phospholipids, and proteins, providing structural stability and transport of lipids in the bloodstream [7]. LDL transports cholesterol from the liver to peripheral tissues, particularly arterial walls, whereas HDL facilitates reverse cholesterol transport from tissues back to the liver, thereby reducing plaque formation. Elevated LDL and reduced HDL levels are characteristic features of coronary artery disease and are often accompanied by elevated triglyceride levels [8]. According to the American Heart Association, standard reference values are used to classify lipid abnormalities [9].

Dyslipidemia is a well-established risk factor for atherosclerosis, coronary artery disease, myocardial infarction, stroke, and mortality [10]. Hyperlipoproteinemia, the most common form of dyslipidemia, is characterized by elevated plasma cholesterol, triglycerides, or LDL levels. VLDL is not included in the present study and was therefore

not evaluated. Elevated LDL levels are strongly associated with atherosclerosis, whereas higher HDL levels are protective. Elevated triglyceride levels increase the risk of pancreatitis and cardiovascular disease. Abnormally high cholesterol levels have also been associated with systemic disorders including liver disease, respiratory illnesses, malignancies, and acute inflammatory states [7].

The association between dyslipidemia and tinnitus has been attributed to microvascular pathology of the inner ear. Dyslipidemia may cause localized vascular changes, including capillary thickening in the endolymphatic sac, basement membrane, and stria vascularis. These alterations result in biochemical changes within the scala media, ischemia, and reduced blood flow due to capillary occlusion, ultimately impairing inner ear function. Such pathological changes may contribute to the development of tinnitus [10]. **The aim of this study was to evaluate the association between dyslipidemia and idiopathic tinnitus in patients attending a tertiary care centre in Uttar Pradesh, India.**

MATERIAL AND METHODS

This cross-sectional case-control study was conducted in the Department of Otorhinolaryngology, Government Medical College (GMC), Orai, Jalaun, Uttar Pradesh, India. Patients presenting with complaints of tinnitus between December 2024 and November 2025 were evaluated. Patients diagnosed with **idiopathic tinnitus** were included in the study group. An equal number of age- and sex-matched individuals without tinnitus were enrolled as the control group.

A total of **250 patients with idiopathic tinnitus** and **250 control subjects** were included in the study. Detailed demographic data, including age and gender, were recorded for all participants. Venous blood samples were collected after overnight fasting, and serum lipid profiles were analyzed as part of routine biochemical investigations. The lipid parameters of both groups were compared and statistically evaluated.

Exclusion Criteria

Patients were excluded from the study if they had:

- History of head and neck trauma
- Pulsatile or objective tinnitus
- Associated hearing loss
- Otological diseases
- History of ototoxic drug usage
- Prolonged exposure to high-intensity noise
- Psychiatric disorders

Evaluation of Lipid Profile

Serum lipid values were classified according to the **American Heart Association (AHA) guidelines** [11]

Total cholesterol:

- <200 mg/dL: Normal
- 200–239 mg/dL: Borderline high
- ≥240 mg/dL: High

High-density lipoprotein (HDL):

- <40 mg/dL: Low
- ≥40 mg/dL: Desirable

Triglycerides:

- <200 mg/dL: Normal
- 200–400 mg/dL: Borderline high
- 400–1000 mg/dL: High
- 1000 mg/dL: Very high

Statistical Analysis

Data were analyzed using **SPSS (Statistical Package for the Social Sciences) version 15.0**. Descriptive statistics were expressed as frequency, mean, and standard deviation. The **Student's t-test** was used for comparison between groups. A p-value of <0.05 was considered statistically significant.

RESULTS

The study included **250 patients with idiopathic tinnitus** and **250 individuals in the control group**. In the tinnitus group, **28% were male and 72% were female**, whereas in the control group, **30% were male and 70% were female**. The **mean age** of patients with idiopathic tinnitus was **57.8 ± 14.05 years**, while the mean age of the control group was **47.3 ± 14.1 years**. The demographic characteristics of both groups are summarized in **Tables 1 and 2**.

Table 1: Age and gender distributions of cases

		Tinnitus group (N=250)		Control group (N=250)	
		N	%	N	%
Age	≤30	10	4	44	17.6
	31-40	40	16	29	11.6
	41-50	70	28	57	22.8
	51-60	72	28.8	60	24
	61-70	33	13.2	38	15.2
	≥70	25	10	22	8.8
Female		180	72	175	70
Male		70	28	75	30

Table 2. Mean and standard deviation results of patients' findings.

	Tinnitus group (N=250) Mean.±SD	Control group (N=250) Mean.±SD	P-value
Age	57.8±14.05	47.3±14.1	0.0001
Cholesterol	229.4±44.2	203.8±23.9	0.0001
HDL	50.1±11.9	52.5±10.7	0.018
Triglyceride	155.8±34.2	143.2±31.7	0.0001

Hypercholesterolemia was observed in **52.8%** of patients with idiopathic tinnitus, while **low HDL levels** were detected in **10%**, and **hyperlipidemia** in **15.2%** of cases. Among patients with tinnitus, **70 (28%) were male** and **180 (72%) were female**.

In the control group comprising **250 individuals without tinnitus**, **43.2%** had hypercholesterolemia, **15.2%** had low HDL levels, and **42%** had hyperlipidemia. Of the control subjects, **75 (30%) were male** and **175 (70%) were female**. These findings are summarized in **Table 3**.

Table 3: Serum lipoprotein levels of patients

		Tinnitus group (N=250)				Control group (N=250)				P-value
		Female		Male		Female		male		
		N	%	N	%	N	%	N	%	
Chole sterol	<200 mg/dl	48	19.2	32	12.8	82	32.8	38	15.2	0.0001
	200-239 mg/dl	62	24.8	23	9.2	68	27.2	22	8.8	
	≥240 mg/dl	70	28	15	6	40	16	15	6	
HDL	<40 mg/dl	25	10	20	8	38	15.2	25	10	0.642
	≥40 mg/dl	155	62	50	20	137	54.8	50	20	
Trigly ceride s	<200 mg/dl	132	52.8	53	21.2	138	55.2	55	22	0.0001
	200-400 mg/dl	36	14.4	12	4.8	33	13.2	14	5.6	
	401-1000 mg/dl	12	4.8	5	2	3	1.2	5	2	
	≥1000 mg/dl	00	0			1	0.4	1	0.4	

As observed in the present study, the prevalence of tinnitus increased after the age of 40 years and peaked between 50 and 70 years. Females constituted the majority of patients diagnosed with idiopathic tinnitus, accounting for approximately 70% of cases.

On comparison of lipid parameters, statistically significant differences were found in **total cholesterol, LDL, and triglyceride levels** between male and female patients in the tinnitus group as well as in the control group ($p < 0.005$). However, no statistically significant difference was observed between **HDL levels** of male and female patients with tinnitus or between the tinnitus and control groups ($p > 0.05$) (Table 3).

Higher HDL levels are considered protective, whereas low HDL is an undesirable finding. Based on the present results, a significant association was observed between tinnitus and elevated serum cholesterol, LDL, and triglyceride levels. Contrary to some previously published studies, the association between tinnitus and dyslipidemia was found to be statistically significant in this study.

DISCUSSION

Tinnitus is a multifactorial symptom associated with numerous local and systemic conditions, and there is no single standardized treatment due to its diverse etiologies. When an underlying disease is identified, treatment should be directed toward eliminating the primary pathology [6]. Tinnitus may occur at any age and affects both sexes. Its impact extends beyond auditory symptoms and often includes psychological disturbances such as anxiety, sleep disorders, and impaired concentration, ultimately affecting quality of life. The prevalence of tinnitus in adults has been reported to range from 10% to 15% [3].

Shargorodsky et al. reported tinnitus in approximately 50 million adults in the United States and noted higher prevalence among individuals with smoking habits, hypertension, and exposure to noisy environments, particularly firearms and occupational noise [12]. Melo et al., in a study involving individuals over 60 years of age, found tinnitus in

40% of those exposed to occupational noise but did not observe a statistically significant difference compared to the non-exposed control group [13].

The role of dyslipidemia in inner ear pathology was first investigated by Spencer in 1973, who demonstrated a relationship between hyperlipoproteinemia and sensorineural hearing loss and vestibular symptoms, with hyperlipoproteinemia detected in 42% of affected patients [14]. Cholesterol metabolism plays a pivotal role in atherosclerosis and coronary artery disease. Total cholesterol consists of HDL, LDL, and VLDL fractions, which function as lipid transport complexes composed of cholesterol, triglycerides, phospholipids, and proteins [15]. Elevated LDL and reduced HDL levels are strongly associated with atherosclerotic cardiovascular disease and are often accompanied by hypertriglyceridemia [16].

Cardiovascular risk assessment in apparently healthy individuals relies on multiple interacting risk factors,

including lipid profiles. Current guidelines recommend lipid evaluation in men over 40 years of age and women over 50 years or postmenopausal women [17]. According to the 2019 European Society of Cardiology (ESC) guidelines, patients at very high cardiovascular risk should achieve LDL cholesterol levels below 55 mg/dL, using the highest tolerated dose of statins when necessary [18]. These recommendations are routinely followed in our institution.

Dyslipidemia is a well-established cause of atherosclerosis, coronary artery disease, myocardial infarction, stroke, and mortality [16]. Hyperlipidemias, particularly elevated LDL and triglycerides, represent the most common form of dyslipidemia. Elevated LDL promotes atherosclerosis, whereas higher HDL levels are protective. Excessively elevated triglyceride levels increase the risk of pancreatitis. Although rare, very low cholesterol levels have also been associated with systemic illnesses such as malignancy, liver cirrhosis, respiratory diseases, and acute inflammatory conditions [15].

The association between dyslipidemia and tinnitus is believed to result from microvascular pathology affecting the inner ear. Dyslipidemia can cause localized vascular changes, including thickening of capillaries in the endolymphatic sac, basement membrane, and stria vascularis, as well as thickening of vestibulocochlear nerve veins. These alterations reduce cochlear blood flow, resulting in ischemia and biochemical changes within the scala media, thereby impairing inner ear function and potentially leading to tinnitus [19].

Evans et al. demonstrated that chronic hypertriglyceridemia may reduce cochlear vascularity and contribute to hearing impairment [16]. Lowry reported hyperlipoproteinemia in 20% of patients with bilateral sensorineural hearing loss [18]. Pulec et al. observed improvement in tinnitus following hypolipidemic dietary interventions, suggesting reversible microvascular compromise in the inner ear [21]. Basut et al. and Sutbas et al. similarly reported reduced tinnitus severity following normalization of lipid profiles [22,23].

Conversely, some studies have failed to demonstrate a significant association between dyslipidemia and tinnitus. Kazmierczak and Doroszewska found no relationship between lipid metabolism and tinnitus but highlighted an association with glucose metabolism [24]. Shirazi and Etemadi also reported no statistically significant association between dyslipidemia and tinnitus prevalence [2,25]. Lee et al. observed mild elevations in cholesterol and LDL levels in elderly individuals but without statistical significance [26]. Despite conflicting evidence, the

present study demonstrated a statistically significant association between dyslipidemia and tinnitus, supporting the hypothesis that lipid abnormalities may contribute to tinnitus pathogenesis in susceptible individuals.

CONCLUSION

Dyslipidemia appears to be significantly associated with idiopathic tinnitus, particularly in middle-aged and older adults. Given the role of dyslipidemia in atherosclerosis and coronary artery disease, its identification in patients presenting with tinnitus is clinically relevant. Tinnitus may serve as an early indicator of underlying metabolic and vascular risk. Therefore, evaluation and appropriate management of lipid abnormalities should be considered in patients with tinnitus, not only to alleviate auditory symptoms but also to reduce long-term cardiovascular risk.

Funding: No funding sources

Conflict of Interest: None declared

REFERENCES

1. Tunkel DE, Bauer CA, Sun GH, Rosenfeld RM, Chandrasekhar SS, Cunningham Jr ER, et al. Clinical practice guideline: tinnitus. *Otolaryngol Head Neck Surg*. 2014 Oct;151(2):S1-40. .
2. Etemadi K, Goljanian Tabrizi A, Fahimi M. Dyslipidemia prevalence among tinnitus patients of a referral ENT clinic in Tehran, Iran, 2018. *Int Clin Neurosci J*. 2019;6(2):59-63.
3. Baguley D, Mc Ferran D, Hall D. Tinnitus. *Lancet*. 2013;382(9904):1600-7.
4. Sennaroğlu G, Kayıkçı ME. Tinnitus. In: Kulak Burun Boğaz Hastalıkları ve Baş Boyun Cerrahisi. Ed. Koç C. Ankara. Güneş Ki tabevi; 2004:313-20.
5. Tuncer Ü. Sürmelioglu Ö, Tinnitusta Patofizyoloji. *Turki ye Klinikleri J ENT. Special Topics* 2010;3(2):6-10.
6. Bayazıt YA. Deniz H. Tinnitusta Tedavi Yaklaşımları. *Türkiye Klinikleri J ENT. Special Topics* 2010;3(2):67-71.
7. Campbell KC, Rybak LP, Khardori R. Sensorineural hearing loss and dyslipidemia. *Am J Audiol*. 1996 Nov;5(3):11-4
8. Evans MB, Tonini R, Shope CD, Oghalai JS, Jerger JF, Insull W Jr, et al.. Dyslipidemia and auditory function. *Otol Neurotol*. 2006;27(5):609-14.
9. Alberti KG, Eckel RH, Grundy SM. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and Int Association for the Study of Obesity. *Circulation*.

- 2009;120(16):1640-5.
10. Wackym PA, Linthicum FH, Jr. Diabetes mellitus and hearing loss: clinical and histopathologic relationships. *Am J Otol*. 1986;7(3):176-82.
11. Alberti KG, Eckel RH, Grundy SM. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation*. 2009;120(16):1640-5.
12. Shargorodsky J, Curhan GC, Farwell WR. Prevalence and Characteristics of Tinnitus among US Adults. *Am J Med* 2010;123:711-8.
13. Melo JJ, Meneses CL, Marchiori LL. Prevalence of tinnitus in elderly individuals with and without a history of occupational noise exposure. *Int Arch Otorhinolaryngol*. 2012;16(2):222-5.
14. Spencer JT. Hyperlipoproteinemia in the etiology of inner ear disease. *Laryngoscope*. 1973;83:639-78.
15. Campbell KC, Rybak LP, Khardori R. Sensorineural hearing loss and dyslipidemia. *Am J Audiol*. 1996 Nov;5(3):11-4.
16. Evans MB, Tonini R, Shope CD, Oghalai JS, Jerger JF, Insull W Jr, et al. Dyslipidemia and auditory function. *Otol Neurotol*. 2006;27(5):609-14.
17. Su X, Kong Y, Peng D. Evidence for changing lipid management strategy to focus on non-high density lipoprotein cholesterol. *Lipids in health and disease*. 2019 Dec;18(1):1-7.
18. Lowry LD, Isaacson SR. Study of 100 patients with bilateral sensorineural hearing loss for lipid abnormalities. *Annals Otol Rhinol Laryngol*. 1978 May;87(3):404-8.
19. Wackym PA, Linthicum FH, Jr. Diabetes mellitus and hearing loss: clinical and histopathologic relationships. *Am J Otol*. 1986;7(3):176-82.
20. Lockwood AH, Salvi RJ, Burkard RF. Tinnitus. *N Engl J Med*. 2002;347(12):904-10.
21. Pulec JL, Pulec MB, Mendoza I. Progressive sensorineural hearing loss, subjective tinnitus, and vertigo caused by elevated blood lipids. *Ear Nose Throat J*. 1997;76(10):716-20.
22. Basut O, Ozdilek T, Coskun H, Erisen L, Tezel I, Onart S, et al. The incidence of hyperinsulinemia in patients with tinnitus and the effect of a diabetic diet on tinnitus. *Kulak Burun Bogaz Ihtis Derg*. 2003;10(5):183-7.
23. Sutbas A, Yetiser S, Satar B, Akcam T, Karahatay S, Saglam K. Low-cholesterol diet and anti-lipid therapy in managing tinnitus and hearing loss in patients with noise-induced hearing loss and hyperlipidemia. *Int Tinnitus J*. 2007;13(2):143-9.
24. Kazmierczak H, Doroszewska G. Metabolic disorders in vertigo, tinnitus, and hearing loss. *Int Tinnitus J*. 2001;7(1):54-8.
25. Shirazi M, Farhadi M, Jaleesi M, Kamrava SK, Heshmatzadeh-Behzadi A, Arami B. Prevalence of dyslipidemia among Iranian patients with idiopathic tinnitus. *J Res Med Sci*. 2011;16(7):890-6.
26. Lee FS, Matthews LJ, Mills JH, Dubno JR, Adkins WY. Analysis of blood chemistry and hearing levels in a sample of older persons. *Ear and hearing*. 1998 Jun 1;19(3):180-90