A STUDY ON THE RELATIONSHIP OF HYPERLIPIDAEMIA WITH TINNITUS AMONG PATIENTS IN A TERTIARY CARE CENTRE

R. Rajesh

ABSTRACT

BACKGROUND
Tinnitus is the perception of noise in the absence of an acoustic stimulus. It is a symptom, which can cause much suffering and anxiety since it is quite often not possible to get a timely complete symptomatic relief. Literature shows that hyperlipidaemia was reported in a good number of patients with tinnitus.

AIMS OF THIS STUDY
To find out the prevalence of hyperlipidaemia in patients with tinnitus and to analyse the improvement in tinnitus after giving treatment for hyperlipidaemia to patients who are having it.

SETTINGS AND DESIGN
This was an analytical case-control study conducted in the Department of ENT in a tertiary care centre in south India.

METHODOLOGY
Patients with complaint of tinnitus seen by the investigator in the outpatient department during a period of 18 months were taken as participants for the study and an equal number of individuals without tinnitus were randomly taken as control group. Fasting lipid profile was done and the prevalence of hyperlipidaemia in the two groups were analysed by statistical methods like chi-square test and p-value estimation. Patients with altered lipid profile were given atorvastatin 10 mg daily for two months and any improvement in the symptomatology was assessed and analysed.

RESULTS
Among 84 patients, hyperlipidaemia was seen in 54 (64.29%) people, while in the control group, it was seen only in 23 (27.38%). Among the 54 patients who were treated with atorvastatin more than 40% experienced a decrease in tinnitus.

CONCLUSION
Based on this study, it can be concluded that hyperlipidaemia is a causative factor for tinnitus and treatment of the same may lead to improvement in tinnitus.

KEYWORDS
Tinnitus, Lipid Profile, Hyperlipidaemia, Hypercholesterolaemia.

INTRODUCTION
In the day-to-day practice, we come across several disease conditions in which it is difficult to get a complete symptomatic relief. One such symptom is tinnitus for which several aetiological theories and numerous causes have been described. Literature shows that hyperlipidaemia was reported in a good number of patients with tinnitus. This investigator was interested to find out whether hyperlipidaemia is contributing to tinnitus among the patients he was dealing with. The aims of the study were to find out the prevalence of hyperlipidaemia in patients with tinnitus and to analyse the improvement in tinnitus after giving treatment for hyperlipidaemia to patients who are having it.

Financial or Other, Competing Interest: None.

muscles, intracellular oedema of the organ of Corti pushing hair cells to come into contact with the tectorial membrane, etc. The common causes of non-vibratory tinnitus are presbycusis, conductive hearing loss due to wax or Eustachian tube dysfunction, trauma, tumours of vestibulocochlear nerve and temporal lobe, Meniere’s disease, otosclerosis, labyrinthitis, Bell’s palsy, deficiency of vitamins, copper, iron, zinc, etc., metabolic disorders like hyperthyroidism and diabetes mellitus, circulatory disorders like hypertension, drugs like NSAIDs, aspirin, aminoglycosides, antidepressants, etc.

MATERIALS AND METHODS
This was an analytical case-control study conducted in the Department of ENT in a tertiary care centre in south India after getting approval from the institutional ethical committee for research works. The sample size was calculated to be a minimum of 54.

Patients above 20 years of age with complaint of tinnitus seen by the investigator in the outpatient department during a period of 18 months were taken as participants for the study. An equal number of individuals without tinnitus were randomly taken as control group for the study.

After taking informed consent as per a suitable proforma, data collection, clinical examination, and relevant investigations were done. Fasting lipid profile (total cholesterol, triglycerides, LDL, HDL) was done in the participants.

In patients with altered lipid profile (any of the following: total serum cholesterol >240 mg/dL, LDL cholesterol >150 mg/dL, HDL cholesterol <35 mg/dL, serum triglycerides >150 mg/dL), after medical consultations, a two-month therapy using the lipid-lowering drug atorvastatin 10 mg orally daily was given. No other medication was given for tinnitus during that period. No significant side effect of the drug was seen in any of the patients.

Lipid profile was repeated after two months and any change in the symptomatology regarding tinnitus was noted. The results were analysed using appropriate statistical methods.

RESULTS AND ANALYSIS
- Among the patients, 39 (46.42%) were males and 45 (53.58%) were females. In the control group, 51 (60.71%) were males and 33 (39.29%) were females.
- Among the patients, 8, 16, 20, 18, 14, and 8 people belonged to the age groups 21-30, 31-40, 41-50, 51-60, 61-70, and 71-80 years, respectively. Among the control group, 6, 10, 23, 19, 20, and 6 people belonged to these age groups, respectively.
- Among the patients, 28 (33.33%) were hypertensive, while in the control group, only 2 (2.28%) people were having hypertension.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Controls</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Hypertension present</td>
<td>28 (33.33%)</td>
<td>2 (2.28%)</td>
</tr>
<tr>
<td>Hypertension absent</td>
<td>56 (66.67%)</td>
<td>82 (97.72%)</td>
</tr>
<tr>
<td>Total</td>
<td>84 (100%)</td>
<td>84 (100%)</td>
</tr>
</tbody>
</table>

The chi-square test derived a value of 27.43 with a p-value of <.001, which showed that among patients with tinnitus, proportion having hypertension is significantly higher than that in the control group.

- Among the patients, 13 (15.48%) were diabetic, while in the control group, only 1 (1.19%) person was having diabetes mellitus.

<table>
<thead>
<tr>
<th>Diabetics</th>
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<tbody>
<tr>
<td>Patients</td>
<td>13 (15.48%)</td>
<td>1 (1.19%)</td>
</tr>
<tr>
<td>Controls</td>
<td>71 (84.52%)</td>
<td>83 (98.81%)</td>
</tr>
<tr>
<td>Total</td>
<td>84 (100%)</td>
<td>84 (100%)</td>
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</tbody>
</table>

The chi-square test showed a value of 11.22 with a p-value of .001, which showed that diabetes also has a statistically significant association with tinnitus.

- Among the patients, 26 (30.95%) were smokers, while in the control group, only 3 (3.57%) people were having history of smoking.

<table>
<thead>
<tr>
<th>Smoking</th>
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<tr>
<td>Patients</td>
<td>26 (30.95%)</td>
<td>3 (3.57%)</td>
</tr>
<tr>
<td>Controls</td>
<td>58 (69.05%)</td>
<td>81 (96.43%)</td>
</tr>
<tr>
<td>Total</td>
<td>84 (100%)</td>
<td>84 (100%)</td>
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The chi-square test derived a value of 22.05 with a p-value of <.001, which showed that among patients with tinnitus, proportion having history of smoking is significantly higher than that in the control group.

- Among the patients, altered lipid profile (mainly, hypercholesterolaemia) was seen in 54 (64.29%) people. In the control group, it was seen only in 23 (27.38%).

<table>
<thead>
<tr>
<th>Lipid profile</th>
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<tbody>
<tr>
<td>Patients</td>
<td>54 (64.29%)</td>
<td>23 (27.38%)</td>
</tr>
<tr>
<td>Controls</td>
<td>30 (35.71%)</td>
<td>61 (72.62%)</td>
</tr>
<tr>
<td>Total</td>
<td>84 (100%)</td>
<td>84 (100%)</td>
</tr>
</tbody>
</table>

The chi-square test showed a value of 23.04 with a p-value of <.001, which showed that hyperlipidaemia has a statistically significant association with tinnitus.

- Among the patients with altered lipid profile after giving 2 months treatment with atorvastatin, an improvement in lipid profile was seen in 51 (94.45%) and a symptomatic improvement in tinnitus was seen in 22 (40.75%) patients.

<table>
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<tr>
<th>Results</th>
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<tbody>
<tr>
<td>Patients</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>Controls</td>
<td>52</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 1: No. of Patients Having Hypertension Among the Patients and Controls
Clinical patients. C. Tinnitus in 5, 4-4, 2719, 11. A decrease in tinnitus. Altered lipid profile was given two months treatment with the results of the present study, which give an indication about the relation between altered lipid profile and tinnitus.

In a study by Martines F et al, it was found that hypercholesterolaemia and hypertension were significant risk factors for tinnitus (p<0.001) while the interaction between smoking and hypercholesterolaemia further increased the risk of tinnitus (p<0.001). A cross-sectional study conducted by Kim HJ et al showed that the adjusted odds ratio of tinnitus was higher in those with a history of hyperlipidaemia and also with smoking.

Chang NC et al did a study, which showed that individuals with hyperlipidaemia are at greater risk of noise-induced hearing loss and tinnitus while a study by Santos MA et al showed higher incidence of hypercholesterolaemia in patients with vertigo and tinnitus. An animal study by Satar B et al showed profound oedema in the strial marginal layer and slight oedema in the outer hair cells of inner ear in the hypercholesterolaemia group. However, studies by Evans MB et al, M-Shirazi M et al, Kazmierczak H et al, and Canis M et al did not show a significant relation between hyperlipidaemia and tinnitus.

The present study was conducted in patients with tinnitus who were seen by the investigator in the outpatient department of ENT in a tertiary care centre in south India. Among the patients, the number of females (45) was more than the number of males (39). Maximum number of patients belonged to the age group of 41-50. Regarding the known risk factors, hypertension, diabetes, and history of smoking were having statistically significant association with tinnitus.

Among the 84 patients, 64.29% were having altered lipid profile especially hypercholesterolaemia, but in the control group only 27.38% showed altered lipid profile. The chi-square test showed a value of 23.04 with a p-value of <0.001, which showed that hyperlipidaemia has a statistically significant association with tinnitus.

Literature shows that in a study by Nowak K et al, 41% of patients with tinnitus had hypercholesterolaemia, 47% had hypertension, and 16% had diabetes; while a study by Pulek JL et al showed that 5.1% of patients with tinnitus had hyperlipoproteinemia. According to a study by Zhang X et al, 49.6% patients with sudden deafness and tinnitus had hyperlipidaemia. The results of these studies were comparable with the results of the present study, which give an indication about the relation between altered lipid profile and tinnitus.

To substantiate it, those patients who had tinnitus and altered lipid profile were given two months treatment with atorvastatin and patients were reassessed thereafter. Among the 54 patients who were treated with atorvastatin, 94.45% showed decrease in cholesterol level and 40.75% experienced a decrease in tinnitus.

| Table 5: No. of Patients Who Had Improvement in Lipid Profile and in Tinnitus After Treating with Atorvastatin |
|-----------------|--------|--------|--------|
| Improvement in lipid profile | Present | Absent | Total |
|  | (94.45%) | (5.55%) | (100%) |
| Improvement in tinnitus | 22 | 32 | 54 |
|  | (40.75%) | (59.25%) | (100%) |

DISCUSSION

Review of literature shows that hyperlipidaemia maybe a cause for tinnitus according to majority of the related studies. Many of the conditions producing sensory hearing impairment and vertigo will also develop tinnitus.

In a study by Martines F et al, it was found that hypercholesterolaemia and hypertension were significant risk factors for tinnitus (p<0.001) while the interaction between smoking and hypercholesterolaemia further increased the risk of tinnitus (p<0.001). A cross-sectional study conducted by Kim HJ et al showed that the adjusted odds ratio of tinnitus was higher in those with a history of hyperlipidaemia and also with smoking.

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The results of these studies were comparable to those of the present study, which substantiates the relation between altered lipid profile and tinnitus.

CONCLUSIONS

Based on this study, it can be concluded that hyperlipidaemia is a causative factor for tinnitus and treatment of the same may lead to improvement in tinnitus. Hypertension, diabetes mellitus, and habit of smoking are also contributing to the occurrence of tinnitus.

REFERENCES
