



## STUDY ON PROPORTION OF TINNITUS IN ANEMIA AND ITS IMPACT ON QUALITY OF LIFE IN A TERTIARY CARE CENTRE

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### ABSTRACT

**Background:** Tinnitus is the perception of sound without an external auditory stimulus and can significantly impair quality of life. While several etiological factors are implicated, anemia has been proposed as an important contributor, especially in patients with normal audiological findings, due to altered hemodynamics and reduced cochlear oxygenation. **Objectives:** To determine the proportion of tinnitus among patients with anemia attending a tertiary care centre and to assess its impact on quality of life using the Tinnitus Handicap Inventory (THI). **Methods:** This hospital-based cross-sectional study included 151 adult patients diagnosed with tinnitus and anemia in a tertiary care ENT outpatient department. All patients underwent detailed history taking, otoscopic examination, Pure Tone Audiometry, impedance audiometry, and complete blood count. Quality of life was assessed using the THI questionnaire. Associations between tinnitus characteristics, hemoglobin levels, audiological findings, and THI scores were analyzed statistically. **Results:** The majority of patients were middle-aged, with a female predominance. All participants had normal hearing thresholds and normal middle ear status, indicating tinnitus without audiological pathology. Anemia (Hb <11 g/dl) was present in 76.2% of patients. Pulsatile tinnitus was slightly more common than non-pulsatile tinnitus. Based on THI scoring, 56.3% of patients experienced moderate to catastrophic handicap, reflecting a significant negative impact on quality of life. A statistically significant association was observed between THI severity and type of tinnitus, with pulsatile tinnitus associated with higher handicap scores. No significant association was found between hemoglobin levels and tinnitus type. **Conclusion:** Tinnitus is common among anemic patients and can cause considerable impairment in quality of life despite normal hearing. Early detection and management of anemia may help reduce tinnitus-related distress. Routine hemoglobin evaluation should be considered in patients presenting with tinnitus.

### KEYWORDS

Tinnitus, Anemia, Quality of life, Tinnitus Handicap Inventory, Pulsatile tinnitus

### INTRODUCTION

The term tinnitus is derived from Latin word TINNIRE (to Ring), the term describes the conscious perception of an auditory sensation in the absence of a corresponding external stimulus. It can be of two types subjective and objective. Subjective tinnitus is when the tinnitus is experienced alone by the patients, objective, when an observer can hear the tinnitus. The sensation is generally of an elementary nature, descriptions of Roaring, Hissing, Sizzling, and Ringing which is most commonly seen in majority of the patients and less commonly there can be complex sounds like voices or music are perceived, although it doesn't convey any meaning. It can be unilateral or bilateral / constant or intermittent / rhythmical or pulsatile sound, can be synchronous with heart beat suggesting of vascular origin or asynchronous suggesting myoclonus of middle ear or palatal muscles.<sup>1</sup>

The risk factors of tinnitus remain unknown, but among several risk factors anemia is especially related to pulsatile tinnitus due to an altered hemodynamic status. Other factors are age, gender, hearing loss, occupational and recreational noise exposure, eustachian tube dysfunction, obesity, smoking, alcohol consumption, stress, ototoxic drugs, previous head injury, arthritis, diabetes and hypertension. Globally, One third of the total population is affected by anemia, which is characterized by excessive loss of erythrocytes, which can occur due to nutritional deficiency, inflammation, genetic conditions. Resulting in, insufficient oxygen supply to various organs. Therefore, organs like cochlea will be susceptible to anemic insult leading to oxidative stress and inflammation due to high metabolic demands of cochlear hair cells involved in acoustic stimuli.<sup>2</sup>

The Quality of Life in individuals with tinnitus is reduced as a result of severe distress. Depression, anxiety and other psychological comorbidities are suffered by the patients.<sup>3</sup>

### OBJECTIVES

1)To assess the findings of pure tone audiometry among tinnitus

patients with anemia

2)To assess the quality of life among patients using Tinnitus Handicap Inventory Scale.

3)To assess the correlation of severity of tinnitus with Quality of Life.

### METHODS

All the patients attending ENT Outpatient Department of Sri Sidhartha Medical College and Hospital, Tumkur of both the genders and age group above 18 years, diagnosed with tinnitus and anemia who are willing to give consent. A detailed history is taken and otoscopic examination, pure tone audiometry and complete blood count is done and patients are given the tinnitus handicap inventory scale questionnaire to assess the quality of life.

Your Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Instructions:** The purpose of this questionnaire is to identify, quantify, and evaluate the difficulties that you may be experiencing because of tinnitus. Please do not skip any questions. When you have answered all the questions, add up your total score, based on the values for each response.

|                                                                                                                                 |         |               |        |
|---------------------------------------------------------------------------------------------------------------------------------|---------|---------------|--------|
| 1. Because of your tinnitus, is it difficult for you to concentrate?                                                            | Yes (4) | Sometimes (2) | No (0) |
| 2. Does the loudness of your tinnitus make it difficult for you to hear people?                                                 | Yes (4) | Sometimes (2) | No (0) |
| 3. Does your tinnitus make you angry?                                                                                           | Yes (4) | Sometimes (2) | No (0) |
| 4. Does your tinnitus make you feel confused?                                                                                   | Yes (4) | Sometimes (2) | No (0) |
| 5. Because of your tinnitus, do you feel depressed?                                                                             | Yes (4) | Sometimes (2) | No (0) |
| 6. Do you complain a great deal about your tinnitus?                                                                            | Yes (4) | Sometimes (2) | No (0) |
| 7. Because of your tinnitus, do you have trouble falling to sleep at night?                                                     | Yes (4) | Sometimes (2) | No (0) |
| 8. Do you feel as though you cannot escape your tinnitus?                                                                       | Yes (4) | Sometimes (2) | No (0) |
| 9. Does your tinnitus interfere with your ability to enjoy your social activities (such as going out to dinner, to the movies)? | Yes (4) | Sometimes (2) | No (0) |
| 10. Because of your tinnitus, do you feel frustrated?                                                                           | Yes (4) | Sometimes (2) | No (0) |
| 11. Because of your tinnitus, do you feel that you have a terrible dream?                                                       | Yes (4) | Sometimes (2) | No (0) |
| 12. Does your tinnitus make it difficult for you to enjoy life?                                                                 | Yes (4) | Sometimes (2) | No (0) |
| 13. Does your tinnitus interfere with your job or household responsibilities?                                                   | Yes (4) | Sometimes (2) | No (0) |
| 14. Because of your tinnitus, do you find that you are often irritated?                                                         | Yes (4) | Sometimes (2) | No (0) |
| 15. Because of your tinnitus, is it difficult for you to read?                                                                  | Yes (4) | Sometimes (2) | No (0) |
| 16. Does your tinnitus make you upset?                                                                                          | Yes (4) | Sometimes (2) | No (0) |
| 17. Do you feel that your tinnitus problem has placed stress on your relationships with members of your family and friends?     | Yes (4) | Sometimes (2) | No (0) |
| 18. Do you find it difficult to focus your attention away from your tinnitus and on other things?                               | Yes (4) | Sometimes (2) | No (0) |
| 19. Do you feel that you have no control over your tinnitus?                                                                    | Yes (4) | Sometimes (2) | No (0) |
| 20. Because of your tinnitus, do you often feel tired?                                                                          | Yes (4) | Sometimes (2) | No (0) |
| 21. Because of your tinnitus, do you feel depressed?                                                                            | Yes (4) | Sometimes (2) | No (0) |
| 22. Does your tinnitus make you feel anxious?                                                                                   | Yes (4) | Sometimes (2) | No (0) |
| 23. Do you feel that you can no longer cope with your tinnitus?                                                                 | Yes (4) | Sometimes (2) | No (0) |
| 24. Does your tinnitus get worse when you are under stress?                                                                     | Yes (4) | Sometimes (2) | No (0) |
| 25. Does your tinnitus make you feel nervous?                                                                                   | Yes (4) | Sometimes (2) | No (0) |

The sum of all responses is your THI Score >>>

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Patients of both the genders and age group above 18 years presenting to the outpatient department of ENT in Sri Siddhartha Medical College and Hospital who are diagnosed to have tinnitus and anemia who are willing to get evaluated after taking informed written consent are taken up for the study. Following protocol will be utilized for each of the patient.

- Detailed history is taken, and clinical examination of the patient is done and noted using otoscope.
- Pure Tone Audiometry is done to assess the type and degree of hearing loss.
- Complete blood count is done to assess hemoglobin levels.
- Assessing the quality of life by using Tinnitus Handicap Inventory Scale<sup>9</sup>.

## RESULTS

**Table 1: Association Between PTA And Tinnitus**

| PTA      | TYPE OF TINNITUS |               | Total  | Chi-square, P-value |
|----------|------------------|---------------|--------|---------------------|
|          | PULSATIVE        | NON PULSATIVE |        |                     |
| NORMAL   | N 81             | 70            | 151    | 0.000, 1.000        |
|          | % 53.6%          | 46.4%         | 100.0% |                     |
| ABNORMAL | N 81             | 70            | 151    |                     |
|          | % 53.6%          | 46.4%         | 100.0% |                     |
| Total    | N 81             | 70            | 151    |                     |
|          | % 53.6%          | 46.4%         | 100.0% |                     |

**Table 2: Association Between Hemoglobin Levels And Tinnitus**

| HB_LEVELS             | TYPE OF TINNITUS |               | Total  | CHI-SQUARE, P-VALUE |
|-----------------------|------------------|---------------|--------|---------------------|
|                       | PULSATIVE        | NON PULSATIVE |        |                     |
| 11 mg/dl - ANEMIA     | N 62             | 53            | 115    | 0.014, 0.905        |
|                       | % 53.9%          | 46.1%         | 100.0% |                     |
| >= 11 mg/dl - OPTIMAL | N 19             | 17            | 36     |                     |
|                       | % 52.8%          | 47.2%         | 100.0% |                     |
| Total                 | N 81             | 70            | 151    |                     |
|                       | % 53.6%          | 46.4%         | 100.0% |                     |

**Table 3: Association Between THI And Tinnitus**

| THI_score             | Type_Of TINNITUS |               | Total  | Chi-square, P-value |
|-----------------------|------------------|---------------|--------|---------------------|
|                       | Pulsative        | Non Pulsative |        |                     |
| 0-16 (NO HANDICAP)    | N 16             | 4             | 20     | 29.663, <0.001      |
|                       | % 80.0%          | 20.0%         | 100.0% |                     |
| 17-36 (MILD)          | N 10             | 36            | 46     |                     |
|                       | % 21.7%          | 78.3%         | 100.0% |                     |
| 37-56 (MODERATE)      | N 31             | 20            | 51     | 100.0%              |
|                       | % 60.8%          | 39.2%         | 100.0% |                     |
| 57-76 (SEVERE)        | N 19             | 7             | 26     | 100.0%              |
|                       | % 73.1%          | 26.9%         | 100.0% |                     |
| 77-100 (CATASTROPHIC) | N 5              | 3             | 8      | 100.0%              |
|                       | % 62.5%          | 37.5%         | 100.0% |                     |
| Total                 | N 81             | 70            | 151    |                     |
|                       | % 53.6%          | 46.4%         | 100.0% |                     |

**Table : Association Between Laterality And Tinnitus**

| LATERALITY | Type_Of TINNITUS |               | Total  | Chi-square, P-value |
|------------|------------------|---------------|--------|---------------------|
|            | Pulsative        | Non Pulsative |        |                     |
| UNILATERAL | N 39             | 42            | 81     | 2.121, 0.145        |
|            | % 48.1%          | 51.9%         | 100.0% |                     |
| BILATERAL  | N 42             | 28            | 70     |                     |
|            | % 60.0%          | 40.0%         | 100.0% |                     |
| Total      | N 81             | 70            | 151    |                     |
|            | % 53.6%          | 46.4%         | 100.0% |                     |

The present study was conducted among 151 patients with tinnitus and anemia attending a tertiary care centre, to determine the proportion of tinnitus and its impact on quality of life. The majority of patients belonged to the 41–50 years age group (41.1%), followed closely by 31–40 years (40.4%). Patients aged 21–30 years constituted 18.5% of the study population. This indicates a higher prevalence of tinnitus among middle-aged adults. Females predominated the study population, accounting for 66.2% (n=100), while males constituted 33.8% (n=51), suggesting a female preponderance among anemic

patients with tinnitus. The majority of patients (92.7%) did not have associated comorbidities, while only 7.3% had additional systemic illnesses, minimizing confounding factors.

- Pure Tone Audiometry (PTA): All patients (100%) demonstrated normal hearing thresholds.
- External and Middle Ear Examination (EUM): Normal in 100% of cases.
- These findings confirm that tinnitus in the present study was not associated with hearing loss or middle ear pathology. There was no statistically significant association between PTA findings and type of tinnitus ( $\chi^2 = 0.000$ ,  $p = 1.000$ ), as all patients had normal hearing.
- Anemia (Hb <11 mg/dl) was observed in 76.2% (n=115) of patients.
- Optimal hemoglobin levels ( $\geq 11$  mg/dl) were present in 23.8% (n=36).

This demonstrates a high proportion of tinnitus among anemic patients. No statistically significant association was found between hemoglobin levels and type of tinnitus ( $\chi^2 = 0.014$ ,  $p = 0.905$ ). Duration of tinnitus <3 months was reported by 71.5%, while 28.5% had symptoms for more than 3 months. No history of ototoxic drug intake was present in any patient. No significant occupational or noise exposure was reported by all participants.

Based on the Tinnitus Handicap Inventory (THI), No handicap: 13.2%, Mild handicap: 30.5%, Moderate handicap: 33.8%, Severe handicap: 17.2%, Catastrophic handicap: 5.3%. More than 56% of patients experienced moderate to catastrophic tinnitus-related handicap, indicating a significant impact on quality of life.

A statistically significant association was observed between THI scores and type of tinnitus ( $\chi^2 = 29.663$ ,  $p < 0.001$ ). Pulsatile tinnitus was more commonly associated with higher THI scores, indicating greater functional and emotional distress.

## CONCLUSION

This study highlights a high proportion of tinnitus among anemic patients, predominantly affecting middle-aged females. Despite normal hearing and middle ear status, tinnitus was found to cause considerable impairment in quality of life, with over half of the patients experiencing moderate to severe handicap.

Anemia appears to play a significant contributory role in the genesis of tinnitus, particularly in the absence of other known etiological factors such as noise exposure, ototoxic drugs, or audiological abnormalities. While hemoglobin levels did not show a statistically significant association with tinnitus type, the severity of tinnitus-related disability was significantly associated with THI scores, especially in patients with pulsatile tinnitus.

Early identification and management of anemia may help in reducing tinnitus severity and improving quality of life. Hence, routine hemoglobin evaluation should be considered in patients presenting with tinnitus, especially when audiological findings are normal.

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