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RESEARCH

Anthropometric Indices Among Patients with Tinnitus at The Otorhinolaryngology Head and Neck Surgery Outpatient Clinic Of RSUP Prof. Dr. I G. N. G. Ngoerah

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ABSTRACT

Background: Tinnitus is a common otologic symptom that may significantly impair quality of life. In addition to auditory pathology, systemic and metabolic factors have been proposed to contribute to tinnitus. Anthropometric indices such as body mass index (BMI) and waist circumference are widely used markers of nutritional and metabolic status; however, their relationship with tinnitus remains controversial. **Purpose:** This study aimed to describe the anthropometric characteristics of patients with tinnitus attending a tertiary referral hospital. Method: This was a retrospective descriptive study using secondary data from medical records of tinnitus patients treated at the Otorhinolaryngology–Head and Neck Surgery outpatient clinic of RSUP Prof. Dr. I G. N. G. Ngoerah, Denpasar, between 2019 and 2022. **Results:** A total of 96 patients were included. Most patients were male (54.2%) with a mean age of 45 years. The most common tinnitus perception was high-pitched ringing. More than half of the patients experienced tinnitus for 6 months to 5 years. Among male patients, obesity class I was the most frequent BMI category, and 59.1% had central obesity based on waist circumference. **Conclusion:** Overweight, obesity, and central obesity were common among patients with tinnitus in this study. Anthropometric assessment may be considered as part of a comprehensive evaluation of tinnitus, particularly in patients with metabolic risk factors.

Keywords: tinnitus, body mass index, waist circumference, anthropometry, obesity.

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INTRODUCTION

Tinnitus is defined as the perception of sound in the absence of an external acoustic stimulus and is one of the most frequently encountered symptoms in otology. The global prevalence of tinnitus is estimated to range from 7% to 32% and increases with age, with a peak incidence in individuals older than 65 years.[1,2] Although tinnitus is often mild, a proportion of patients experience severe and persistent symptoms that negatively affect sleep, concentration, emotional well-being, and overall quality of life.[3]

The pathophysiology of tinnitus is complex and multifactorial. It is commonly associated with sensorineural hearing loss; however, non-auditory factors such as psychological conditions, cardiovascular disease, metabolic disorders, and lifestyle factors have also been implicated.[3,4] These factors may influence cochlear microcirculation, neural plasticity, and central auditory processing.

Anthropometric indices, including body mass index (BMI) and waist circumference, are practical, non-invasive measures used to assess nutritional status and cardiometabolic risk. Obesity and central adiposity are associated with systemic inflammation, oxidative stress, endothelial dysfunction, and microvascular impairment, all of which may affect the inner ear and auditory pathways.[5,6] Several epidemiological studies have suggested a possible association between abnormal anthropometric indices and tinnitus; however, published results remain inconsistent.[6-9]

Given the limited and conflicting evidence, particularly in Asian populations, this study aimed to describe the anthropometric characteristics of patients with tinnitus treated at a tertiary referral hospital in Indonesia.

METHOD

This study employed a retrospective descriptive design. Secondary data were obtained from medical records of patients diagnosed with tinnitus at the Otorhinolaryngology–Head and Neck Surgery outpatient clinic of RSUP Prof. Dr. I G. N. G. Ngoerah, Denpasar, from January 2019 to December 2022.

The study population consisted of all tinnitus patients during the study period. Total sampling was applied. Inclusion criteria were patients diagnosed with tinnitus based on history and physical examination and having complete medical records. Patients with incomplete anthropometric data were excluded.

Collected variables included age, sex, occupation, tinnitus characteristics (type of sound, laterality, and duration), body weight, height, and waist circumference. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m²) and categorized according to World Health Organization criteria for Asian adults. Central obesity was defined as waist circumference ≥90 cm in men and ≥80 cm in women.

Data were analyzed descriptively and presented as frequencies, percentages, means, and ranges using SPSS IBM version 21.

RESULT

A total of 96 patients met the inclusion criteria. Male patients accounted for 54.2% of cases, while 45.8% were female. The mean age was 45 years, ranging from 23 to 79 years, with the highest proportion in the 41–50-year age group.

The most common tinnitus perception was high-pitched ringing (69.8%). More than half of the patients (51.0%) reported tinnitus duration between 6 months and 5 years. Tinnitus was most frequently unilateral, predominantly affecting the left ear.

Regarding anthropometric indices, obesity class I was the most common BMI category among male patients. Central obesity based on waist circumference was found in more than half of male patients. These findings indicate a high prevalence of abnormal anthropometric indices among patients with tinnitus.

Table 1. Demographic characteristics of patients with tinnitus.

Variable	n	%
Sex		
Male	52	54.2
Female	44	45.8
Age group (years)		
21–30	15	15.6
31–40	18	18.8
41–50	25	26.0
51–60	24	25.0
>60	14	14.6

Mean age: 45 years (range 23–79 years).

Table 2. Occupational characteristics of patients with tinnitus

Occupation	n	%
Manager	5	5.2
Professional / Specialist	13	13.5
Staff / Service worker	26	27.1
Salesperson	1	1.0
Farmer / Fisherman	2	2.1
Technician / Mechanic / Production worker / Engineer	6	6.3
Laborer	3	3.1
Military	1	1.0
Unemployed	23	24.0
Informal small trader	7	7.3
Student	5	5.2
Retired	4	4.2
Total	96	100

Table 3. Characteristics of tinnitus symptoms.

Variable	n	%
Tinnitus sound perception		
High-pitched ringing	67	69.8
Buzzing / hissing / crackling	3	3.1
Humming / roaring	10	10.4
Pulsatile	16	16.7
Duration of tinnitus		
<6 months	36	37.5
6 months–5 years	49	51.0
>5 years	9	9.4
Unknown	2	2.1

Table 4. Laterality of tinnitus.

Laterality	n	%
Right ear	26	27.1
Left ear	45	46.9
Bilateral	25	26.0
Total	96	100

Table 5. Anthropometric indices in male patients with tinnitus.

Variable	n	%
Body mass index (WHO Asian criteria)		
Underweight	4	7.7
Normal	13	25.0
At risk	5	9.6
Obesity class I	18	34.6
Obesity class II	12	23.1
Waist circumference		
<90 cm (non-central obesity)	25	40.9
≥90 cm (central obesity)	27	59.1

DISCUSSION

This study demonstrates that abnormal anthropometric indices, including overweight, obesity, and central obesity, are common among patients with tinnitus treated at a tertiary referral hospital. These findings support the growing body of evidence suggesting that metabolic and nutritional factors may contribute to the clinical profile of tinnitus.

Several epidemiological studies have evaluated the association between body mass index and tinnitus with heterogeneous results. Torun et al. reported significantly higher BMI values among patients with tinnitus compared with controls, suggesting a potential link between obesity and tinnitus development.[6] In contrast, other studies have shown no significant association between BMI and tinnitus occurrence.[8,9] Lee et al. reported an increased risk of tinnitus among underweight premenopausal women, highlighting that both extremes of body weight may influence tinnitus risk through different mechanisms.[7] The variability among studies may be attributed to differences in population characteristics, study design, definitions of tinnitus, and adjustment for confounding factors such as hearing loss, cardiovascular disease, and psychological status.

Central obesity, as reflected by increased waist circumference, may be a more relevant indicator than BMI alone. Waist circumference is a surrogate marker of visceral adiposity, which is metabolically active and strongly associated with insulin resistance, dyslipidemia, and chronic low-grade inflammation.[5,10] These metabolic disturbances may impair cochlear microcirculation and lead to ischemia of the inner ear structures, particularly the stria vascularis, which plays a critical role in maintaining endocochlear potential. Reduced cochlear blood flow and endothelial dysfunction may contribute to hair cell damage and abnormal auditory nerve activity, which are implicated in tinnitus generation.[3,6]

Obesity is also associated with increased oxidative stress and the release of pro-inflammatory cytokines and adipokines. These mediators can affect neural signaling and synaptic plasticity within the central auditory pathway.[5,11] Experimental and clinical studies suggest that oxidative stress may exacerbate cochlear injury and promote maladaptive neuroplastic changes in the auditory cortex, thereby sustaining tinnitus perception.[3,12] Furthermore, obesity-related conditions such as diabetes mellitus, hypertension, and dyslipidemia have been independently associated with hearing disorders and tinnitus, reinforcing the hypothesis that metabolic health plays an important role in auditory function.[6,10]

Psychological factors may also mediate the relationship between anthropometric indices and tinnitus. Obesity has been linked to depression, anxiety, and reduced quality of life, conditions that are frequently reported among patients with bothersome tinnitus.[3,14] The limbic system and prefrontal cortex are involved in tinnitus-related distress and emotional processing. Dysregulation within these networks may amplify tinnitus perception and reduce habituation, particularly in individuals with metabolic and psychological comorbidities.[12,14]

The findings of this study should be interpreted in light of its limitations. The retrospective and descriptive design precludes causal inference, and the absence of a control group limits the ability to assess the strength of association between anthropometric indices and tinnitus. Additionally, data on hearing thresholds, metabolic parameters, and psychological assessments were not systematically available. Nevertheless, this study provides valuable baseline data from an Indonesian tertiary care setting and highlights the high prevalence of abnormal anthropometric profiles among patients with tinnitus.

From a clinical perspective, these findings underscore the importance of a holistic approach to tinnitus management. Assessment of anthropometric indices and metabolic risk factors

may complement routine otologic and audiologic evaluation. Lifestyle interventions targeting weight reduction, diet modification, and physical activity may have potential benefits not only for general health but also for tinnitus-related outcomes, although further analytical and interventional studies are required to confirm this hypothesis.

In conclusion, overweight, obesity, and central obesity were commonly observed among patients with tinnitus in this study. Anthropometric assessment should be considered as part of a comprehensive evaluation of tinnitus, particularly in patients with metabolic risk factors. Future prospective studies are warranted to elucidate causal pathways and to explore the impact of metabolic interventions on tinnitus severity and quality of life.

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