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PREVALENCE OF INSOMNIA AND IMPACT ON QUALITY OF LIFE AMONG COMMUNITY ELDERLY WITH TINNITUS

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Abstract

Objectives—Determine the prevalence of insomnia and its impact on the quality of life (QoL) among community elderly subjects (≥ 65 years) with subjective tinnitus.

Methods—Following household selection with multi-stage stratified area probability sampling, face-to-face interview was used to obtain self-reports of subjective tinnitus and insomnia and QoL was assessed using the WHOQoL Bref instrument.

Results—Among 1302 elderly subjects, there were 183 (109 females and 74 males) with tinnitus. Among those with tinnitus, insomnia was encountered in 95(51.9%) and found to be significantly more common among those with tinnitus than those without 378/1119(33.8%), ($P=0.002$). The insomnia symptoms included difficulty in maintaining sleep 73.4%, difficulty in falling asleep 70.0%, early morning wakefulness 64.3%, non-restorative sleep 35.1% and daytime sleepiness 34.7%. Univariate analysis revealed difficulty with falling asleep ($P=0.01$) and early morning wakefulness ($P=0.05$) to be significantly associated with tinnitus among the symptoms. The student t-test and logistic regression analysis revealed significant deterioration in the total QoL, and physical, psychological, social and environmental QoL domains, among elderly subjects who had tinnitus with insomnia compared with those without insomnia.

Conclusions—insomnia was significantly more common among elderly with tinnitus than those without and its presence further depreciates the quality of life in these elderly individuals.

Keywords

Tinnitus; insomnia; community elderly; quality of life

INTRODUCTION

The prevalence of sleep disturbance among patients with tinnitus has been reported to be between 25%³ and 60%¹⁻⁴. Various explanations have been offered for this coexistence of tinnitus and insomnia; it has been suggested to be a reaction to the acoustic percept of tinnitus, or due to common causes.⁵ Besides the fact that little is known about relationship, the occurrence of insomnia has been associated with functional impairment and depreciation in the quality of life (QoL) among the elderly subjects with tinnitus.^{6, 7, 8, 9}

Furthermore, reports of such study from the developing countries are sparse despite the fact these countries contain a large proportion of the world elderly population and the treatment modalities for these conditions are not readily accessible^{9, 10}. This is a report of the study of the association between tinnitus and sleep disturbance among community elderly in a developing country. The objective was to determine the prevalence of sleep related problems among community elderly subjects with tinnitus and assess the impact of this sleep disorder on the quality of life of these elderly subjects with tinnitus.

METHODS

Sampling

The Ibadan Study of Aging (ISA) is a longitudinal cohort study of the mental and physical health status as well as the functioning and disability of elderly persons (aged 65 years and over) residing in the Yoruba-speaking areas of Nigeria, consisting of eight contiguous states in the south-western and north-central regions (Lagos, Ogun, Osun, Oyo, Ondo, Ekiti, Kogi and Kwara). These states account for about 22% of the Nigerian population (approximately, 25 million people). The baseline survey was conducted between November 2003 and August 2004 and the methodology has been described in full elsewhere,^{11, 12} and only a brief summary is provided here. Respondents were selected using a multi-stage stratified area probability sampling of households. In households with more than one eligible person (aged 65 years and fluent in the language of the study, Yoruba), the Kish table selection method was used to select one respondent¹³.

Data Collection

Face-to face interviews were carried out at baseline in 2003 on 2152 respondents who provided consent to participate, representing a response rate of 74.2%. An annual three-wave follow-up of the cohort was begun in 2007. Of the baseline sample, 1413 were alive in 2007. This cohort was enlarged by the addition of 461 new respondents, thus resulting in a total of 1874. A second-wave assessment was conducted in 2008 with the successful interview of 1474 persons (79%). Those who could not be interviewed consisted of 112 (6%) who had died, 275 (14.7%) who had relocated or could not be found after repeated visits (a maximum of 5 visits were made) and 13 (0.7%) who refused to be interviewed. Of the 1474 persons who were successfully interviewed, 1302 provided complete information about tinnitus, sleep disorders and the correlates examined in this report.

Measures

Along with several other assessments, a checklist of chronic physical and pain conditions was included in the ISA.¹⁴ At the 2008 follow-up, subjective tinnitus was assessed by asking respondents if they had a sensation of noise in the ear without an external source of sound. In addition, questions were asked about insomnia. Specifically, respondents were asked: a) “difficulty falling asleep”; b) “difficulty maintaining sleep”; c) “early morning wakefulness”; d) “day time sleepiness” and e) “non restorative sleep”. Respondents were required to give a yes or no answer to each of these questions. The diagnosis of insomnia was based on positive response to any of the symptoms listed above.

All respondents also completed the WHO quality of life instrument, brief version (WHOQoL-Bref).¹⁵ WHOQoL-Bref was developed as an instrument, applicable across many cultures, for subjective assessment of health-related quality- of – life.¹⁵ It was designed in diverse cultural settings, including in sub-Saharan Africa,¹⁵ and has been validated as a measure of quality of life in elderly people.¹⁶ In our study this instrument had excellent reliability (Cronbach $\alpha=0.86$). The lower the score on the WHOQoL-Bref, the poorer the quality of life.¹⁵

The survey was approved by the University of Ibadan/University College Hospital, Ibadan Joint Ethical Review Board.

Data analysis

We present the unweighted estimates of the occurrence of tinnitus and insomnia. Univariate analysis was used to determine the significance of the differences in the occurrence of the demographic and clinical variables between the elderly subjects who had tinnitus with

insomnia and those without. The economic status was assessed by taking an inventory of household and personal items such as chairs, clock, bucket, radio, television set, fans, stove or cooker, car, telephone, etc. The list was composed of 21 such items. This is a standard and validated method of estimating economic wealth of elderly persons in low income settings.¹⁰ Respondents' economic status was categorized by relating each respondent's total possessions to the median number of possessions of the entire sample. Thus, economic status was rated low if its ratio to the median was 0.5 or less, low-average if the ratio is 0.5 – 1.0, high-average if it was 1.0 – 2.0, and high if it was over 2.0. Residence was classified as rural (less than 12,000 households), semi-urban (12,000 – 20,000 households) and urban (greater than 20,000 households). Associations with socio-economic variables and co-morbid conditions were explored using logistic regression and the results are presented as odds ratios (ORs) with 95% confidence intervals (95% CI). The odds for the occurrence of variables were determined with multivariate analysis. The mean total score for the brief version of the WHO quality of life instrument, and for each domain within that instrument, was determined for the elderly subjects who had tinnitus with insomnia and those without and the significance of any difference was determined using the Student t-test. In order to assess further the significance of insomnia on the quality of life of elderly people with tinnitus, we used logistic regression analysis, controlling for age, gender, sociodemographic and lifestyle variables, to determine the significance of the difference of the total mean score of the brief version of the WHO QoL instrument, and each domain of that instrument between elderly subjects who had tinnitus with insomnia and those without¹⁷. The estimates of standard errors of the Odds Ratio (OR's) obtained for the means and proportions were made with the STATA.¹⁸ All of the confidence intervals reported were at 95% and statistical significance was set at 0.05 in two-sided tests.

RESULT

The study sample consisted of 750 (57.6%) females and 552 (42.4%) males with a mean age of 77.3 years (SE = 0.3). Of these, 183(14.1%) (109 females and 74 males) had subjective tinnitus while 473(36.3%) had any symptom of insomnia. Among the 473 subjects with insomnia, the symptoms encountered included difficulty in maintaining sleep in 347(73.4%), difficulty in falling asleep in 331(70.0%), early morning wakefulness in 304(64.3%), non-restorative sleep in 166(35.1%) and daytime sleepiness in 164(34.7%).

The univariate analysis revealed that insomnia was significantly more common among the elderly with tinnitus 95/183(51.9%) than those without subjective tinnitus (378/1119) (33.8%), ($P=0.002$). Difficulty with falling asleep ($P=0.01$) and early morning wakefulness ($P=0.05$) emerged to be symptoms of insomnia that were significantly associated with tinnitus among those elderly subjects while the other symptoms were not.

Among the 183 elderly subjects with tinnitus, insomnia was encountered in 95(51.9%) while 88(48.1%) did not have. Table 1 compares the sociodemographic profile of elderly subjects who had tinnitus with insomnia and those without and it reveals that the education, socioeconomic status and other demographic and lifestyle profile are similar between the two groups and there was no significant difference.

Table 2 shows the student t-test analysis of the mean scores for the WHO brief QoL instrument between elderly subjects who had tinnitus with insomnia and those without. It revealed significant deterioration in the total QoL, and physical, psychological, social and environmental QoL domains, among elderly subjects who had tinnitus with insomnia compared with those elderly who had tinnitus without insomnia.

Table 3 shows logistic regression analysis of the quality of life, adjusted for age, gender, sociodemographic and lifestyle variables between elderly subjects who had tinnitus with insomnia and those without. This confirms the significance of insomnia on deterioration of the total QoL and QoL for each of the instrumental domains among the elderly who had tinnitus.

DISCUSSION

The findings from this study have revealed that insomnia is significantly more prevalent among elderly subjects with tinnitus than the rest of the population and this disturbance of sleep exerts profound negative effect on their quality of life. Our study, which found insomnia in about 52% of elderly with tinnitus, compared with previous works which reported the prevalence of sleep disturbance among tinnitus subjects to be between 25% and 60%^{3, 4, 6, 9, 19, 20} and found it to be among the three major complaints of patients with tinnitus. In terms of the nature of insomnia, our study revealed that difficulty falling asleep and early morning wakefulness had significant correlation with tinnitus although difficulty maintaining sleep was most predominant. In the work of Tyler and Baker⁸ and others²¹⁻²⁴ difficulty getting to sleep was the most commonly encountered symptom, a complaint reported by about 57% of their respondents. Asplund²⁵ reported poor sleep in 14.4% of the men and 27.9% of the women respectively who had tinnitus. In addition he found poor sleep and frequent waking were more common in both sexes, while difficulties in falling asleep after awakening at night were reported more often by women. It has been proposed that the occurrence of tinnitus around the time of sleep was due to the reduced masking effect of external noise, resulting in an increased awareness of the tinnitus sensation²¹.

In view of the fact that this was a cross-sectional study, it was difficult to ascertain which predates the other between tinnitus and insomnia, however, this study found significant association between tinnitus and insomnia, suggesting that tinnitus is also one of the significant medical conditions associated with insomnia. Some other studies have reported association between insomnia and variety of psychiatric disorders and medical conditions such as dyspnea²⁶ and pain²⁷. This study examined the presence of ongoing tinnitus in the elderly, which might include the temporary, constant or nearly constant chronic tinnitus, however, as part of the limitation of this study, we did not assess the duration and the severity of tinnitus, in addition, this study could not find explanation for the mechanism of the association found between tinnitus and insomnia. However, some workers have indicated that the presence of sleep disturbance may be a complication of tinnitus and an index of severity of tinnitus;¹⁶⁻²⁰ while others suggested that the coexistence of these two disorders in the same patients may be reflective of a common pathology, and not a cause–effect relation. Recent studies have demonstrated that the presence of insomnia is related to hypersecretion of cortisol^{28, 29}. Similar hyperactivation of the hypothalamic-pituitary-adrenal (HPA) axis has also been reported in patients with depression^{30, 31}. However, this is yet to be proven in tinnitus. The implication of this is that the medications working on the HPA axis such as corticotrophin-releasing hormone antagonists) may be effective for controlling some of these medical conditions associated with insomnia including tinnitus.

Concerning the quality of life of the elderly subjects, our findings revealed that the presence of insomnia exerts further diminishing effect on the quality of life of the elderly subjects with tinnitus. This is similar to previous work which reports that the occurrence of insomnia in elderly individuals with tinnitus may become associated with impairment of psychological factors and coping mechanisms.²¹⁻²⁴ Meikle et al²⁰ and others^{5, 19, 22, 30} have shown that emotional distress become associated with auditory perceptual difficulties in the presence of sleep disturbances. Other studies also found that when insomnia and depression, are associated with tinnitus there is decreased tolerance and increased

discomfort with the tinnitus,^{2, 7} significantly decreased daytime functioning across a large number of areas including emotional, social, and physical domains and an overall lower quality of life comparable to that of individuals with chronic medical conditions^{28,31}.

We conclude from this study that insomnia was significantly more common among elderly with tinnitus than those without and its presence further depreciates the quality of life in these elderly individuals; however, studies continue on the link as this may reveal novel ways of treatment.

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TABLE 1
Sociodemographic and lifestyle profile among elderly who had tinnitus with insomnia and those without

Variables	Tinnitus only (n=88)		Tinnitus with insomnia (n=95)		P value
	N	%	N	%	
Age (years)					
80	36	(40.9%)	41	(43.2%)	0.2
75–79	19	(21.6%)	24	(25.3%)	
70–74	23	(26.1%)	17	(17.9%)	
65–69	10	(11.4%)	13	(13.7%)	
Gender					
Male	33	(37.5%)	41	(43.2%)	0.8
Female	55	(62.5%)	54	(56.8%)	
Education (years completed)					
13	18	(20.5%)	19	(20.0%)	0.4
7–12	11	(12.5%)	21	(22.1%)	
1–6	22	(25.0%)	14	(14.7%)	
0	37	(42.1%)	41	(43.2%)	
Economic Status					
High	3	(3.4%)	7	(7.4%)	0.1
High-average	31	(35.2%)	29	(30.5%)	
Low-average	25	(28.4%)	38	(40.0%)	
Low	29	(33.0%)	21	(22.1%)	
Residence					
Urban	14	(15.9%)	14	(14.7%)	0.8
Semi-urban	44	(50.0%)	44	(46.3%)	
Rural	30	(34.1%)	37	(38.9%)	
Alcohol drinking, ever					
No	44	(50.0%)	55	(57.9%)	0.1
Yes	44	(50.0%)	40	(42.1%)	

Variables	Tinnitus only (n=88)		Tinnitus with insomnia (n=95)		P value
	N	%	N	%	
Cigarette smoking, ever					
No	41	(46.6%)	52	(54.7%)	0.5
Yes	47	(53.4%)	43	(45.3%)	

TABLE 2
Student t-test Analysis comparing the quality of life between Elderly subjects who had tinnitus with and without insomnia

WHOQoL Bref Domain	Group Interval	n	Mean	[95% Conf. interval]	P value
Physical	0	84	23.5	22.4	0.01
	1	93	19.5	18.2	
Psychological	0	84	20.9	20.3	0.04
	1	93	19.1	18.2	
Environmental	0	83	9.6	9.1	0.05
	1	95	9.0	8.5	
Social	0	84	26.5	25.8	0.05
	1	94	25.2	24.4	
QoL Bref Total	0	82	80.6	78.3	0.01
	1	90	73.1	70.5	

0-Elderly subjects who had tinnitus without insomnia

1-Elderly subjects who had tinnitus with insomnia

Table 3
Logistic regression modeling comparing the quality of life between Elderly subjects who had tinnitus with and without insomnia

WHOQoL Bref Domain	β	P value	95% Confidence interval
Physical	-0.04	0.01	-0.05 to -0.02
Psychological	-0.04	0.01	-0.06 to -0.02
Environmental	-0.05	0.03	-0.08 to -0.02
Social	-0.03	0.02	-0.06 to -0.01
QoL Bref Total	-0.02	0.01	1.17 to 3.37

* Adjusted for age, gender, sociodemographic and lifestyle variables