STATE MENTAL AND IMPACT OF THE TINNITUS IN THE ELDERLY

Estado mental e impacto do zumbido em idosos

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ABSTRACT

Purpose: to analyze the performance of the elderly people on the Mini Mental State Examination (MMSE); to verify the results of the Tinnitus Handicap Inventory (THI); to investigate the interference of the variables gender, schooling and tinnitus on the MMSE and THI scores; to verify possible relations with self-reported mental state of psychoacoustic characteristics and emotional domain of THI. **Methods:** clinical descriptive, exploratory qualitative and quantitative research. It was submitted to the MMSE and THI, 108 volunteers, male and female, aged ranged 60 to 80 years referred from Coordenadoria de Atenção Básica of Itabaiana – SE. The statistical analysis based on sample distribution and Spearman´s correlation with 0,05%. **Results:** the mean age was 65.63 years. The MMSE results were grouped into four levels of education: no schooling (37.0%), ≥ 1 to ≤ 8 years (55.6%), ≥ 9 to ≤ 11 years (4.6%) and ≥ 12 years (2.8%), the mean MMSE was 21.7 points. It was observed that 49.1% scored below the pattern, while 50.9% presented equals or exceeds the parameter used. On THI, we found that 59.3% presented tinnitus. It was observed that tinnitus interferes with the quality of life on 89.10% of the population. **Conclusion:** the majority of the elderly people presented abnormal MMSE. It was verify no significant association between gender, schooling and MMSE score and THI and the majority of the participants in this study reported impaired quality of life associated with tinnitus. No relation between abuse of psychoacoustic characteristics of tinnitus and results displayed by the MMSE, however, the data showed that the majority of the population tested complained of tinnitus.

KEYWORDS: Aged; Tinnitus; Cognition Disorders; Diagnosis; Quality of Life

INTRODUCTION

According to the Brazilian Institute of Geography and Statistics[1], we had observed changes on demographic pattern in Brazil. These changes emerged from the ‘40s and presented more different on the´60s. So we evidenced the decline of mortality rates in same proportion on fertility levels. One of the mainly factor that contributed in this aspects was the decrease in mortality with improvement in quality of life assured by an improvement in public health life, social security and investments in urban infrastructure and advances on the chemical-pharmaceutical industry.

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Conflict of interest: non existent

Aging causes changes on several systems that carried bad quality of life. On elderly we could find health problems, mental disorders which affect about one-third of the elderly population. There are few epidemiological studies of general psychiatric morbidity in the elderly but we can point from 26.4% to 33.6% in Brazilian urban communities[2].

The study of the mental state is evaluates with the Mini Mental State Examination (MMSE) that is cognitive evaluation test that provide date of many cognitive parameters of geriatric population. The MMSE is named mini because concern with only cognitive aspects of mental function and does not identify dementia state. This evaluation verify temporal and spatial orientation, writing of three words, attention and account, recall of three words, language and visual capacity[3].

This test a sample test that is used worldwide to evaluate the cognitive status, mainly for evaluation of large population groups, and allow statistical

analysis of incidence and prevalence of dementia, it´s so fast to carry out (spend from 5 to 10 minutes). The scores ranging from 0 to 30 and their questions evaluate: orientation to time (5 points), spatial orientation (5 points), immediate memory (3 points), attention and account (5 points), memory recall (3 points), language (8 points) and visual and constructive praxis (1 point). However, one must be careful when evaluating the MMSE memory, because this test is highly influenced by age and schooling that allows results "false positives" and "false negatives"[4].

The studies of Almeida (1998) and Brucki et al. (2003)[5,6] showed the interference of schooling and age on performance of this test in São Paulo - Brazil. Almeida (1998)[5] translated and validated this questionnaire for Brazilian Portuguese. The tinnitus becoming a common otological complaint that affect around 25 million brazilian citizen[7], and it´s prevalent on 63.3% of subjects older than 45 years. Lack of mental state, of memory and concentration are frequent complaints, and affect the daily activities, communication, social and on home environment. We observed prejudice on psychic state revealed by stress, anxiety, depression and insomnia[8]. At least 17% of the population was affected by tinnitus, and 15% to 25% reported influence in their quality of life[9]. Axelsson, Ringdahl (1989)[10] suggested that this disorder affects 10-15% of the general population and 20-40% of the elderly subjects.

Tinnitus is a misunderstood perception of sound without its presence in the environment[11]. Tinnitus could be describe as an illusory sensation of noise similar as sound as rain, the sea, running water, bells, insects, whistle, hiss, ringer, pulse tone or others. This sensation may be continuous or intermittent, have different frequency characteristics, intensity perceived on the ears or head[12].

The impact of tinnitus on quality of life can be measured by the Tinnitus Handicap Inventory (THI) which was developed by Newman, Jacobson, Spitzer (1996)[13]. This questionnaire consists of 25 questions which asses 3 different domains. It is easy to carry out, to interpretation, to reliable for clinical practice and to analyzer the interference of tinnitus on quality of life of the patient. It´s possible study by following levels: reactions functional, emotional and catastrophic tinnitus. The functional (F) domain measures the discomfort caused by tinnitus in mental, social, occupational and physical functions. The emotional scale (E) measures the affective responses such as anxiety, anger and depression. The catastrophic domain(C) quantifies the despair and the incapacity to live by the affected person or get rid of the symptom. There are three response options for each question, scored as follows: for YES (4 points), sometimes (2 points) and not (zero) [13].

This instrument, translated and validated for Brazilian Portuguese in 2005 by Ferreira and colleagues[14] can be used widely in the clinical setting for evaluation of tinnitus patients and quantify the subjects related to this symptom and analyzer the response on the treatment proposed. Baguley et al. (2000)[15] and Berry et al. (2002)[16] referred that the THI quantifies the clinical improvement of tinnitus and highlighted its usefulness in monitoring and evaluation of treatment.

According to the proposed Mccombe et al. (1999)[17], tinnitus can be:

Degree	Intensity	Percentage
1	Worthless	0-16%
2	Light	18-36%
3	Moderate	38-56%
4	Severe	58-76%
5	Catastrophic	78-100%

Figure 1 - Classification of the degree of tinnitus according to Mccombe et al. (1999)[17].

It´s verified the increasing of number of research focused on the study of the quality of life of the elderly, but there are not researches on the relationship between mental state and tinnitus which reveal that elderly patients need different demands for health care. This population requires greater investment of resources in health and social security. The brazilian government had been developing more efficient public policies to provide better quality of life conditions to elderly population[18].

Based on these, the objectives of this study were to analyze the performance of a group of elderly population on the Mini-Mental State Examination; to verify the results of the application of the Tinnitus Handicap Inventory (THI), to investigate the interference of the variables gender, schooling

and tinnitus in the MMSE and THI evaluation; to determine possible relationships with self-reported mental state of psychoacoustic characteristics and emotional state of THI.

METHODS

This study was submitted to the Ethics and Research Center of Medicine of the Federal University of Sergipe. The project was approved and registered with the following numbers CAAE: 0016.0.107.000-10. All volunteers signed a consensual agreement and allowed us to use the data as part of this study.

It´s a clinical, descriptive, exploratory, quantitative and qualitative study, 108 volunteers of both gender, age ranging 60 to 80 years from Itabaiana Athletic Association and basic cares center were evaluated by Mini Mental State Examination (MMSE) and Tinnitus Handicap Inventory (THI).

Volunteers were excluded if they met the following eigth inclusion criteria: younger than 60 years who used psychotropic drugs, history of stroke, degenerative neurological diseases, depression, delirium, history of head trauma and early diagnosis of dementia.

The Mini Mental State Examination (MMSE) was developed by Folstein (1975)[19], as is shown below:

1 - Mini Mental State Examination – MMSE

1.1 - Orientation

5 ( ) "What is the year? Season? Date? Day? Month?"

5 ( ) "Where are we now? State? County? Town/ city? Hospital? Floor?"

1.2 - Registration

3 ( ) The examiner names three unrelated objects clearly and slowly, then the instructor asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible.

1.3 - Attention and Calculation

5 ( ) "I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65 …)

Alternative: "Spell WORLD backwards." (D-L-R-O-W)

1.4 - Recall

3 ( ) "Earlier I told you the names of three things. Can you tell me what those were?"

1.5 - Language

9 ( ) Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them. (2 points).

( )"Neither yes nor no, not because" (1 point).

( ) "Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.) (3 points).

( ) "Please read this and do what it says." (Written instruction is "Close your eyes.") (1 point).

( ) "Make up and write a sentence about anything." (This sentence must contain a noun and a verb.) (1 point).

( ) "Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) (1 point).

Total ( )

1.1.6 – Measure of consciousness:

Alert ( ) Drowsy ( ) Stupor ( ) Coma ( )

In this study we used the Brazilian version proposed by Almeida (1998)[5].

In the last task of MMSE we used a drawing of a house composed of geometric shapes because of the elderly difficulties at this stage.

Two trained examiners evaluate elderly group. We ensured the anonymity of individuals and permitted their withdrawal at any stage during the study.

For data analysis, we used the cutoff scores, from Herrera Jr., Caramelli, Nitrini (1998)[20] study.

The responses of THI could be 0-100 (points or %), the maximum score means that tinnitus interfere a lot in patient´s life and when the score is zero tinnitus does not cause any problem to the person, The results of questions were categorized into five groups or levels of severity.

For statistical purposes we used summarized measures and SPSS 20.0 software. We used parametric and Spearman test to verify correlation between the variables. Results lower than 5% ($p < 0.05$) were considered significant and are indicated with one asterisk

Schooling	No schooling	≥1 and ≤ 8 years	≥ 9 and ≤ 11 years	≥ 12 years
Score	19	24	24	28

Figure 2 - Distribution according the level of education

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

Figure 3 – The Tinnitus Handicap Inventory (THI)[13], translated by Ferreira et al. (2005)[14].

RESULTS

Table 1 shows the distribution of the percentage of male and female population according schooling and it was verified that the majority of the sample (92.6%) was composed by individuals without and with low schooling.

Table 2 shows that 50.9% of the sample scored within normal limits on MMSE and note that half of the female presented bad performance in this evaluation.

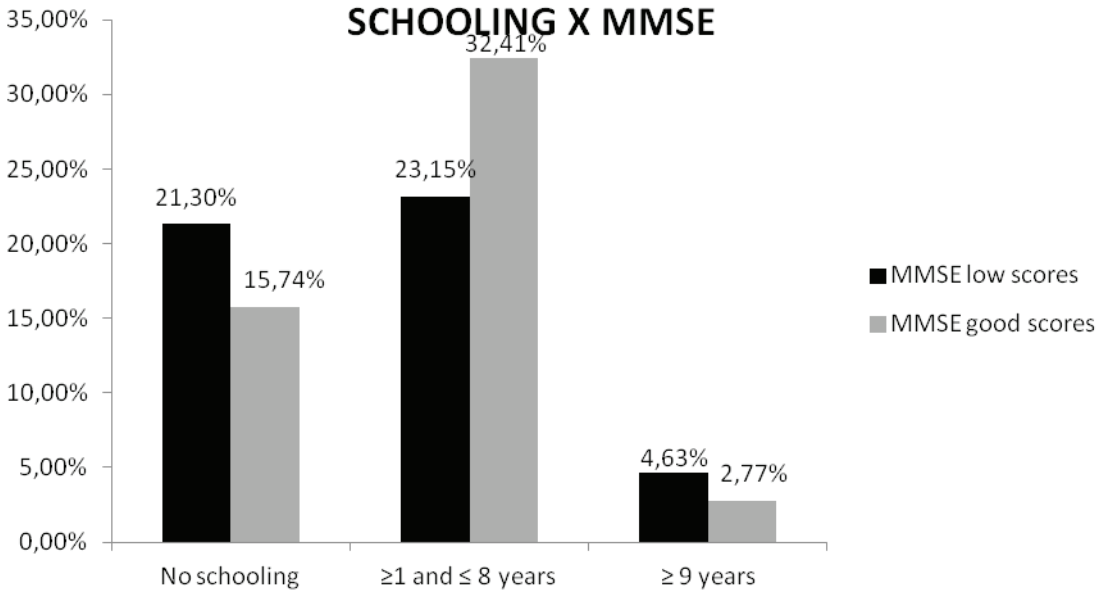
In Figure 4 it was note that in subjects with ≥ 1 and ≤ 8 years of schooling presented alteration on MMSE. Subjects in the range with and without ≥ 9 years of schooling presented normal scores on MMSE.

Table 1 – Distribution of the percentage of male and female population according schooling

	Male	Female	Schooling	Amount	Percentage
Amount	4	104	No schooling	40	37,0%
			≥ 1 and ≤ 8 years	60	55,6%
Percentage	3,7%	96,30%	≥ 9 and ≤ 11 years	5	4,6%
			≥ 12 years	3	2,8%
Total	**3,7%**	**96,30%**		**108**	**100,0%**

Table 2 – Distribution of the percentage of the ratio: Gender x Mini Mental State Examination scores

Gender		MMSE		Total
		With low scores	No alterations	
Female	Amount	52	52	**104**
	Percentage	50%	50%	**100%**
Male	Amount	1	3	**4**
	Percentage	25%	75%	**100%**
Total	**Amount**	**53**	**55**	**108**
	Percentage	**49,1%**	**50,9%**	**100%**



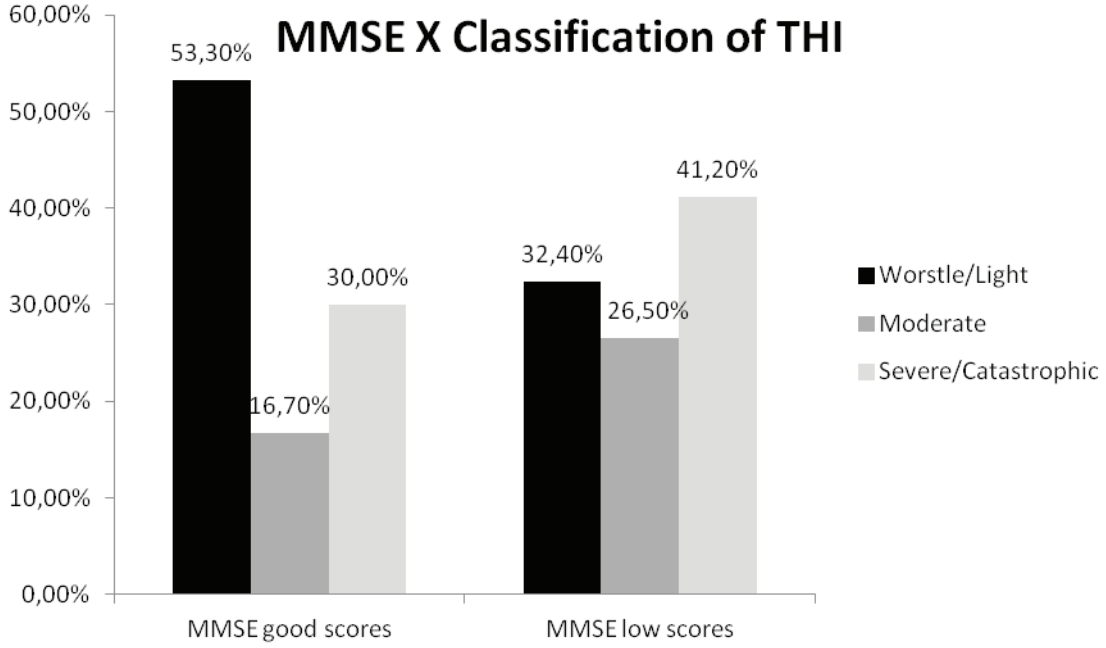
Legend: MMSE = Mini Mental State Examination

Figure 4 - Distribution according to the ratio: Schooling x Mini-Mental State Examination scores

The results showed that among the subjects who had reported tinnitus, 53.1% presented bad scores on MMSE. The same pattern it was verified between subjects who did not report tinnitus (46.9%). It is possible that there was similar self-report between the subjects whose complain tinnitus and have or do not change in MMSE. It is verified that there was similar self-report between the subjects whose not complain tinnitus and have or do not bad scores on MMSE

Figure 5 indicates that there was a predominance of worthless / mild influence of the tinnitus on subjects with normal MMSE. In individuals with bad performance on MMSE there was a slight predominance of individuals with severe feeling / catastrophic tinnitus.

Table 3 reveals that 59.30% of individuals submitted to THI presented tinnitus. In this sample more than half (60.90%) self-report tinnitus complaint. and it was perceived in both ears and (71.90%). The prevalence of the pitch of the tinnitus was described as high.



Legend: MMSE = Mini Mental State Examination
THI = Tinnitus Handicap Inventory

Figure 5 - Distribution according to the ratio: Mini Mental State Examination scores X Tinnitus Handicap Inventory classification

Table 3 - Percentage distribution of the results of the Tinnitus Handicap Inventory, according the predominance of ear with tinnitus and Pitch

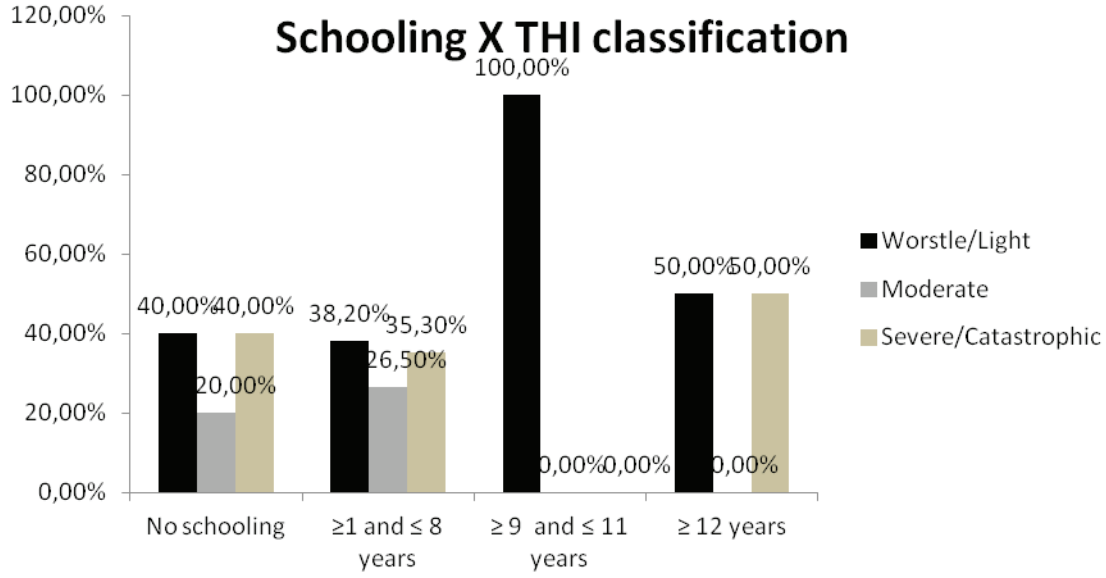
Tinnitus Complain	Amount	Percentage				
Yes	64	**59,3%**				
		Ear			***Pitch***	
		Rigth	**Left**	**Both**	**Righ**	**Bass**
		17,2%	21,9%	60,9%	71,9%	28,10%
No	44	**40,7%**				
Total	**108**	**100,0%**				

Table 4 shows that almost half of the sample that present self-report of tinnitus, (42.20%) was composed of individuals that perceived it so worstle or mild (89.10%), and that interfere on their quality of life.

Figure 6 indicates that there was a predominance of worthless / mild and severe / catastrophic tinnitus sensation on the groups no schooling, ≥ 1 and ≤ 8 and ≥ 12 years of schooling. Individual on the ≥ 9 and ≤ 11 years of schooling referred worst or mild tinnitus.

Table 4 - Distribution according to the classification of the degree of tinnitus and their influence on quality of life

Classification of the degree of tinnitus	Amount	Percentage	Interference of tinnitus on quality of life
Worstle	7	10,9%	No
Light	20	31,3%	Yes
Moderate	14	21,9%	Yes
Severe	13	20,3%	Yes
Catastrophic	10	15,6%	Yes
Total	**64**	**100,0%**	**89,10%**



Legend: THI = Tinnitus Handicap Inventory

Figure 6 - Distribution of the relationship: Schooling X Tinnitus Handicap Inventory classification

DISCUSSION

From the results of the MMSE it was verified that the average of the total scores was 21.7 points that was achieved in some studies[21-24].

It was observed that the average of the age was 65.63 years which agree with the results of the other researchers[24].

In this research, the majority of the sample was female (96.3%) and individuals with low or no schooling (92.6%) which agreed with similar study[24] and its confirms that the results for gender in Brazil, the absolute number of elderly women has been higher when with men over than 65 years old[25].

Statistical analysis showed that the results on MMSE revealed no association with schooling which

agree with a previous study[26]. However, disagreed with others[6,24,27] who have shown that the MMSE was correlate with schooling.

By analysis of the performance on the MMSE, half of the sample presented lower scores. The highest concentration was in the range ≥ 1 and ≤ 8 years of schooling (32.41%), that was confirmed with some studies[23,28] and disagreed with others[24,29].

A research [22] which correlated MMSE with the age and schooling in the elderly community found out that an average of 21.97 points and between those with ≥ 1 and ≤ 8 years of schooling, the average was 23.85 points, which agree with this research that verified 22.76 points.

It was observed from this study that not all volunteers with low schooling presented lower scores, which agreed with the findings in some studies[30].

The distribution showed that majority of the volunteers presented MMSE scores that indicates no cognitive impairment, emphasizing that different standards[20] were adopted as presented previously.

According with the results on THI, it was found that the average age of the volunteers with self-report complaint in THI was 65.06 years. So 59.3% of the sample interviewed reported tinnitus corroborating with this study[31]. The average score on the THI of the sample was 26.94, which disagreed with other[32].

In this research, tinnitus ´pitch related was high and present in both ears was the most frequent and the discomfort was mild, which agrees with findings reported in the literature[33-36].

It was observed that 89.10% of individuals reported negative influence of the tinnitus in their quality of life with agrees with this authors[14,37] and disagrees with others studies[38,39].

The statistical analysis revealed that there was no relationship between self-report of psychoacoustic characteristics of tinnitus and the results presented on MMSE. But, the results show that the majority of the sample complained of tinnitus, which was similar to the result in this study[38].

CONCLUSION

A significant portion of the participants had lower scores on MMSE. There was no significant association between gender, education and MMSE and THI. The majority of the subjects in this study reported impaired quality of life associated with tinnitus. No relation between complaints of the psychoacoustic characteristics of tinnitus and the results on MMSE, however, the data showed that the majority of this sample complained of tinnitus.

RESUMO

Objetivo: analisar o desempenho de uma população idosa no Mini Exame do Estado Mental; verificar os resultados da aplicação do *Tinnitus Handicap Inventory* (THI); averiguar a interferência das variáveis gênero, escolaridade e zumbido no desempenho geral no MEEM e THI; verificar possíveis relações do estado mental com o autorrelato das características psicoacústicas e escala emocional do THI. **Métodos:** estudo clínico descritivo, exploratório, quantitativo e qualitativo em que se submeteram ao MEEM e THI, 108 voluntários, de gênero masculino e feminino, com idade entre 60 a 80 anos encaminhados da Coordenadoria de Atenção Básica de Itabaiana – SE. Para a análise dos dados foram utilizadas a distribuição percentual simples e a correlação de Spearman com p<0,05. **Resultados:** a média de idade foi 65,63 anos. Os resultados no MEEM agruparam-se em quatro níveis de escolaridade: sem escolaridade (37,0%); ≥1 a ≤8 anos (55,6%); ≥9 a ≤11 anos (4,6%) e ≥12 anos (2,8%); a média no MEEM foi 21,7. Observou-se que 49,1% pontuaram abaixo da nota de corte, enquanto 50,9% apresentaram nota igual ou superior ao parâmetro adotado. No THI, observou-se que 59,3% apresentavam queixa de zumbido. Verificou-se que o zumbido interfere na qualidade de vida de 89,10% da população estudada. **Conclusão:** uma parcela expressiva dos participantes apresentou alteração no MEEM. Não existiu associação significante entre gênero, escolaridade e pontuação do MEEM e THI e a maioria dos participantes desta pesquisa referiu prejuízo na qualidade de vida com associação ao zumbido. Inexistiu relação entre queixa das características psicoacústicas do zumbido e resultados exibidos pelo MEEM, todavia, os achados apontaram que a maioria da população testada autorrelataram presença de zumbido.

DESCRITORES: Idoso; Zumbido; Transtornos Cognitivos; Diagnóstico; Qualidade de Vida

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Received on: October 25, 2012
Accepted on: April 25, 2013

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