

RELATION BETWEEN HEARING COMPLAINTS AND AUDIOLOGICAL FINDINGS IN A GROUP OF ACTIVE SENIORS

Relação entre a queixa auditiva e os achados audiológicos de um grupo de idosos ativos

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ABSTRACT

Purpose: to investigate the presence of complaint and hearing loss in a group of active older people and verify the relation between self-perceived hearing condition and audiologic findings. **Methods:** 55 older people, aged 60 or more, of both sexes, socially active, were evaluated. The analyzed variables were the answers to three questions: "Do you think that your hearing is good?", "Do you listen to radio or television on high volume?" and "Do you have difficulty to comprehend when many people are talking at the same time?", which were compared to the tritonal average of 500, 1,000 and 2,000 Hz frequencies (TA1) and of 3,000, 4,000 and 6,000 Hz frequencies (TA2), Speech Recognition Threshold (SRT) and Speech Recognition Percentage Index (SRPI). **Results:** the individuals, who reported not listen well, had worst performance in the averages of all analyzed variables. The older people, who mentioned increasing the volume of the radio or television showed no statistically significant difference in the analysis of TA2 compared to those who do not, but there was this difference when analyzed TA1, SRT and SDT variables. The subjects who reported difficulty hearing, when many people talk at the same time, showed no statistically significant difference, but the averages of these individuals showed worst performance, when compared to those without this complaint. **Conclusion:** there was a relation between self-perceived hearing condition and the audiologic findings.

KEYWORDS: Aged; Hearing; Auditory Perception; Hearing Loss; Presbycusis; Questionnaires

■ INTRODUCTION

Aging refers to a dynamic and progressive process where functional, physiological and psychological changes occur in the individual over time¹.

However, reaching old age is no longer the privilege of a few, it is a reality even in poor countries². Therefore, this topic is increasingly discussed in the global scientific scenario, due to the need of generating knowledge about the health of seniors in search of promoting healthier ways of living at old age³.

The challenge of an aging population comes from the reduction in the number of children and young people and the rise in average life expectancy. The phenomenon is worldwide, but in developing countries such as Brazil, it occurs in a more evident manner^{1,3-5}.

Graying and hair loss, skin wrinkling and reduction of memory are characteristic of senility, however, such changes do not preclude the participation of seniors in society, in economic, cultural and religious issues, as per their wish and capacity³. These are the socially active seniors who enjoy a

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wide social agenda, such as participation in senior groups⁶.

Studies^{6,7} suggest that with the increase in the proportion of people aged 60 years or more, presbycusis rates will increase, which is hearing loss associated with aging⁷. It is known that hearing loss causes a number of negative effects on the quality of life of the seniors, because it not only causes sensory deprivation - difficulty hearing - but also a difficulty understanding what is being said^{6,8}. Thus, the presence of hearing loss in this population may lead to their removal from family and social environments and generate or worsen cases of isolation or depression⁹. In addition to these impacts, sensory deprivation, including hearing loss, may be related to dementia processes, due to the relationship of auditory processing with cerebral associative functions^{6, 10, 11}.

Thus, due to the substantial increase in the senior population and the high prevalence of presbycusis in this age group, studies on methods for early detection of hearing loss are of utmost importance, as they contribute to the development of prevention actions and early intervention in order to avoid or minimize the psychosocial implications of hearing impairment contributing to improving the quality of life of the elderly^{6,8,12}. It is known that audiometry is the test that quantifies hearing, being standard for the assessment of hearing loss, however, its performance may be hampered mainly by the difficulty of access to services that perform the exams⁷. Thus, the self-perceived hearing difficulty surveys may become useful, quick and cheap tools capable of being used in the early identification of hearing loss and, in conjunction with audiometry, can better represent the hearing complaints of the seniors. Therefore, it is necessary to perform studies that seek to examine the likelihood of association between what the patient reports and the results of audiological evaluation.

Thus, the aim of this study was to investigate the presence of hearing complaints in a group of active seniors and examine the possible relationship between the self-perceived hearing condition and audiological findings.

■ METHODS

This study presents an observational descriptive, retrospective and cross-sectional character and originated from a larger project called "Recognition of sentences with different speeds of speech", registered at the Health Sciences Center Projects

Department under No. 029 457 and approved by the Ethics Committee of the Federal University of Santa Maria (UFSM) with certificate No. 0098.0.243.000 11. Thus, the study was conducted with information from a database from this project, and the data used for this research article had not yet been analyzed. It should be noted that all seniors selected to participate of this wider project were socially active, and that their profile, whether active or not, was traced through an initial interview. All patients involved in the study signed a Consent Form.

The study group was composed of 55 socially active seniors, non-institutionalized, aged 60 years or more (seniors in developing countries, according to the World Health Organization - WHO) of both sexes, stemming from the Senior Groups and by seniors awaiting receipt of the hearing aid grant program of the Ministry of Health developed at the Hearing Aids Selection and Adaptation Center (NUSEAPA) at SAF. It should be noted that all seniors selected to participate of this wider project underwent an initial interview where their profile, whether active or not, was traced, and the presence of deficiencies and/or speech alterations was observed as well.

The subjects whose data were incomplete, or that presented unilateral or asymmetrical hearing loss, were excluded from the study group.

The variables analysed were related to: tritonal mean of thresholds of frequencies at 500, 1,000 and 2,000 Hz (TM1), tritonal mean of thresholds of frequencies at 3,000, 4,000 and 6,000 Hz (TM2), Speech Recognition Threshold (SRT) and the Speech Recognition Percentage Index (SRPI). The results obtained were analyzed in the ear with better tritonal mean. Speech tests were performed on speakerphone by the same examiner.

In order to investigate the relationship between hearing complaints and audiological findings, these variables were compared to the answers of a three question questionnaire prepared by the researchers (Figure 1): "Do you think you hear well?", "Do you listen to the radio or watch TV at a very high volume?" and "Do you have trouble listening when many people are talking at once?". This instrument contained three objective questions with two possible answers: "yes" or "no".

A descriptive and statistical analysis of the findings was performed, and to verify the normality, ShapiroWilk's test was used. In order to carry out the data comparison, the t-test was used, considering a 95% confidence interval ($p \leq 0.05$). Analyses were performed with the software Statistica 9.0.

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Date: ____/____/____

Name: _____

Gender: _____ Age: _____

Date of birth: ____/____/____

Contact phone number: _____

Education level: _____

QUESTIONNAIRE:

1. Do you think you hear well?
 YES NO

2. Do you listen to the radio or watch TV at a very high volume?
 YES NO

3. Do you have trouble listening when many people are talking at once?
 YES NO

Figure 1 - Questionnaire

■ RESULTS

Data from 55 subjects were analyzed, whereas 38 (69%) were female and 17 (31%) were male, aged between 60 and 84 years with a mean of 69.45 years. The data regarding the quantitative variables (TM1, TM2, SRT and SRPI) presented normal distribution.

The descriptive analysis data are shown in Figure 2, which shows the number and percentage of seniors, according to their individual response in the three issues examined, according to the variables tritonal mean of thresholds of frequencies at 500, 1,000 and 2,000 Hz (TM1), tritonal mean of thresholds of frequencies at 3,000, 4,000 and 6,000

Hz (TM2), Speech Recognition Threshold (SRT) and the Speech Recognition Percentage Index (SRPI).

Then, the statistical analysis was made comparing the responses of the group of subjects who reported complaints with the group of subjects who did not report complaints on the three questions studied, these analyzes being presented in Tables 1, 2 and 3.

In Table 1, it is possible to observe the TM1, TM2, SRT and SRPI of the group of subjects who reported not hearing well (with complaints) and the group of subjects who reported hearing well (no complaints) against the question “*Do you think you hear well?*” and their respective means.

	Do you think you hear well?		Do you listen to the radio or watch TV at a very high volume?		Do you have trouble listening when many people are talking at once?	
	Yes	No	Yes	No	Yes	No
TM1						
Normal	15(100%)	16(40%)	4(15%)	27(93%)	17(42,5%)	14(93%)
Altered	0(0%)	24(60%)	22(85%)	2(7%)	23(57,5%)	1(7%)
TM2						
Normal	11(73%)	6(15%)	3(11,5%)	14(48%)	9(22,5%)	8(53%)
Altered	4(27%)	34(85%)	23(88,5%)	15(52%)	31(77,5%)	7(47%)
SRT						
Normal	15(100%)	15(37,5%)	3(11,5%)	27(93%)	16(40%)	14(93%)
Altered	0(0%)	25(62,5%)	23(88,5%)	2(7%)	24(60%)	1(7%)
SRPI						
Normal	15(100%)	23(57,5%)	11(42%)	27(93%)	25(62,5%)	13(87%)
Altered	0(0%)	17(42,5%)	15(58%)	2(7%)	15(37,5%)	2(13%)

Figure 2 - Number and percentage of seniors with normal and abnormal audiological findings in each variable for the questions studied

Table 1 - Distribution of subjects regarding their response to the question “Do you think you hear well?” and comparative analysis of audiological means - TM1, TM2, SRT and SRPI of the group with complaints (Yes) and the group without complaints (No)

Data	Response	N(%)	Mean	P-value
TM1	Yes	15 (27%)	13,56	0,00015*
	No	40 (73%)	28,92	
TM2	Yes	15 (27%)	21,44	0,005539*
	No	40 (73%)	46,12	
SRT	Yes	15 (27%)	17,66	0,000125*
	No	40 (73%)	33,12	
SRPI	Yes	15 (27%)	97,33	0,000172*
	No	40 (73%)	88,1	

TM1 - Tritonal mean of thresholds of frequencies at 500, 1,000 and 2,000 Hz; TM2 - Tritonal mean of thresholds of frequencies at 3,000, 4,000 and 6,000 Hz; SRT - Speech recognition threshold; SRPI - Speech Recognition Percentage Index; (*) Statistically significant difference according to t-test (p ≤ 0.05);

Table 2 provides a better characterization for the variables analyzed and the audiological averages, of the group of subjects who had hearing complaints (yes) and the group of subjects who did not have hearing complaints (no) against the question “Do you listen to the radio or watch TV at a very high volume?”.

Now, Table 3 shows the variables related to the question “Do you have trouble listening when many people are talking at once?” of the group of subjects who had (yes) and did not have (no) complaints.

Table 2 - Distribution of subjects regarding the response to the question “Do you listen to the radio or watch TV at a very high volume?” and comparative analysis of audiological means - TM1, TM2, SRT and SRPI of the group with complaints (Yes) and without complaints (No)

Data	Response	N(%)	Mean	P-value
TM1	Yes	26(47%)	35,83	0,000258*
	No	29(53%)	14,77	
TM2	Yes	26(47%)	52,62	0,126923
	No	29(53%)	27,53	
SRT	Yes	26(47%)	39,42	0,000156*
	No	29(53%)	19,48	
SRPI	Yes	26(47%)	84,61	0,000044*
	No	29(53%)	96	

TM1 - Tritonal mean of thresholds of frequencies at 500, 1,000 and 2,000 Hz; TM2 - Tritonal mean of thresholds of frequencies at 3,000, 4,000 and 6,000 Hz; SRT - Speech recognition threshold; SRPI - Speech Recognition Percentage Index; (*) Statistically significant difference according to t-test ($p \leq 0.05$);

Table 3 - Distribution of subjects regarding the response to the question “Do you have trouble listening when many people are talking at once?” and comparative analysis of audiological means - TM1, TM2, SRT and SRPI of the groups with complaints (Yes) and without complaints (No)

Data	Response	N(%)	Mean	P-value
TM1	Yes	40(73%)	27,71	0,073522
	No	15(27%)	16,78	
TM2	Yes	40(73%)	44,08	0,711491
	No	15(27%)	26,88	
SRT	Yes	40(73%)	32	0,186010
	No	15(27%)	20,66	
SRPI	Yes	40(73%)	88,9	0,431527
	No	15(27%)	95,2	

TM1 - Tritonal mean of thresholds of frequencies at 500, 1,000 and 2,000 Hz; TM2 - Tritonal mean of thresholds of frequencies at 3,000, 4,000 and 6,000 Hz; SRT - Speech recognition threshold; SRPI - Speech Recognition Percentage Index; (*) Statistically significant difference according to t-test ($p \leq 0.05$);

■ DISCUSSION

In Figure 1, for the first question “Do you think you hear well?”, out of the 40 subjects who reported not hearing well, 24 (60%) presented an alteration in TM1 and 34 (85%) also presented an alteration in TM2, showing hearing loss. The SRT was consistent with TM1 but the SRPI was not compatible with the other variables, a fact that was already expected, since it is performed at a supraliminal intensity and in silence, causing the difficulty of the individual to not be so evident in this situation. On the other hand, all seniors who reported hearing well presented TM1, SRT and SRPI within normal limits and only four subjects showed lowered TM2. Based on these results, it is suggested that the seniors which reported not hearing well are more likely to present

alterations in audiological findings than the subjects that did not report complaints.

Regarding the 16 (40%) subjects who reported not hearing well, but that presented a normal TM1, it can be said, based on the literature consulted^{13,14} that hearing processing disorders interfere in the recognition of sounds, especially of speech, even when the hearing thresholds are normal.

Regarding the second question of Figure 1, “Do you listen to the radio or watch TV at a very high volume?”, there was a high relation between hearing perception and audiological findings, since over 80% of the 26 seniors who reported listening to the radio or watching television at a high volume presented an alteration in TM1, and the same was observed with the variables TM2 and SRT. The SRPI was also altered, but in a smaller number of subjects: 15 (58%). It was observed that the

findings on the variable TM2, regarding the average frequencies of 3,000, 4,000 and 6,000 Hz, were consistent with the results of another research¹⁵, that speech recognition in silence has its prognosis based on frequencies of 500, 1,000 and 2,000 Hz, but frequencies of 3,000, 4,000 and 6,000 can also influence recognition, although there are variations among responses.

Therefore, it is believed that there are a number of individual factors to be considered in quiet situations, including memory, intelligence, interest and level of stress of the subject^{16,17}. Furthermore, it is also noted that when the seniors listen to the radio or watch television in quiet environments, other factors may be involved beyond the hearing threshold, such as the reduction of visual cues, speech rate increased and lack of contextualization of what is said¹⁸.

Thus, it can be said that when the seniors report to increase the volume of the radio/television, it is very likely that their hearing means already indicate the presence of hearing loss and, consequently, there is already a need for greater amplification of the volume of these devices in order to compensate for this difficulty.

Taking into account the results for the third question of Figure 1: *“Do you have trouble listening when many people are talking at once?”*, it can be seen that the 40 subjects who reported difficulty in noisy environments, 23 (57.5%) presented an alteration in TM1, 24 (60%) presented alteration in SRT, in accordance with TM1, and 31 (77.5%) presented altered hearing thresholds in the frequencies of 3,000, 4,000 and 6,000 Hz (TM2), demonstrating the importance of preservation of high frequencies for understanding speech in unfavorable environments.

In turn, when SRPI is analyzed, it is once again was not consistent with the results of other variables, for it was verified that 25 (62.5%) of the 40 subjects presented an SRPI with recognition values between 88 and 100%, even reporting having difficulty hearing when many people are talking at the same time¹⁹.

Thus, it can be said that for the present study, the SRPI was not data that showed a relation between the complaint and audiological findings, because even in the presence of some degree of hearing loss and/or complaint, the subjects performed well, since this test is done at an supraliminal intensity and in silence, which makes the difficulty of the individual not evident in this situation.

Based on the descriptive analysis of these three simple questions, it became clear that the majority of subjects who reported complaints in the first question presented alterations in TM1, TM2 and SRT and that the same was found for question

three. In question two, the seniors with complaints presented, in addition to these three variables, the SRPI also altered. It was also observed that the SRT, in all questions, was consistent with the TM1.

When analyzing the data in Table 1, which shows the distribution of subjects into two groups, with and without complaint regarding the response to the question, *“Do you think you hear well?”*, it was observed that 40 subjects (73%) reported not hearing well and only 15 (27%) reported hearing well.

The 40 (73%) seniors that reported not hearing well had the worst performance in the means of all variables analyzed - TM1, TM2, SRT, SRPI - when compared to the 15 (27%) subjects who reported hearing well. This difference was statistically significant, confirming a relationship between the perception of the hearing complaint and the audiological findings.

It is noteworthy that other research have also found a relationship between self-reports of hearing difficulties and audiological findings, revealing a high likelihood of association between what the patient reports and the audiological assessment^{20,21}, although this reality does not apply to all cases¹². However, other studies have shown there is no relationship between the complaint and the presence of hearing loss^{7,8,22,23}. This can be explained by the variability in the perception of hearing loss due to the lifestyle of each senior, or also by the prevalence of losses at a lesser degree, as well as the configuration of the loss and the progression of presbycusis, which causes the subject to not yet perceive hearing changes.

It is believed that in the present study, the high number of subjects who reported complaints can be explained due to the lifestyle of the senior group studied, which due to being socially active, i.e., still enjoying a large social agenda, religious gatherings and groups of seniors, need hearing in various communicative situations and therefore have a higher perception when its decrease occurs. Seniors with fewer social activities, such as those institutionalized, have a lower perception of the hearing difficulty due to the lack of interest in social relations and communication activities caused by social isolation²⁴.

With regards to the question *“Do you listen to the radio or watch TV at a very high volume?”* it is noted in Table 2 that 29 subjects (53%) reported not listening to the radio or television at a high volume and 26 (47%) mentioned that they do.

There was no statistically significant difference in the analysis of TM2 among the 26 seniors who reported difficulties - yes (47%) - in relation to those 29 subjects who denied raising the volume of the

radio or television - no (53%). However, there was a statistically significant difference between the two groups when variables TM1, SRT and SRPI were analyzed.

In a study by Santiago and Novaes²⁵ on the psychosocial impact of hearing loss, among the complaints reported by the 35 seniors studied, was also the need to raise the volume of electronic devices, especially for seniors over 70 years. It can be seen that this is a characteristic of the seniors for better understanding of the messages, due to the presence of the hearing loss associate to aging, which justifies the necessity of amplification of sounds²⁶.

Taking Table 3 into account, which lists the audiological findings with the question "*Do you have trouble listening when many people are talking at once?*" it can be observed that 40 subjects (73%) reported this difficulty, and the means of the variables showed the worst performances of these subjects when compared to the 15 subjects without this complaint (27%), but with no statistically significant difference.

Out of the total subjects, 40 (73%) reported having difficulty hearing when many people talk at the same time and only 15 (27%) reported no complaints.

It is known that this complaint of difficulty hearing in acoustically unfavorable environments is common in the senior population and jeopardizes the communication process, since the intelligibility of speech is reduced^{26,27}.

The fact that tonal hearing thresholds were within the normal range is not sufficient to ensure adequate recognition of speech in situations where there is competitive noise²⁸. Authors²⁷ indicate that the aging of the auditory system can interfere in speech recognition, even when peripheral hearing is normal. Thus, in the audiological evaluation of seniors, in many cases there is no relationship between the degree of hearing loss and the ability to recognize speech^{16,17}.

According to some studies^{25,29} the difficulty in understanding speech in noisy places may be related to the inability to efficiently processing the sounds and not necessarily by decreased hearing, and hearing loss is only an aggravating factor for this difficulty. As the decline in age-related cognitive functions such as working memory, selective attention and speed of information processing, they also have an important effect on speech understanding in seniors. Therefore, difficulties in speech understanding in the elderly cannot be explained

only by peripheral hearing loss, but also by hearing processing disorders or the decline of cognitive abilities^{13,14}.

Thus, it is possible to suggest that the aging process causes changes in the auditory system, and as a result there is a worse performance in various communicative situations, especially in noisy environments. It can be seen that even the seniors with normal hearing have difficulties in this situation. Thus, it is clear the importance of referring senior individuals to audiological evaluations and also to hearing processing tests, especially in individuals with complaints regarding speech comprehension. This attitude is essential, because the hearing loss affects the communication process of individuals, causes a removal from society and family, creates isolation and is associated with worsening of depression²².

This study emphasized the importance of using self-assessment surveys, even those formulated with simple questions, such as the one used in this research, because these instruments are able to detect any suspected hearing loss and thus allow referrals to specialized services, taking into account the large increase the number of people aged 60 years or more and the high prevalence of presbycusis in this population. Also, it is considered essential to use surveys, as they complete the audiological assessment with data that are not predicted from the audiogram, such as the functional capacity of the subject, the psychosocial impact, among others^{7,8,12,30,31}.

Therefore, with the results found in this study, the self-perception of the elderly becomes useful in relation to their hearing because this action reflects the subjective dimensions of hearing loss that are not seen on the audiogram. Moreover, the attitudes of acceptance of this disability, its assimilation as part of the aging process and adaptation to possible difficulties through reorganization of the environment facilitate the hearing rehabilitation process²⁵.

The seniors who reported not hearing well were more likely to present changes in audiological findings when compared to subjects who did not report complaints.

■ CONCLUSION

There were hearing complaints in all questions from a significant number of subjects.

The results of this study showed a relationship between the self-perceived hearing condition and audiological findings of the study group.

RESUMO

Objetivo: investigar a presença de queixa auditiva em um grupo de idosos ativos e verificar a possível relação entre a autopercepção da condição de escuta e os achados audiológicos. **Métodos:** foram avaliados 55 idosos socialmente ativos, de ambos os sexos e faixa etária igual ou superior a 60 anos. As variáveis analisadas foram as respostas às três perguntas: “O(a) senhor(a) acha que escuta bem?”, “O(a) senhor(a) escuta rádio ou televisão em volume muito alto?” e “O(a) senhor(a) tem dificuldade para escutar quando muitas pessoas conversam ao mesmo tempo?” que foram comparadas às médias tritonais dos limiares das frequências de 500, 1000 e 2000 Hz (MTT1) e de 3.000, 4.000 e 6.000 Hz (MTT2), Limiar de Reconhecimento de Fala (LRF) e Índice Percentual de Reconhecimento de Fala (IPRF). **Resultados:** os idosos que referiram não escutar bem, apresentaram piores desempenhos nas médias de todas as variáveis analisadas. Os idosos que mencionaram aumentar o volume do rádio ou televisão não apresentaram diferença estatisticamente significativa na análise da MTT2 em comparação aos que não o fazem, porém, houve esta diferença quando analisadas as variáveis MTT1, LRF e IPRF. Os sujeitos que referiram dificuldade de escutar quando muitas pessoas conversam ao mesmo tempo, não apresentaram diferença estatisticamente significativa, mas as médias das variáveis evidenciaram piores desempenhos destes sujeitos, quando comparados àqueles sem a queixa. **Conclusão:** houve presença de queixa auditiva em todas as questões e foi verificada relação entre a autopercepção da condição de escuta e os resultados da avaliação audiológica.

DESCRIPTORIOS: Idoso; Audição; Percepção Auditiva; Perda Auditiva; Presbiacusia; Questionários

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