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Satisfaction of elderly individuals with hearing aids in the first six months of use

Satisfação de idosos com os aparelhos de amplificação sonora individual nos primeiros seis meses de uso

ABSTRACT

Purpose: To analyze the hearing aid satisfaction after one, three and six months of use. **Methods:** Longitudinal study with 22 elderly individuals who participated in a selection and adaptation process for sound amplification devices in a high complexity health service. The study was carried out at the institution on the day of hearing aid fitting and on the follow-up appointments after one, three and six months of fitting. The data is part of the application of the Satisfaction with Amplification in Daily Life (SADL) questionnaire. In order to assess the consistency of the items composing the positive effects category of the SADL survey after one, three and six months of hearing aid use, the Cronbach's coefficient alpha was used. **Results:** There were improvements to the SADL scores in the period between the first use of the hearing aid and the following six months. Cronbach's coefficient alpha was calculated excluding questions 9 and 10, simultaneously. The coefficient values were 0.75 after a month, 0.69 after three months, and 0.81 after six months. Questions 9 (Do you feel more confident when you use hearing aids?) and 10 (The sounds that you hear with your hearing aids are normal?) created inconsistency in the assessment after one and three months of amplification use. **Conclusion:** The results obtained with the SADL indicate a high level of satisfaction. The averages for positive effects, negative effects, and global score were different after one, three and six months of hearing aid use.

RESUMO

Objetivo: Analisar a satisfação do idoso usuário de amplificação após um, três e seis meses de uso do Aparelho de Amplificação Sonora Individual (AASI). **Métodos:** Estudo longitudinal com 22 idosos que iniciaram o processo de seleção e adaptação de AASI em um serviço de alta complexidade. A pesquisa foi realizada no dia da adaptação dos AASI e nos retornos de um, três e seis meses do paciente à instituição e constou na aplicação do questionário *Satisfaction With Amplification in Daily Life* (SADL). Para avaliar a consistência dos itens que compõem os efeitos positivos do questionário SADL após um, três e seis meses de uso do AASI foi calculado o coeficiente alfa de Cronbach. **Resultados:** Houve melhora no escore do SADL quando comparados os momentos de entrega e após seis meses de uso de amplificação. O coeficiente alfa de Cronbach foi calculado excluindo as questões nove e dez simultaneamente. Os valores do coeficiente observados nesta situação foram: 0,73 após um mês de uso, 0,69 após três meses de uso e 0,81 após seis meses de uso. As questões 9 (Você se sente mais confiante quando usa os aparelhos auditivos?) e 10 (Os sons que você ouve com seus aparelhos auditivos são normais?) geraram inconsistência nas avaliações com um e três meses de uso da amplificação. **Conclusão:** Os resultados obtidos no SADL indicam grau de satisfação elevado. As médias dos efeitos positivos, efeitos negativos e escore global do SADL são diferentes após um, três e seis meses de uso de AASI.

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INTRODUCTION

With the implementation of the Hearing Health Ordinance, on September 28, 2004, several health care services were accredited to the Brazilian Public Health System (SUS – *Sistema Único de Saúde*). Thereafter, discussions about the quality of services – based on patient satisfaction and on benefits provided by hearing aids (HA) granted by SUS – became fundamental to ensure compliance with the proposed objectives.

There is a lack of studies in the area of auditory rehabilitation regarding implications of evaluations of the treatment of people with hearing loss in the services offered by SUS. However, in the field of public health, evaluation of services is of great importance since it favors the development of guidelines that contribute to the continuous improvement of quality of services⁽¹⁾.

The evaluation of the results can be monitored and recorded by means of tests and specific self-assessment questionnaires that are applied before, during and after the adaptation period. The self-assessment is a simple and rapid procedure that enables individual evaluation during the fitting of hearing aids. This procedure allows for comparison of different adjustments as well as the evaluation of the benefit of its use for a short period of time. Furthermore, it allows the user to recognize the advantages, activity limitations, and participation restrictions in activities of daily living. Thus, through questionnaires that enable measurement and analysis of these limitations and participation restrictions, it is possible to enhance the period of hearing aid fitting⁽²⁾.

Aiming to investigate the satisfaction of hearing aid users, many researchers have developed and validated measurement instruments. Among the best known and widely used is the Satisfaction with Amplification in Daily Life (SADL) questionnaire⁽³⁾.

User satisfaction can be defined as one of the areas of self-assessment, aggregated to physical, social, psychological and financial changes arising from the acquisition and use of hearing aids⁽⁴⁾. Some authors have opted to use the SADL questionnaire and found a high degree of satisfaction in patients who received hearing aids through concession⁽⁵⁻⁸⁾.

In some cases, it can be observed that some individuals are not satisfied with the use of hearing aids despite having benefits, and in turn, that individuals are satisfied even with no significant benefits. However, it is important to consider the existence of a necessary period of use of sound amplification to restore speech abilities and evaluate the benefits obtained with amplification. Thus, measures that assess subjective satisfaction must be held throughout the use of hearing aids. Therefore, further studies are still needed to identify which is the minimum needed period of use before the onset of assessment.

Considering that monitoring results of hearing aids should be made throughout the auditory rehabilitation process, studies that monitor the follow up satisfaction of the new user are necessary. The results of such studies could significantly contribute to the clinical aspect both in generating information from hearing aid users and in indicating instruments that assess the real satisfaction of these individuals.

Therefore, the purpose of this study was to analyze the satisfaction of elderly individuals in the first six months of use of hearing aids granted by SUS.

METHODS

This study was approved by the Research Ethics Committee of the Graduate Program in Speech-Language Pathology and Audiology of Pontifícia Universidade Católica de São Paulo (PUC-SP), under protocol number 036/2009. The study was conducted at the Division of Education and Rehabilitation of Communication Disorders (DERDIC/PUC-SP), which is a service of high complexity accredited by Hearing Health Ordinance number 587 of October 7, 2004.

Study design

The current research consisted on a clinical descriptive and analytical study with longitudinal design. The sample was comprised by individuals with hearing loss who were submitted for the first time through the process of selection and fitting of hearing aids. The longitudinal design of the sample consisted on monitoring and evaluating the satisfaction with hearing aids after one, three and six months of fitting.

Participants

Patients were summoned to the hearing aid concession based on a waiting list previously established by the institution. Initially, the researcher invited the individuals to participate in the study and made clarifications about the objectives, procedures and ethical implications. Once the Consent Form was signed, the individual became part of the sample.

The eligibility criteria for the composition of the sample were the following:

- Diagnosis of bilateral symmetrical sensorineural hearing loss with average of 500 Hz, 1 kHz, 2 kHz, 3 kHz and 4 kHz between 40 and 70 dB HL regardless of hearing loss configuration.
- Use of behind the ear nonlinear hearing aids.
- First use of hearing aid, i.e. without previous experience.
- Acquired post-lingual hearing loss.
- Age over 60 years – criterion established by law number 8842 of January 4, 1994, which provides for a National Policy for the Elderly⁽⁹⁾.

The sample consisted of 22 elderly individuals (11 females and 11 males), aged between 63 and 87 years.

Material

The Satisfaction with Amplification in Daily Life (SADL) questionnaire, developed at the University of Memphis, USA, and translated into Brazilian Portuguese by the very authors of the questionnaire, was applied. The original and translated versions are available at www.memphis.edu/ausp/harl/sadl.htm. Such instrument was developed in order to quantify the degree of satisfaction with the use of amplification, allowing the

identification of adverse aspects related to hearing aid fitting⁽³⁾.

The SADL questionnaire consists of 15 closed questions, divided into four categories, namely:

- Positive effects: includes questions related to communication skills, sound localization, sound quality, besides addressing psychological issues. It is comprised of six items (questions 1, 3, 5, 6, 9, 10);
- Service and cost: assesses the speech-language pathologist and audiologist competence and the value of hearing aids. It is comprised of three items (12, 14, 15). Since this research was conducted with subjects who received hearing aids through concession, only the cost of batteries and transportation were considered;
- Negative factors: covers three items that investigate performance in noisy environments, acoustic feedback and telephone use (questions 2, 7, 11);
- Personal image: composed of three items analyzing the self-image of the hearing aid user and hearing aid stigma (questions 4, 8, 13).

The questionnaire presents closed questions, with seven response options: nothing, a little, somewhat, moderately, considerably, very, and very much. The answers are equivalent to a seven-point scale, where the score with the smallest value is 1, corresponds to the answer “nothing”; the highest value is 7 and corresponds to the response “very much”, indicating, respectively, the lowest and highest satisfaction. The questions 2, 4, 7 and 13 correspond to items denominated reverse, where the score 7 corresponds to the answer “nothing” and the score of 1 corresponds to “very much”.

The scores were summed in their categories and then divided by the number of questions in each category. Thus, the overall result is the arithmetic average of the four categories. For the analyses, the total score and the categories “positive effects” and “negative factors” were used. The specific analysis of categories “service and value” and “personal image” were not part of the purpose of the study.

Procedures

All patients initiated the process at DERDIC through consultation with ENT, followed by audiometry (pure tone audiometry and speech) and acoustic impedance measurements. Hearing testing was performed by Audiologists and the equipment was calibrated according to ISO 8253-1 (1989). From the medical indication, patients were referred to the process of selection and fitting of hearing aids.

Once the concession of hearing aids was formalized, patients were instructed on care, handling and use of communication strategies to better understanding speech. The instruction manual and warranty card were handled to patients and they were scheduled to return for follow-up sessions. The research was conducted in the follow-up sessions of one, three and six months.

In all follow-up sessions the researcher verified if the patient and/or companion had any questions about the care and handling of the hearing aid and if there was need for adjustment in the molds or in the electroacoustic characteristics of the hearing

aid (based on complaints). In addition, in situ measurements were performed to verify the electroacoustic characteristics of hearing aids, but these were not used in the analysis of the current study. There was a gradual increase in the gain of hearing aids at the follow-up sessions of three and six months.

The SADL questionnaire was administered via oral presentation, in individual interviews, conducted by the researcher in a silent room and with the participant using the hearing aid. The form of application in which the individual answers the questions read by the examiner (face to face) is clinically preferable, since the responses are more reliable when compared to the technique in which the patient responds by writing⁽¹⁰⁾.

Data analysis

To evaluate the behavior of the SADL questionnaire variables (total score, positive effects and negative factors) during the period of use, the statistical technique of analysis of variance with repeated measures was applied. Tukey’s method was used to locate differences between means. The verification of model assumptions was made by residuals analysis. When the analysis indicated the existence of outliers, this was done with and without these values and the results were compared (sensitivity analysis).

To evaluate the consistency of the items comprising the positive effects after one, three and six months of use, the Cronbach’s coefficient α was calculated. This coefficient represents a manner to estimate the reliability of a questionnaire applied on a study. Alpha measures the correlation between responses to a questionnaire by analyzing the profile of responses. It is an average correlation among questions. Since all items of a questionnaire use the same measurement scale, the coefficient α is calculated from the variance of individual items and the variance of the sum of the items of each evaluator.

The significance level was set at 0.05 for all hypothesis tests.

RESULTS

Descriptive statistics for the positive effects, negative factors and total score were calculated. Note that the mean and median tend to increase with increased usage.

The analysis of variance with repeated measures showed that the mean of the positive effects are different in the three periods of use ($p < 0.001$). Comparing the mean pairs two by two (Tukey method), it was observed that the average satisfaction assessed after three and six months were higher than the satisfaction assessed after one month ($p < 0.001$ and $p < 0.001$, respectively), but there was no significant difference between the average satisfaction assessed after three and six months ($p = 0.593$).

For the sample of this study, the positive effects increased after the first three months of use. Thus, three months using hearing aids were sufficient to increase the score of positive effects, and this result was maintained after six months.

The average of negative factors were different in the three periods of use ($p < 0.001$). There was no difference between

Table 1. Distribution of mean, standard deviation, median, minimum and maximum values for the global score of the SADL questionnaire regarding the duration of hearing aid use

Duration of use	n	Mean	SD	Minimum	Median	Maximum
1 month	22	6.3	0.5	5.1	6.4	7.0
3 months	22	6.7	0.3	5.9	6.8	7.0
6 months	22	6.8	0.4	5.0	7.0	7.0

Note: SD = standard deviation

Table 2. Distribution of mean, standard deviation, median, minimum and maximum values for the positive effects category of the SADL questionnaire regarding the duration of hearing aid use

Duration of use	n	Mean	SD	Minimum	Median	Maximum
1 month	22	5.9	0.7	4.6	6.1	7
3 months	22	6.6	0.5	5	6.8	7
6 months	22	6.8	0.4	6	7	7

Note: SD = standard deviation

Table 3. Distribution of mean, standard deviation, median, minimum and maximum values for the negative factors category of the SADL questionnaire regarding the duration of hearing aid use

Duration of use	n	Mean	SD	Minimum	Median	Maximum
1 month	22	5.9	1.1	3	6.2	7
3 months	22	6.3	0.9	4	6.8	7
6 months	22	6.7	0.7	4	7.0	7

Note: SD = standard deviation

the averages after one month and three months ($p=0.072$), the average after six months was higher than in one month ($p<0.001$), and there was no difference between the averages after three and six months ($p=0.113$). Thus, for the sample, an increase in scores of negative factors was only observed from six months of hearing aid use.

The overall average scores were different in the three periods of use ($p<0.001$). The average after three months was higher than one month ($p<0.001$), the average after six months was higher than one month ($p<0.001$), and there was no difference between the averages after three and six months ($p=0.250$). Therefore, in this sample, the first three months of

use were enough to increase the overall score and the result was maintained at six months.

The consistency of items comprising the positive effects category after one, three and six months of use of hearing aids was evaluated. This analysis was performed with the objective of verifying the consistency of questions one and five with other questions that compose the positive effects category. The observed values of Cronbach's coefficient α were: 0.65 after a month of use, 0.57 after three months of use, and 0.80 after six months of use. The observed values of the coefficient α after one and three months of use were, therefore, lower than 0.70, indicating no consistency among the questions that compose the positive effects category. It was possible to observe the coefficient value after deleting each question (Table 4). It can be concluded that the lack of consistency has no relation to the questions 1 and 5 since after the deletion of each of these, there was no increase in the value of the coefficient. However, note that the exclusion of question 10 increased the coefficient to 0.71, after a month of use, and exclusion of question nine increased the coefficient to 0.72, after three months of use.

Table 4. Distribution of observed values of Cronbach's coefficient after one, three and six months of amplification use for items that compose the positive effects category of the SADL questionnaire

Item	Cronbach when the item is excluded		
	1 month	3 months	6 months
Q1	0.52	0.31	0.69
Q3	0.66	0.59	0.83
Q5	0.63	0.40	0.65
Q6	0.50	0.42	0.75
Q9	0.61	0.72	0.78
Q10	0.71	0.49	0.80

Note: Q = question

The coefficient was recalculated excluding questions 9 and 10 simultaneously. The values observed in this condition were: 0.73 after a month of use, 0.69 after three months of use and 0.81 after six months of use. Therefore, the lack of consistency in the first two assessments could be attributed to questions 9 and 10.

Due to the lack of consistency among the items comprising the positive effects category, the specific questions one and five were separately analyzed. Descriptive statistics for scores on these questions were obtained (Table 5).

Table 5. Distribution of mean, standard deviation, median, minimum and maximum values for the SADL questionnaire score on questions 1 and 5

Question	Assessment	n	Mean	SD	Minimum	Median	Maximum
1. Do your hearing aids help you understand what people who talk more often you say, when compared without the use of hearing aids?	1 month	22	5.5	1.0	4	5	7
	3 months	22	6.5	0.7	5	7	7
	6 months	22	6.6	0.7	5	7	7
5. Do your hearing aids reduce the number of times you have to ask people to repeat what they said?	1 month	22	5.8	1.2	4	6	7
	3 months	22	6.5	0.9	4	7	7
	6 months	22	6.6	0.9	4	7	7

Note: SD = standard deviation

The average scores on question 1 are different in the three periods of use ($p < 0.001$). The average satisfaction after three months was higher than after one month ($p < 0.001$), the mean after six months was higher than after one month ($p < 0.001$), and there was no difference between the average after three and six months ($p = 0.663$). The residuals analysis indicated the existence of outliers, but the analysis without these observations led to the same conclusions.

The same conclusions were obtained in the analysis of question 5: the average scores were different in the three periods of use ($p = 0.008$). The average score after three months was higher than after one month ($p = 0.029$), the average score assessed after six months was higher than the scores assessed after one month ($p = 0.012$), and there was no difference between the average scores after three and six months ($p = 0.933$). It can be affirmed that three months of amplification use were sufficient to observe higher scores with the use of hearing aids in questions 1 and 5.

DISCUSSION

Self-assessment questionnaires have been incorporated into routine clinical practice and can be used to evaluate several aspects, such as the satisfaction with hearing aids. In this study the SADL overall average score in the first month (6.3) after hearing aid fitting was higher than that obtained in the study of standardization of the questionnaire (4.3)⁽³⁾.

The fact that the overall results were positive does not necessarily indicate that patients were satisfied. In fact, that might reveal an attitude of humility and gratification for having received the hearing aids without any financial burden and, therefore, patients do not consider themselves worthy of any dissatisfaction⁽¹¹⁾.

The high levels of satisfaction found through questionnaires can be reflecting both the argument difficulty of SUS users (which are usually patients with lower educational level) and the reluctance to express criticism and negative opinions (biases of gratitude) and even fear losing the right to care. However, these limitations are inherent in studies of any area of health that has the intention to investigate the satisfaction of patients with the care provided by SUS and, therefore, should be treated with caution⁽¹²⁾. Other authors also found a high degree of satisfaction in applying the SADL questionnaire in subjects who received hearing aids through concession⁽⁵⁻⁸⁾.

Both the present study and the aforementioned studies used individual interview as a method for data collection. Although the literature indicates that the application form in which the individual responds to questions read by the examiner (face to face) is clinically preferable⁽¹⁰⁾, the lack of privacy may have influenced the validity of some responses.

Some studies reported that the time interval between adaptation and evaluation is one of the variables that seem to influence the results of self-assessment methods. Many concluded that the two week period after the fitting of hearing aids was insufficient to evaluate the results through the SADL⁽¹³⁾. In the current study, the first application of the questionnaire was conducted after a month of use, period also used in other studies^(6-8,14,15).

In general, the results of SADL indicated that the overall score, the positive effects and the negative factors were different when comparing one, three and six months of hearing aids use. In the overall score and the category of positive effects, three months of use was enough to raise the scores that remained stable in the range of six months. However, the category of negative factors only showed an increased score after six months of hearing aids use.

In another study, all indexes computed from the SADL questionnaire (overall score, categories and individual questions) were higher in users adapted for two weeks compared to those adapted for a year. There were differences in the types of positive effects, service and value and negative factors. The authors found that the negative factors (interference from background noise, acoustic feedback and problems using the telephone) apparently take longer to be observed than the positive effects (improved communication and good sound quality). Moreover, they also observed a reduction in the rates over time⁽⁶⁾.

In the present study reductions in rates over time were not observed in any category, however, the first measurement was performed after one month of use. It is believed that one month of use is sufficient for the patient to perceive the interference of background noise, acoustic feedback and problems using the telephone.

The type of instrument used to assess the satisfaction is an important variable to be taken into account, since it may produce different results. In general, studies using the SADL questionnaire emphasized only the degree of user satisfaction and the scores did not correlate with other types of evaluation. However, this did not occur with studies that used the International Outcome Inventory for Hearing Aids (IOI-HA) to assess satisfaction. Another author noted that in the analysis of the IOI-HA questionnaire there was an increase in score of all questions and in the total score of the questionnaire over time. These results showed that older adults showed improvement in performance with the use of hearing aids after six months of use of amplification⁽¹⁶⁾. However, the results of the current study do not corroborate other findings that observed no difference between the average overall score of IOI-HA obtained after the first and third month using hearing aids⁽¹¹⁾.

Questions 1 (“Do your hearing aids help you understand what people who talk more often you say, when compared without the use of hearing aids?”) And 5 (“Do your hearing aids reduce the number of times you have to ask people to repeat what they said?”) were selected to be analyzed separately due to the suspicion that they might be more related with performance improvement of hearing aid users. However, after statistical analysis, it was concluded that such questions need not be analyzed separately and, therefore, must remain with the others that compose the positive effects category. In contrast, questions 9 (“Does the use of the device improve your confidence?”) and 10 (“How natural is the sound you get from your telephone?”) generated inconsistency in assessment after one month and three months of hearing aid use. The contents of both questions, especially question 9, can generate response variability due to other factors (not just related to hearing impairment) that may be associated.

In general, the longitudinal design of the present study was effective to identify improvements in auditory performance of hearing aid users. The sensory deprivation can result in reduced rates of speech recognition^(13,17,18) and, therefore, amplification is essential for neuronal auditory plasticity^(19,20). Longitudinal studies that track the performance over years using different instruments can possibly assist the clinical practice of Speech-Language Pathologists and Audiologists, especially in assisting a better hearing aid fitting.

CONCLUSION

The results obtained from the SADL indicate that the averages of positive factors and the overall result obtained after the third month of use were higher than those obtained after the first month; there is no difference in average between the third and sixth months of use. Furthermore, the means of negative factors obtained in the sixth month of use were higher than those of the first and third months. Questions number nine and ten can lead to a lack of consistency in the average results for the first three months.

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