Self-perceived hearing handicap and hearing sensitivity in nursing home elders

Maria Beatriz Baruzzi1, Alda Christina Lopes de Carvalho Borges2, Miriam Ikeda Ribeiro3, Fabio Nasri4

ABSTRACT

Objectives: To identify hearing sensitivity and self-perceived handicap and their relation. Methods: Schooling, dependence for daily activities and auditory complaints were investigated in 79 nursing home elderly subjects, male and female, aged from 66 to 100 years. All underwent basic hearing evaluation and answered a self-assessment scale (HHIE-S). Results: Mean schooling was of 8.3 years. Thirty-one subjects (39.3%) were classified as independent, 43 (54.4%) as semi-dependent and 5 (6.3%) as dependent. Fifty-eight (73.4%) subjects had complaints concerning their hearing. Only 25.3% demonstrated normal hearing for low and medium frequencies, and 8.9% and 7.6% for high frequencies on the right and left ears, respectively. Hearing loss for low and medium frequencies was mild, while that for high frequencies was moderate. The great majority of subjects (64.8%) did not demonstrate hearing handicap as evaluated by the HHIE-S.

Conclusions: Hearing loss without self-perceived hearing handicap was prevalent in the group and these aspects were highly associated, that is, the worse the hearing sensitivity, more evident the handicap. The development of hearing loss is usually slow and only perceived when affecting the entire frequency range, leading to difficulties in social integration and lack of motivation in maintaining interpersonal relations, strengthening the social barriers and demonstrating the importance of the audiologist in these institutions.

Keywords: Hearing; Hearing loss; Auditory perception; Questionnaires; Aging; Health of institutionalized elderly

INTRODUCTION

Brazil, as several other countries, is going through a process of population aging. Demographic data (IBGE, 2004) point to the social impact of the increased concentration of the population older than 60 years and the influence of the aging process in biological, psychological and social-cultural aspects1.

Biologic aging may cause the loss of autonomy (partial or total) to perform daily activities, becoming one of the main risk factors for institutionalization2-3.

Entering a lengthy stay institution has a major impact on social relations and these individuals face isolation. When there is hearing deprivation, isolation
is enhanced, and the progression of functional changes, of cognitive decline and of depression symptoms may be accelerated.

The reasons for non-compliance of the elderly population on the auditory rehabilitation programs have been widely investigated. Such programs attempt to improve hearing of different sounds and helping these individuals to cope with limitations (hearing disability) in their daily activities, and to minimize the disadvantages (handicap) due to hearing impairment. More investigation on the aspects related to auditory dysfunction in institutionalized elderly subjects is needed.

In Brazil, there are few professionals interested in caring for this specific population. The process of auditory rehabilitation must meet the needs of these individuals and according to the institution, adapting the environment and training the team, family and friends, in order to provide as many subsidies as possible to improve communication.

**OBJECTIVE**

To identify the hearing behavior: hearing sensitivity and self-perceived handicap in a group of institutionalized elderly subjects and to verify the relation between both.

**METHODS**

The project for this study was analyzed by the Ethics Committee of Universidade Federal de São Paulo and of Instituto de Ensino e Pesquisa da Sociedade Beneficente Israelita Brasileira Hospital Albert Einstein and approved under process number 0054/06 and 05/371, respectively.

Residencial Israelita Albert Einstein is a lengthy stay institution for the elderly cared by a multiprofessional team. Periodically, as from admission, the elderly subjects undergo thorough gerontologic assessment and are classified according to the degree of independence to perform activities of daily life into three different groups: independent, semi-dependent and dependent.

Seventy-nine institutionalized subjects took part in the present study, with the following inclusion criteria: minimum age of 60 years, absence of cognitive impairment that could limit the performance of the proposed tasks; voluntary agreement to participate in this study and signing the informed consent form.

The sample was composed by individuals aged from 66 to 100 years, 62 females with a mean age of 85.13 years (± 6.28) and 17 males with mean age of 82.76 (± 6.69) years.

Data about age, schooling and degree of independence to perform daily life activities were obtained from the medical charts available at the institution. Complaints about hearing of each individual were also studied and all data were recorded in an investigation protocol.

First, a self-assessment questionnaire was applied, The Hearing Handicap Inventory for the Elderly – Screening Version (HHIE-S), adapted for the Portuguese language. There are three possible answers to the questionnaire: yes (corresponds to four points), sometimes (two points) and no (no point); with the following categorization: severe or significant perceived handicap – above 24 points; mild to moderate handicap – 10 to 24 points; no perceived handicap – 0 to 8 points.

Next, they underwent laminar tonal audiometry, air audibility thresholds with headphones, in the 250 to 8,000 Hz frequencies, and bone with 500 to 4,000 Hz bone vibrator when necessary. An acoustic booth, a MA41 MAICO audiometer with TDH-39 headphones, properly verified, were used.

The degree of hearing sensitivity based on the mean hearing thresholds at 500, 1,000 and 2,000 Hz frequencies and the magnitude of hearing impairment based on the 3,000 and 4,000 Hz frequencies were categorized as:
- normal: below 25 dBNA;
- mild: 26 to 40 dBNA;
- moderate: 41 to 55 dBNA;
- moderately severe: 56 to 70 dBNA;
- severe: 71 to 90 dBNA;
- profound: above 90 dBNA.

The statistical analysis of the present study involved descriptive statistics of the categorical variables with absolute frequency (n) and proportion (%), and of continuous variables with means, standard deviations, minimum and maximum values, medians and quartiles.

In order to compare the degree of hearing sensitivity and self-perceived hearing, the Fischer exact test was used (expected values lower than five), and the comparison of different degrees of hearing sensitivity between the right and left ears was done with the Bowker symmetry test, for related samples for variables with three or more categories, and the McNemar test for related samples for variables with two categories.

The statistical analysis of the present study was descriptive and analytical and used non-parametric tests. The significance level adopted was 5% and the confidence intervals applied during the study were determined with 95% statistic confidence.

**RESULTS**

There was a high incidence of females in the population studied (78.48%) and the age ranged from 66 to 100 years. Comparison between ages, according to gender,
demonstrated that females had a mean age of 85.13 (± 6.28) years higher than males, of 82.78 (± 6.69) years.

The degree of dependence for daily life activities most frequent was semi-dependent, encompassing 43 (54.43%) of the individuals studied, 31 (39.24%) independent and 5 (6.33%) dependent elderly individuals. Mean schooling was of 8.63 (± 4.31) years, ranging from 0 to 18 years.

The most frequent hearing complaint was difficulty in hearing, present in 43 (54.4%) individuals, significantly different from other complaints (p < 0.001): dizziness (30.4%), tinnitus (22.8%), auditory discomfort (6.3%) and history of ear problems (5.1%). Only 21 (26.6%) individuals had no complaints regarding hearing.

Table 1 shows a significant predominance of mild involvement in both sides (36.71%), compared to the remaining hearing sensitivity degrees, and only 20 (25.30%) individuals had a normal hearing sensitivity in both sides at low and medium frequencies (Figure 1).

Regarding high frequencies, 8.9% and 7.6% of the subjects had normal sensitivity at the right and left ears, respectively; there was a predominance of moderate degree (35.4% at the right and 32.9% at the left). Tables 1 and 2 show the comparison between both ears, with no significant difference between them. There was a close relation between increased hearing sensitivity and aging.

Regarding self-perceived hearing handicap, 64.6% (51 individuals) had no perception, 20.3% had mild to moderate perception and 15.2% had severe or significant perception of the handicap (Figure 2). The HHIE-S results were related to the age group, presence of hearing complaints and degree

<table>
<thead>
<tr>
<th>Hearing sensitivity degree</th>
<th>Normal n(%)</th>
<th>Mild n(%)</th>
<th>Moderate n(%)</th>
<th>Moderately severe n(%)</th>
<th>Severe n(%)</th>
<th>Profound n(%)</th>
<th>Total n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>19 (24.05)</td>
<td>1 (1.27)</td>
<td>0 (0.00)</td>
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<td>0 (0.00)</td>
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<tr>
<td>Mild</td>
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<td>23 (29.11)</td>
<td>5 (6.30)</td>
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<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>29 (36.71)</td>
</tr>
<tr>
<td>Moderate</td>
<td>0 (0.00)</td>
<td>4 (5.06)</td>
<td>7 (8.66)</td>
<td>1 (1.27)</td>
<td>0 (0.00)</td>
<td>2 (2.53)</td>
<td>14 (17.72)</td>
</tr>
<tr>
<td>Moderately severe</td>
<td>0 (0.00)</td>
<td>1 (1.27)</td>
<td>3 (3.80)</td>
<td>5 (6.33)</td>
<td>2 (2.53)</td>
<td>0 (0.00)</td>
<td>11 (13.92)</td>
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<tr>
<td>Severe</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>2 (2.53)</td>
<td>0 (0.00)</td>
<td>2 (2.53)</td>
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<tr>
<td>Profound</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>1 (1.27)</td>
<td>0 (0.00)</td>
<td>2 (2.53)</td>
<td>3 (3.80)</td>
</tr>
<tr>
<td>Total n(%)</td>
<td>20 (25.32)</td>
<td>29 (36.71)</td>
<td>15 (18.99)</td>
<td>7 (8.86)</td>
<td>4 (5.06)</td>
<td>4 (5.06)</td>
<td>79 (100.00)</td>
</tr>
</tbody>
</table>

Bowker test for symmetry: S = 7.11; FD = 15; p = 0.955

Table 2. Comparing hearing sensitivity degree between the left and right ears at high frequencies

<table>
<thead>
<tr>
<th>Hearing sensitivity degree</th>
<th>Normal n(%)</th>
<th>Mild n(%)</th>
<th>Moderate n(%)</th>
<th>Moderately severe n(%)</th>
<th>Severe n(%)</th>
<th>Profound n(%)</th>
<th>Total n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>5 (6.33)</td>
<td>2 (2.53)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>7 (8.86)</td>
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<tr>
<td>Mild</td>
<td>1 (1.27)</td>
<td>10 (12.66)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
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<td>11 (13.92)</td>
</tr>
<tr>
<td>Moderate</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>21 (26.58)</td>
<td>6 (7.59)</td>
<td>0 (0.00)</td>
<td>1 (1.27)</td>
<td>28 (35.44)</td>
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<tr>
<td>Moderately severe</td>
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<td>0 (0.00)</td>
<td>4 (5.06)</td>
<td>13 (16.46)</td>
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<td>0 (0.00)</td>
<td>1 (1.27)</td>
<td>2 (2.53)</td>
<td>6 (7.59)</td>
<td>0 (0.00)</td>
<td>9 (11.39)</td>
</tr>
<tr>
<td>Profound</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>3 (3.80)</td>
<td>2 (2.53)</td>
<td>5 (6.33)</td>
</tr>
<tr>
<td>Total n(%)</td>
<td>6 (7.59)</td>
<td>12 (15.19)</td>
<td>26 (32.91)</td>
<td>21 (26.58)</td>
<td>11 (13.92)</td>
<td>3 (3.80)</td>
<td>79 (100.00)</td>
</tr>
</tbody>
</table>

Bowker test for symmetry: S = 5.72; FD = 15; p = 0.984
of hearing sensitivity. Older age was associated with a higher degree of hearing loss and a significant perception of age for low, medium and high frequencies.

Although the analyses performed point toward a close relation between the degree of hearing sensitivity and self-perceived hearing handicap, it can be observed that even individuals with severe and profound hearing loss did not show self-perceived hearing handicap for low, medium, and high frequencies (Tables 3 and 4).

DISCUSSION
The predominance of females in the population studied, although higher than what is found in the Brazilian population, in which women represent 55.1% (14), is probably due to the increased longevity of this sex worldwide and in Brazil, and to the fact that older age is considered one of the risk factors for institutionalization (15).

Mean schooling years found point to low level of schooling, considered a risk factor for cognitive decline and for a lower degree of independence for daily life activities, because the individuals with higher schooling show a greater interest in keeping general health and have more access to specialized care (14).

The need for care and help to perform daily life activities associated to poor family support are determining factors for institutionalization (15), and thus may justify the predominance of semi-dependent elderly individuals.

The relation between schooling and the degree of independence found in the literature was not observed, probably due to the fact that this group is made up of individuals of high cultural level, demonstrated by knowledge of two or more languages, great interest in music, painting and, especially, reading; such findings may have influenced positively the preservation of functional capacity.

Hearing disability affects not only sound audibility, speech recognition, but also integration between hearing and other sensory modalities. Sensory losses in the elderly are often accompanied by difficulty in performing daily life activities, and may exert a damaging influence in the self-perceived general health status, in quality of life and maintenance of social relations (16-17). The prevalence of hearing impairment in

<table>
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<tr>
<th>Table 3. Comparing hearing sensitivity degree and self-perception (left and right ears) at low and medium frequencies*</th>
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<tbody>
<tr>
<td>HHI-E-S</td>
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<tr>
<td></td>
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<tr>
<td>No perception</td>
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<tr>
<td>Mild to moderate</td>
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<tr>
<td>Significant</td>
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<tr>
<td>Total</td>
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</table>

Fisher’s exact test: p< 0.001
*The sample number corresponds to the number of ears according to the different degrees of hearing sensitivity.

<table>
<thead>
<tr>
<th>Table 4. Comparing hearing sensitivity degree and self-perception (left and right ears) at high frequencies*</th>
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</thead>
<tbody>
<tr>
<td>HHI-E-S</td>
</tr>
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<td>---------</td>
</tr>
<tr>
<td></td>
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<tr>
<td>No perception</td>
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<tr>
<td>Mild to moderate</td>
</tr>
<tr>
<td>Significant</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Fisher’s exact test: p=0.006
*The sample number corresponds to the number of ears according to the different degrees of hearing sensitivity.
the institutionalized population is even greater than in the remaining one, probably because it is made up of older individuals\(^{5,16}\).

Presbycusis is slow and progressive, and often causes hearing impairment to be perceived only at higher degrees of involvement\(^{18}\).

Inquiring about complaints regarding hearing allows identifying some individuals who do not have hearing difficulty, but other symptoms which accompany or precede hearing impairment, such as: tinnitus, dizziness, hearing discomfort, among others.

Hearing assessment performed in lengthy stay institutions is not a frequent practice and the lack of resources and professionals interested in working in these institutions are some of the obstacles found\(^{6,7,19}\). The mere investigation about the presence of hearing difficulty has been shown as an efficacious tool for screening elderly people with hearing deficit, which represents the most frequent complaint of the population studied\(^{120}\).

By analyzing the degree of hearing sensitivity for low, medium and high frequencies, a low incidence of individuals with normal hearing was observed, as well as greater severity of involvement of high frequency in both sides, with no significant difference between them, in accordance with some studies\(^{16,20}\). The loss of hearing sensitivity was mild for low frequencies and moderate for medium and high frequencies\(^{17}\). A close relation between worsening of hearing sensitivity and increasing age was also observed\(^{14,21-22}\).

The variability found in literature about the incidence of hearing impairment in the elderly population is justified by different classifications employed. The difference between hearing sensitivity in the low and medium frequencies, when compared to the high ones, demonstrate the importance of using broader classifications, which take into account the levels of hearing sensitivity at high frequencies.

The higher involvement of high frequencies (decreasing audiometric configuration) impair the perception of consonant sounds, hindering speech understanding in noisy environments, which often causes decontextualized responses and injures social relationships\(^{23}\).

Adjusting to hearing impairment is a unique process, since individuals with the same type and degree of hearing impairment may show different communication performance, in which behavioral and cognitive changes are made in order to minimize the resulting problems. Hearing assessment, therefore, should encompass the different relations between hearing impairment and disability, by means of self-assessment questionnaires.

Institutionalization has been an option considered for the elderly with functional disabilities, however, this is an excluding model that has deep impact in the quality of life of the individual\(^{24}\).

Isolation and loss of interest in interpersonal relationships observed in the group of institutionalized elderly may, on the other hand, interfere in the self-assessment of hearing handicap, in addition to, of course, the stigma of old age, which causes these individuals in tending to deny the presence of hearing impairment and even at an early phase, to refuse undergoing an assessment and the process of hearing rehabilitation\(^{25}\).

The self-assessment questionnaires are very useful to design the rehabilitation program, because sound amplification, besides reducing the loss of hearing sensitivity, would restore and expand social integration of the individual, by reducing psychosocial and emotional disadvantage, intervening in the hearing handicap and providing facilitating strategies in different communication situations\(^{16-27}\).

The HHIE-S was chosen because it is an instrument of quick and easy application, well-accepted by the elderly. When investigating the self-perceived hearing handicap, it was observed that most of the individuals studied did not perceive the handicap, which was significantly different from other results.

An alarming finding in the present study was the high rate of hearing involvement of individuals with no perception of hearing handicap; this may be associated with the lack of interest in social relations that occur in institutions and that should be taken into account in their process of rehabilitation.

There was a close relation between the degree of hearing impairment and the perception of hearing handicap, which agrees with the literature reviewed\(^{18}\). For high frequencies, this relation is stronger than for normal and mild degree. The high proportion of individuals with no perception of handicap can be explained, when only the high frequencies are affected with less impact in handicap.

The highly variable responses, when comparing these two assessments; for instance, individuals with severe loss of hearing sensitivity and no perception of handicap and those individuals with different degrees of sensitivity and different levels of perception of handicap, justify the need for studying all sorts of hearing behavior in this group.

Considering all specific characteristics of this group of individuals, speech therapy and audiology care, inserted within a specialized team in gerontology in lengthy stay institutions for the elderly becomes essential for social integration and maintenance of quality of life.

**CONCLUSIONS**

The most frequent degree of loss of hearing sensitivity was mild for low and medium frequencies and moderate...
for high frequency. There was a high incidence of hearing impairment in this population for low, medium and high frequencies and the complaints regarding hearing occur in 73.4% of subjects studied, with hearing difficulty being the most frequent. Self-perceived handicap was significantly associated with the presence of complaint, especially with difficulty hearing and worsening of hearing sensitivity, but not to the remaining variables; most of the individuals assessed did not have self-perceived handicap. There was a significant association between self-perceived handicap, worsening of hearing sensitivity, and to age.

REFERENCES


2. Leemrijse CJ, de Boer ME, van den Ende CH, Ribbe MW, Dekker J. Factors associated with physiotherapy provision in a population of elderly nursing home residents; a cross sectional study. BMC Geriatr. 2007;7;7.


