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Association of cognitive status, anxiety and depression with hearing loss in the elderly

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Abstract

Association of cognitive status, anxiety and depression with hearing loss in the elderly

Objective: Hearing loss is an important problem that is common among older people. Dementia can be defined as a group of disorders that adversely affect memory, thinking function and the ability to perform daily activities. Hearing loss leads to poor quality of life due to loneliness, social isolation, anxiety and susceptibility to depression. Hearing aids are the primary tool used in the management of hearing loss. In this study, we aimed to compare participants with and without hearing loss in terms of cognitive status, depression and anxiety, and to assess the effect of hearing aid use on this process.
Method: Between June 2023 and June 2024, 608 patients over the age of 50 who registered at the psychiatric outpatient clinic of Hatay Training and Research Hospital were included in the study. Participants were enrolled if they presented to the Psychiatry outpatient clinic during the selected time interval, were over 50 years of age and agreed to participate in the study. Participants' demographic information, educational status, social information, hearing aid use, minimental score, Beck anxiety score, and geriatric depression score were recorded.
Results: When comparing patients with and without hearing loss, statistically significant differences were observed on the Minimental Test, Beck Anxiety Score and Geriatric Depression Score.
Conclusion: In this study, a statistically significant relationship was found between hearing loss and cognitive status, depression and anxiety, and it was suggested that the use of hearing aids may be beneficial in terms of preventing the development or slowing the progression of these pathologies.
Keywords: Anxiety, Depression, Hearing loss, Hearing aid, Dementia

INTRODUCTION

Hearing loss is an important problem that is common among older people. According to the World Health Organization, more than 42% of people over the age of 60 have some degree of hearing loss (1). Dementia is a group of disorders that affect memory, thinking and the ability to carry out daily activities. It is common in older people and, according to the World Health Organization, 55.2 million people worldwide have dementia [2]. The global social cost of this condition is estimated to be approximately $1.3 trillion (2).

Hearing aids are the primary tool used in the management of hearing loss. The World Health Organization recommends the use of hearing aids when needed for mild hearing loss, with increasing levels of recommendation for moderate, severe and profound hearing loss (3). The rate of use of this tool, particularly in the hearing rehabilitation of the elderly, varies from one society to another. While in the USA the rate is 22% over the age of 80 (4), in Germany it is about 25% (5), in Denmark about 50% and in Japan about 15% (6).

Several studies have reported that hearing loss and depression are risk factors for dementia or cognitive impairment (7,8). Hearing loss leads to poor quality of life due to loneliness, social isolation, anxiety and susceptibility to depression (9). There are also several studies on the contribution of hearing aids to maintaining or slowing

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down cognitive functions (8-10). Although hearing loss has a negative effect on cognitive functions, poor rehabilitation of hearing loss may lead to depression and cognitive impairment in elderly patients. In this study, we aimed to compare participants with and without hearing loss in terms of cognitive status, depression and anxiety, and to assess the effect of hearing aid use on this process. We hypothesised that hearing loss would lead to depression, anxiety and worsening of cognitive status.

METHOD

Between June 2023 and June 2024, 608 patients over the age of 50 who registered at the psychiatric outpatient clinic of Hatay Training and Research Hospital were included in the study. Participants were enrolled if they presented to the Psychiatry outpatient clinic during the selected time interval, were over 50 years of age and agreed to participate in the study. Participants' demographic information, educational status, social information, hearing aid use, minimental score, Beck anxiety score, and geriatric depression score were recorded. Audiometric findings were recorded by an audiometry technician using a diagnostic audiometer. In the hearing assessment, findings above the range of 0-25 dB were considered as hearing loss with reference to World Health Organization data. This study was approved by Hatay Mustafa Kemal University Ethics Committee under number 11.06.2024/01. All study participants gave informed consent.

Statistical analysis was performed using SPSS version 22.0. The data are expressed as the mean ± standard deviation (SD). Pearson's correlation coefficient was used to test the strength of the relationship between variables. Student's t-test was used to determine statistical significance between groups. For proportional correlations, the chi-squared test was used. P-values below 0.05 were considered significant.

RESULTS

The demographic information of the participants is shown in Table 1. When analyzing the educational status of the participants, 25.3% were illiterate, 74.7% were literate and had completed at least primary school. While 16.3% of the participants lived alone, 83.7% lived with family or someone else. Participants with hearing loss represented 25% of the total.

In Table 2, the participants with hearing loss are assessed within themselves. 21.9% of the participants used hearing aids. The participants with hearing loss were divided into two groups, hearing aid users and non-users. When these two groups were compared in terms of socio-demographic data, minimental test score, Beck anxiety score and geriatric depression score, no statistically significant value was found.

Table 1. Demographic characteristics of patients

Patient characteristics	Median [Range or number (%)]
Age	68 (54-88)
Gender	
Male	216 (35%)
Female	392 (65%)
Education level	
Illiterate	154 (25.3%)
Literate and primary school graduate	335 (55.1%)
Secondary school and above	119 (19.6%)
Marital status	
Married	427 (70.2%)
Widowed or Divorced or single	181 (29.8%)
Cohabitant	
Alone	99 (16.3%)
Spouse and or child or carer	509 (83.7%)
Those with hearing loss	151 (25%)
Hearing aid use	
One sided	29 (5%)
Doble sided	4 (1%)

In Table 3, individuals who used hearing aids were assessed within themselves. While 69.7% of the

participants used hearing aids regularly, the other participants did not use hearing aids regularly. 88% of the participants used unilateral hearing aids, 12% used bilateral hearing aids and 85% of the participants found hearing aids useful.

In Table 4, participants with and without hearing loss are compared in terms of demographic characteristics and test results. A significant relationship was observed between the groups in terms of age and gender. Minimal test score, Beck Anxiety Score and Geriatric Depression Score showed statistically significant results between the groups.

In Table 5, all participants were evaluated in terms of Minimental test score, Beck anxiety score and Geriatric depression score. All parameters were found to be significantly related to the Beck Depression Score. Educational status, presence of hearing loss and hearing aid use were found

Table 2. Assessing patients with hearing loss according to device usage status

Patients with hearing loss	Hearing aid users	No hearing aids	p-value
Number of patients (%)	33 (21,9%)	118 (78,1%)	
Age	73 (60-81)	71 (56-88)	0.497
Gender Male Female	 14 (42%) 19 (58%)	 51 (43%) 67 (57%)	0.898
Marital status Married Widowed or Divorced or single	 17 (51.5%) 16 (48.5%)	 80 (67.8%) 38 (32.2%)	0.102
Cohabitant Alone Spouse and or child or carer	 9 (27.3%) 24 (72.7%)	 19 (16.1%) 99 (83.9%)	0.203
Education level Illiterate Literate and primary school graduate Secondary school and above	 8 (24.2%) 20 (60.6%) 5 (15.2%)	 39 (33.1%) 63 (53.4%) 16 (13.6%)	0.62
Co-morbidity Yes No	 29 (87.9%) 4 (12.1%)	 97 (82.2%) 21 (17.8%)	0.59
Minimental Test Score (median; range)	25.5 (12-30)	25 (15-30)	0.444
Beck Anxiety Score	5 (0-19)	6 (0-18)	0.200
Geriatric Depression Score	4 (0-14)	4 (1-15)	0.680

to be significantly associated with Minimental test score. Educational status, marital status, cohabitation and presence of hearing loss were found to be significantly associated with the Geriatric Depression Score.

DISCUSSION

Hearing loss can occur at any age. It causes a reduction in social communication, an inability to understand what is happening in the environment, an inability to hear the sounds in the immediate environment, a reduction in functional capacity and ultimately a serious reduction in quality of life. It can adversely affect mental health and cognitive abilities, leading to reduced attention and concentration. When this situation is seen in older people in particular, when cognitive function begins to decline, and if adequate measures are not taken, the decline in quality of life and functional capacity can be even more shocking. There are many studies in the literature on the psychosocial impact of hearing loss. Kim S.A. et al. found that audiometric hearing loss leads to increased and worsened neuropsychiatric symptoms and worsened depressive symptoms (11). However, all of these signs and symptoms are observed to be less frequent and less severe in hearing aid users [11]. In a study by Livingstone et al, hearing loss was reported to be the most important modifiable risk factor for dementia, with a 9% risk reduction if corrected [8]. In this study, a statistically significant difference was observed when comparing the minimental test scores of participants with and without hearing loss (Table 4). The minimental test score was significantly lower in participants with hearing loss, which is consistent with the literature.

Hearing loss has long been linked to depression. Studies have shown that hearing loss can cause or aggravate depression. Han et al concluded in their study that hearing loss is associated with significantly higher depression and that this condition is more severe in patients with visual loss in addition to hearing loss (12). Brewster et al concluded that age-related hearing loss in elderly patients was associated with increased depressive symptoms after 5 years of follow-up (13). In this study, geriatric depression scores were higher in participants with hearing loss than in participants without hearing loss (Table 4). When the two groups were compared in terms of geriatric depression scores, statistically significant results were obtained (p=0.003).

There are several studies in the literature on the relationship between hearing loss and anxiety. Contrera et al. showed in their study of 1732 elderly patients that the likelihood of anxiety was higher in those with mild hearing loss compared to those without hearing loss [14]. This likelihood increased as hearing loss worsened and it was reported that hearing aid use was not significantly associated with reduced anxiety (14). Zhang et al. investigated the relationship between degree of hearing loss and anxiety and depression in patients with tinnitus in a study of 600 patients. They found a strong positive correlation between the degree of hearing loss and anxiety and depression in these patients (15). Chung et al. found that the rate of previous anxiety disorder was significantly higher in patients with sudden sensorineural hearing loss than in controls without sudden sensorineural hearing loss (16). In this study, the Beck anxiety scores were significantly higher in the group of participants with hearing loss than in the group without hearing loss (Table 4). In line with the literature, we believe that there is a significant relationship between the presence of hearing loss and anxiety.

Hearing aids are an important tool in the management of hearing loss. It is considered the main clinical intervention option, especially for patients with mild to moderate hearing loss. The main purpose of using the device is to reduce the negative consequences of hearing loss and to increase the patient's participation in daily life by facilitating and

Table 3. Demographic information and device satisfaction of hearing aid users

Hearing Aid Users	Median [Range or Number (%)]
Age	73.5 (60-81)
Gender	
Male	14 (42.4%)
Female	19 (57.6%)
Does he or she use his hearing aid every day?	
Yes	23 (69.7%)
No, it sizzles	6 (18.2%)
No, I'm losing	3 (9.1%)
No, I don't like the way it looks.	1 (3%)
Single-sided use	29 (88%)
Double-sided use	4 (12%)
Does he or she find hearing aids useful?	
Yes	28 (85%)
No	5 (15%)

improving access to speech sounds (17). Given that hearing loss is one of the modifiable risk factors for dementia, the importance of hearing aid use is better understood. Cantuaria et al. reported that hearing loss is associated with an increased risk of dementia, especially in those who do not use hearing aids, suggesting that hearing aids delay or prevent the onset or progression of dementia (18). In this study, 25% of participants had hearing loss. Of these, 21.9% used hearing aids. There are no clear data in the literature on the rate of device use in Turkey. Considering the different rates of hearing aid use in countries around the world, the rate in this study may give an idea of the rate of use in Turkey. There are several reasons for low device use among patients with hearing loss. In this study, 18.2% of the participants who used the device reported that the device made noise, 9.1% reported that they lost the device and 3% reported that they did not like its appearance. In their study. Kahveci et al reported that 56% of patients were dissatisfied with the device because of noise (19). It is important to improve the dissatisfaction-causing features of hearing aids, which are the main clinical intervention tool for patients with hearing loss, especially with regard to the health of elderly patients.

Limitations of the study

This study has several strengths and limitations. There is no study in the literature that examines the association between hearing loss and dementia, anxiety and depression and evaluates the effect of device use in a single study. The limitation of the study population can be considered a limitation. Statistically stronger data could have been obtained with a larger population. The assessment tools, especially the Beck Anxiety Scale and the Geriatric Depression Scale, are self-administered scales. Although the study team helped the participants with this, the doctor-assessed scales for older participants could have been more efficient and comprehensive.

Table 4. Comparison of patients with and without hearing loss

	Hearing loss	No hearing loss	p-value
Number of patients (%)	151	457	
Age	71 (56-88)	67 (54-86)	<0.001*
Gender			
Male	65 (43%)	151 (33%)	0.031*
Female	86 (57%)	306 (67%)	
Minimental Test Score (median; range)	25 (12-30)	26 (0-30)	0.001*
Beck Anxiety Score	5 (0-19)	4 (0-19)	0.010*
Geriatric Depression Score	4 (0-15)	3 (0-15)	0.003*

CONCLUSION

Hearing loss, especially in the elderly, reduces quality of life and contributes negatively to the development of various pathologies. In this study, a statistically significant relationship was found between hearing loss and cognitive status, depression and anxiety, and it was suggested that the use of hearing aids may be beneficial in terms of preventing the development or slowing the progression of these pathologies. It is believed that further studies with a larger population will be useful in clarifying this issue.

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Peer-Review

Both externally and internally peer reviewed.

Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article.

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Ethical Declaration

Ethical permission was obtained from the Hatay Mustafa Kemal University Non-Interventional Clinical Researches Ethics Committee for this study with date 11/06/2024 and number 11/06/2024/01, and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

Concept: MİG, Design: MİG, CA, Supervising: MİG, Financing and equipment: MİG, CA, Data collection and entry: MİG, CA, Analysis and interpretation: MİG, Literature search: MİG, Writing: MİG, Critical review: MİG, CA.

Table 5. Scale rating of all study patients

	Minimental Test Score (median; range)	Beck Anxiety Skoru	Geriatric Depression Score
Education level			
Illiterate	24 (12-30)	5 (0-19)	6 (0-14)
Literate and primary school graduate	26 (0-30)	4 (0-19)	3 (0-14)
Secondary school and above	28 (1-30)	3 (0-19)	2 (0-15)
P value	**0.001**	**0.001**	**0.001**
Marital status			
Married	26 (0-30)	4 (0-19)	3 (0-13)
Widowed or Divorced or single	25 (12-30)	5 (0-19)	6 (0-15)
P value	0.11	**0.041**	**0.001**
Cohabitant			
Alone	25 (12-30)	5 (0-19)	7 (0-14)
Spouse and or child or carer	26 (0-30)	4 (0-19)	3 (0-15)
P value	0.108	**0.02**	**0.001**
Hearing aid use			
Yes	25 (15-30)	6 (0-18)	4 (1-13)
No	26 (0-30)	4 (0-19)	4 (0-15)
P value	**0.035**	**0.032**	0.125
Hearing loss			
Yes	25 (12-30)	5 (0-19)	4 (0-15)
No	26 (0-30)	4 (0-19)	3 (0-15)
P value	**0.001**	**0.010**	**0.003**

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