

Original Article

Quality of Life Improvement in Hearing-Impaired Elderly People after Wearing a Hearing Aid

Yones Lotfi MD^{*}, Saeideh Mehrkian MSc^{**}, Abdollah Moossavi MD^{***},
Soghrat Faghieh-Zadeh PhD[†]

Background: Communication is an important aspect of everyday life especially for elderly people. Hearing loss can impair the exchange of information and therefore reduces the quality of life. The purpose of this study was to investigate the quality of life in elderly people who are hard of hearing after wearing a hearing aid.

Methods: Hearing-impaired old people who referred to the rehabilitation centers of Tehran Welfare Organization for having a hearing aid completed the Hearing Handicap Inventory for the Elderly questionnaire before and three months after using a hearing aid. Scores of the effects of hearing loss on quality of life were compared for each subject and between males and females.

Results: The results showed a significant improvement of the quality of life after three months of using a hearing aid in all participants and betterment of their most important problems i.e., the communication and exchange of information.

Conclusion: In conclusion, with respect to the beneficial effects of hearing aids in presbycusis and due to the significant improvement in the quality of life, hearing aids are recommended for this group of population.

Archives of Iranian Medicine, Volume 12, Number 4, 2009: 365 – 370.

Keywords: Elderly • hearing aid • hearing loss • Hearing Handicap Inventory for the Elderly (HHIE) • quality of life

Introduction

Hearing is one of the most desirous divine gifts for humans. Hearing is the basis of language development. Growth and development of our knowledge and thoughts depend on hearing. Language and speech are the only natural methods for communication. Aging can cause presbycusis, so communication may become compromised.

The population of elderly people and therefore presbycusis is increasing worldwide due to impro-

vements in public health conditions, and control of new birth and infectious diseases. Therefore, attention to their health has become a part of governmental policies.

In this century, hearing loss is becoming one of the most prevalent chronic diseases in the elderly as in the USA; hearing loss is the third most prevalent chronic disease in the elderly.¹ WHO has anticipated an increase in the number of elderly people in the world. In Poland, for example, the elderly people constituted 15.32% of the population in 2005 while the expected figure would be 16% in 2020.²

The prevalence of presbycusis is not the same in different parts of the world. The prevalence of sensorineural hearing loss in the Egyptian elderly (>65 years) is reported to be 44.3%³ while in Taiwan, its prevalence is reported to be 1.7% between 65 and 69; 3.2% in 70 to 74; 7.5% between 75 and 79; and 14.9% in those who are 80 years old or more.⁴

Authors' affiliations: *Department of Otolaryngology, University of Social Welfare and Rehabilitation Sciences, **Department of Audiology, Tehran Welfare Organization, ***Department of Audiology, Iran University of Medical Sciences, †Department of Biostatistics, Tarbiat Modarres University, Tehran, Iran.

Corresponding author and reprints: Yunes Lotfi MD, Department of Otolaryngology, University of Social Welfare and Rehabilitation Sciences, Kudakyar St., Daneshjoo Blvd., Evin, Tehran 195713831, Iran.

Telefax: +98-212-218-0066

E-mail: lotfigharablagh@yahoo.com

Accepted for publication: 8 April 2009

In addition to presbycusis, old people, like others, may suffer from conductive hearing loss or a combination of conductive and sensorineural hearing loss called a "mixed hearing loss". Since presbycusis is a sensorineural type of hearing loss which cannot be medically or surgically treated, the only appropriate help is to amplify sounds through a hearing aid.

The benefits and satisfaction from using a hearing aid among hearing-impaired elderly people have been studied in different countries. According to Cox et al., 23% of hearing-impaired elderly people actually seek and use hearing aids.⁵ The effect of different types of hearing aids on the quality of life of the hearing-impaired elderly people has been investigated and some results show that programmable hearing aids have positive and efficient effects on hearing and the quality of life of the hearing-impaired elderly peoples.⁶

Hearing loss can cause loneliness, decrease of social activities, and communication disorders; therefore, it is difficult to manage them in elderly houses. Using a hearing aid and returning them to an ordinary lifestyle is cost-effective according to Manula's report.⁷

In another study, Chao and Chen concluded that for the hearing-impaired elderly people, use of hearing aids was a cost-effective strategy for rehabilitation.⁸

To assess whether hearing aids improve the quality of life of Iranian elderly people with a hearing loss, we studied the effect of using a hearing aid in the hearing-impaired elderly people who referred to the rehabilitation centers of Tehran Welfare Organization (Molavi and Shemiranat) for having a hearing aid.

Patients and Methods

The participants in this research were elderly hearing-impaired people who referred to hearing rehabilitation centers of Tehran Welfare Organization from May 2005 through June 2007 with a complaint about hearing loss.

After a complete ENT examination and ruling out all causes but presbycusis, all patients were examined by an audiologist and pure tone audiometry, tympanometry, speech reception threshold, and speech detection threshold tests were carried out for all of them.

None of the subjects had used a hearing aid before. In this study, we recommended a hearing

aid for those whose average hearing loss was more than 40 dB hearing loss in frequencies: 0.5, 1, 2, and 4 KHz in the better ear.

An informed consent was obtained from each participant in this research and Medical Ethics Committee of the university approved the study.

All of the participants were over the age of 60, all were otherwise healthy and were counseled by the same audiologist, and all were provided with similar hearing aids and most of them had a moderate to severe sensorineural hearing loss.

The patients were asked to complete the Hearing Handicap Inventory for the Elderly (HHIE) questionnaire to determine the severity of the perceived hearing loss and specific communication problems and quality of life. HHIE consists of a series of 25 standardized questions developed to assess hearing loss and quality of life in elderly individuals. It consists of 13 social or situational items (S) and 12 emotional (E) response items. A response of "yes" is given four points, "sometimes" is given two points, and "no" is given zero points. HHIE scores range from zero to 100. A change of nine scores indicates improvement in the quality of life. The questionnaire was completed before a hearing aid was prescribed and also three months after using the hearing aid and the scores were compared (HHIE Questionnaire, Page 368).

Those who did not complete the informed consent or the questionnaire were excluded from the research. After three months, the score of each questionnaire and each item of it was compared with the prior scores and categorized according to the severity of the hearing loss and the results were then analyzed.

The mean and standard deviation of the frequency distributions of answers were calculated using SPSS software. Statistical significance of differences between the mean scores was tested with Man-Whitney U-test.

The Chi-square test was applied for comparing the severity of hearing loss and the mean scores before and after using a hearing aid.

Results

From 350 primary participants in our study, 207 (59%) completed the questionnaires in two stages while 143 (41%) were excluded from study. One hundred and forty-seven (69.56%) were males and 63 (30.43%) were females with a mean age of

Table 1. Mean score (of HHIE questionnaire) before and after hearing aid use.

HHIE score	Mean score	
	Before hearing aid use	After hearing aid use
Total	(65.88±23.14)	(22.1±28.13)
Female	(67.20 ±20.86)	(27.00±29.70)
Male	(65.33±24.21)	(21.00±29.37)
Social question	Total	(35.41±11.25)
	Female	(36.50±12.19)
	Male	(34.95±10.95)
Emotional question	Total	(30.47±13.04)
	Female	(32.50±12.70)
	Male	(29.62 ±13.22)

73.01 years (SD=8.43). One hundred and seventy-one (82.6%) had a sensorineural hearing loss, 24 had (11.69%) a mixed, and 12 (5.8%) had a conductive hearing loss.

One hundred and ninety-six (95.55%) of them had a moderate to severe (56 – 70dB) sensorineural hearing loss while nine (4.45%) had a profound (71 – 90 dB) hearing loss.

The HHIE questionnaire scores before and after wearing a hearing aid in males and females are listed in Table 1. The results showed that the difference in the quality of life was statistically significant before and three months after using a hearing aid in all subjects ($P<0.000$).

The social, emotional, and total scores of the HHIE questionnaire before and after using a hearing aid were compared between males and females. The results in Table 2 show that there was no significant difference between them ($P>0.05$).

The effect of the severity of the hearing loss before and after using a hearing aid in social and emotional scores in Table 3 showed that the severity of the hearing loss did not have any effects on social and emotional scores ($P>0.05$).

We obtained the average score of each question in all participants before and after using a hearing aid. The maximum average (3.797) before using a hearing aid belonged to the question S8 (Do you have difficulty hearing when someone speaks in a

whisper?) and the minimum average (2.183) belonged to S13 (Does a hearing problem cause you to visit friends, relatives, or neighbors less often than you would like?). After using a hearing aid, the maximum difference between average scores (2.763) was seen in S15 (Does a hearing problem cause you difficulty when listening to TV or radio?) and the minimum difference (0.840) belonged to S13.

Question 21, (Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?), was excluded from analysis because most of the participants (85%) did not answer this question.

Discussion

The effect of using a hearing aid in changing the quality of life of the hearing-impaired elderly people has been investigated in many studies.

Theoretical consideration of communication and social interaction is emphasized by Tesch-Romer⁹ and Antonucci.¹⁰ The effect of an appropriate hearing aid on communicative efficiency¹¹ and quality of life¹² is obvious and for this reason, hearing difficulty may reduce communicative relationships and social and emotional interactions.

The impact of hearing loss on the quality of life

Table 2. Comparing social, emotional, and total scores between males and females before and after use of hearing aid.

Variable		Male	Female	Man-Whitney U-test	P value
		(mean±SD)	(mean±SD)		
Before use of hearing aid	Social	35.0±11.56	36.25±10.23	4369.5	0.674
	Emotional	30.65±13.64	30.16±11.34	4307.5	0.564
	Total	65.65±24.06	66.41±20.45	4479.0	0.886
After use of hearing aid	Social	11.104±13.45	9.61±10.46	4478.5	0.946
	Emotional	11.694±14.23	11.341±12.86	4358.5	0.674
	Total	22.68±22.86	20.603±22.35	4298.0	0.597

has been assessed by Dayana.¹³ Data analyses of this study as measured by the SF-36 and activity of daily life (ADL) show a reduction in the quality of life.

The satisfaction from using hearing aids in adults investigated with reviewing many articles by a task force and the final report says that hearing aids improve adults health-related quality of life.¹⁴

Magni et al.¹⁵ discussed that analog and digital hearing aid users have different levels of satisfaction, but all of them can benefit from a hearing aid.

Vuorialho et al. concluded that the total HHIE

score changed from 28.7 (before wearing a hearing aid) to 12.7 (six months after a hearing aid was fitted).¹⁶ In our study, these scores were 65 before and 22 three months after using a hearing aid. In another study in Brazil, Veras and Mattos concluded that a hearing aid and hearing re-education could enhance the quality of life of the elderly people.¹⁷

Hearing loss in the elderly can reduce ADL and quality of life which were assessed and reported by Nishinaga et al.¹⁸

In our study, (Table 1), the social and emotional scores of HHIE questionnaire changed in males

The Hearing Handicap Inventory for the Elderly (HHIE) questionnaire

Instruction:

The purpose of this scale is to identify the problems your hearing loss may be causing you. Answer YES, SOMETIMES, or NO for each question. Do not skip a question if you avoid a situation because of your hearing problem. If you use a hearing aid, please answer the way you hear without the aid.

		Yes (4)	Some- times (2)	No (0)
S-1	Does a hearing problem cause you to use the phone less often than you would like?	—	—	—
E-2	Does a hearing problem cause you to feel embarrassed when meeting new people?	—	—	—
S-3	Does a hearing problem cause you to avoid groups of people?	—	—	—
E-4	Does a hearing problem make you irritable?	—	—	—
E-5	Does a hearing problem cause you to feel frustrated when talking to members of your family?	—	—	—
S-6	Does a hearing problem cause you difficulty when attending a party?	—	—	—
E-7	Does a hearing problem cause you to feel "stupid" or "dumb"?	—	—	—
S-8	Do you have difficulty hearing when someone speaks in a whisper?	—	—	—
E-9	Do you feel handicapped by a hearing problem?	—	—	—
S-10	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?	—	—	—
S-11	Does a hearing problem cause you to attend religious services less often than you would like?	—	—	—
E-12	Does a hearing problem cause you to be nervous?	—	—	—
S-13	Does a hearing problem cause you to visit friends, relatives, or neighbors less often than you would like?	—	—	—
E-14	Does a hearing problem cause you to have arguments with family members?	—	—	—
S-15	Does a hearing problem cause you difficulty when listening to TV or radio?	—	—	—
S-16	Does a hearing problem cause you to go shopping less often than you would like?	—	—	—
E-17	Does any problem or difficulty with your hearing upset you at all?	—	—	—
E-18	Does a hearing problem cause you to want to be by yourself?	—	—	—
S-19	Does a hearing problem cause you to talk to family members less often than you would like?	—	—	—
E-20	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	—	—	—
S-21	Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	—	—	—
E-22	Does a hearing problem cause you to feel depressed?	—	—	—
S-23	Does a hearing problem cause you to listen to TV or radio less often than you would like?	—	—	—
E-24	Does a hearing problem cause you to feel uncomfortable when talking to friends?	—	—	—
E-25	Does a hearing problem cause you to feel left out when you are with a group of people?	—	—	—
FOR CLINICIAN'S USE ONLY:				
	Total score?			
	Subtotal E:			
	Subtotal S:			

Reprinted by permission from Ventry L, Weinstein B. The Hearing Handicap Inventory for the Elderly: a new tool. *Ear Hear.* 1982; 3: 128 – 134.

Table 3. Comparing social, emotional, and total scores between hearing loss levels and after use of hearing aid.

Hearing loss level		Moderate n=57 PAT (55.1±4.95)	Moderate to severe n=87 PAT (65.19±2.89)	Severe n=60 PAT (73.56±6.56)	Chi-square	df	P value
		Mean rank					
Before use of hearing aid	Social	91.71	101	141.93	4.64	2	0.098
	Emotional	93.28	98.71	116.76	274.5	2	0.072
	Total	92.72	98.76	117.22	5.654	2	0.05
After use of hearing aid	Social	100.86	100.44	105.33	0.284	2	0.868
	Emotional	108.37	102.96	96.26	1.293	2	0.524
	Total	103.66	100.73	102.25	0.089	2	0.957

PAT=pure tone audiometry; df=degree of freedom.

and females before and after using a hearing aid; however, the comparison between the scores of males and females before and after using a hearing aid showed no significant difference ($P>0.05$).

In this study, the highest variation of average scores after using a hearing aid was related to question 15 or listening to TV and radio. This means that the participants had a better hearing after using a hearing aid and could listen to radio or TV which could prevent them from feeling lonely.

The least variation was related to question 13. Perhaps this is related to our Iranian culture i.e., our relationship is not mainly affected by disabilities.

Question 21, about dining out, was also excluded because our participants who referred to Tehran Welfare Organization almost always ate their meals at home and for this reason did not answer that question.

Table 3 shows that the severity of the hearing loss had no significant effects on communication and quality of life in males and females and a hearing aid also had a similar effect on improving the quality of life in both genders.

In conclusion, with respect to the beneficial effects of hearing aids in presbycusis and due to the significant improvement in the quality of life, hearing aids are recommended for this group of population.

Acknowledgment

We offer our thanks to all participants, and Dr. Mahdi Rahgozar, Assistant Professor of Biostatistical Sciences, University of Social

Welfare and Rehabilitation Sciences, Tehran.

References

- 1 Bogardus ST Jr, Yueh B, Shekelle PG. Screening and management of adult hearing loss in primary care: clinical applications. *JAMA*. 2003; **289**: 1986 – 1990.
- 2 Betlejewski S. Age-connected hearing disorders (presbycusis) as a social problem] [in Polish]. *Otolaryngol Pol*. 2006; **60**: 883 – 886.
- 3 Abdel-Hamid O, Khatib OM, Aly A, Morad M, Kamel S. Prevalence and patterns of hearing impairment in Egypt: a national household survey. *East Mediterr Health J*. 2007; **13**: 1170 – 1180.
- 4 Chang HP, Chou P. Presbycusis among older Chinese people in Taipei, Taiwan: a community-based study. *Int J Audiol*. 2007; **46**: 738 – 745.
- 5 Cox RM, Alexander GC, Gray GA. Who wants a hearing aid? Personality profiles of hearing aid seekers. *Ear Hear*. 2005; **26**: 12 – 26.
- 6 Yueh B, Souza PE, McDowell JA, Collins MP, Loovis CF, Hedrick SC, et al. Randomized trial of amplification strategies. *Arch Otolaryngol Head Neck Surg*. 2001; **127**: 1197 – 1204.
- 7 Joore MA, van der Stel H, Peters HJ, Boas GM, Anteunis LJ. The cost-effectiveness of hearing-aid fitting in the Netherlands. *Arch Otolaryngol Head Neck Surg*. 2003; **129**: 297 – 304.
- 8 Chao TK, Chen TH. Cost-effectiveness of hearing aids in the hearing-impaired elderly: a probabilistic approach. *Otol Neurotol*. 2008; **29**: 776 – 783.
- 9 Tesch-Römer C. Psychological effects of hearing aid use in older adults. *J Gerontol B Psychol Sci Soc Sci*. 1997; **52**: P127 – P138.
- 10 Antonucci TC. Social supports and social relationships. In: Binstock RH, George LK, eds. *Handbook of Aging and the Social Sciences*. San Diego: Academic Press, c1990.
- 11 Harless EL, McConnell F. Effects of hearing aid use on self concept in older persons. *J Speech Hear Disord*. 1982; **47**: 305 – 309.
- 12 Mulrow CD, Aguilar C, Endicott JE, Tuley MR, Velez R, Charlip WS, et al. Quality-of-life changes and hearing impairment. A randomized trial. *Ann Intern Med*. 1990;

- 113: 188 – 194.
- 13 Dalton DS, Cruickshanks KJ, Klein BE, Klein R, Wiley TL, Nondahl DM. The impact of hearing loss on quality of life in older adults. *Gerontologist*. 2003; **43**: 661 – 668.
- 14 Chisolm TH, Johnson CE, Danhauer JL, Portz LJ, Abrams HB, Lesner S, et al. A systematic review of health-related quality of life and hearing aids: final report of the American Academy of Audiology Task Force on the Health-Related Quality of Life Benefits of Amplification in Adults. *J Am Acad Audiol*. 2007; **18**: 151 – 183.
- 15 Magni C, Freiburger F, Tonn K. Evaluation of satisfaction measures of analog and digital hearing aid users. *Braz J Otorhinolaryngol*. 2005; **71**: 650 – 657.
- 16 Vuorialho A, Karinen P, Sorri M. Effect of hearing aids on hearing disability and quality of life in the elderly. *Int J Audiol*. 2006; **45**: 400 – 405.
- 17 Veras RP, Mattos LC. Audiology and aging: literature review and current horizons. *Braz J Otorhinolaryngol*. 2007; **73**: 122 – 128.
- 18 Nishinaga M, Chi S, Kazusa Y, Takata J, Doi Y. Geriatric syndrome: slightly reduced visual and hearing impairments reduce activities daily living (ADL) and quality of life (QOL) in the community-dwelling elderly. *Nippon Ronen Igakkai Zasshi*. 2007; **44**: 302 – 324.