



Study of hearing aid effectiveness and patient satisfaction

İşitme cihazlarının etkililiği ve hasta memnuniyeti çalışması

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ABSTRACT

Objectives: This study aims to investigate hearing aid using rate, patient satisfaction rate and achievements in social communication of patients by assessing the hearing thresholds before and after device use in patients who were determined as suitable for hearing aid use.

Patients and Methods: Hundred eighty patients who were admitted to Otolaryngology Clinic of Sakarya University Medical Faculty and approved of hearing aid usage between January 2013 and May 2013 were included in the study. Patients (21 males, 26 females; mean age 61.91±12.82; range 24 to 85 years) were performed free field audiometry with and without the device by the same audiometrist and Turkish version of the International Outcome Inventory for Hearing Aids by the same otolaryngologist.

Results: Of patients, 14.28% did not obtain the hearing aid even though they received a hearing aid approval report. Assessment of the answers of inventory questions revealed that 87% of patients used hearing aid more than four hours a day, 72% benefited significantly from hearing aid, and 64% had no complaint or had few complaints compared to the before-hearing aid period.

Conclusion: Using hearing aid affects daily activities of patients slightly or moderately and increases their communication skills.

Keywords: Hearing aid; hearing loss; personal satisfaction; quality of life.

ÖZ

Amaç: Bu çalışmada işitme cihazı kullanımı için uygun olduğu tespit edilen hastalarda cihaz kullanımı öncesi ve sonrası işitme eşikleri değerlendirilerek hastaların işitme cihazı kullanımı oranı, memnuniyet oranı ve sosyal iletişimdeki ilerlemeleri araştırıldı.

Hastalar ve Yöntemler: Çalışmaya Ocak 2013 ve Mayıs 2013 tarihleri arasında Sakarya Üniversitesi Kulak Burun Boğaz Kliniğine başvuran ve işitme cihazı kullanması onaylanan 180 hasta dahil edildi. Hastalara (21 erkek, 26 kadın; ort. yaş 61.91±12.82 yıl; dağılım 24-85 yıl) aynı odyometrist tarafından cihazlı ve cihazsız serbest saha odyometresi ve aynı kulak burun boğaz uzmanı tarafından Uluslararası İşitme Cihazları Değerlendirme Envanteri'nin Türkçe sürümü uygulandı.

Bulgular: Hastaların %14.28'i işitme cihazı onayı raporu almasına rağmen işitme cihazını edinmedi. Envanter sorularının cevapları değerlendirildiğinde hastaların %87'sinin işitme cihazını günde dört saatten fazla kullandığı, %72'sinin işitme cihazından anlamlı şekilde faydalandığı ve %64'ünün işitme cihazı öncesi döneme kıyasla hiç yakınması olmadığı veya birkaç yakınması olduğu ortaya çıktı.

Sonuç: İşitme cihazı kullanımı hastaların günlük aktivitelerini çok az veya orta derecede etkiler ve iletişim becerilerini artırır.

Anahtar Sözcükler: İşitme cihazı; işitme kaybı; kişisel memnuniyet; yaşam kalitesi.

Aging is an inevitable and ongoing process for all living creatures. The fundamental change that occurs during the aging process is the

decrease in accommodation abilities of reserve capacities of organ systems by environmental factors.^[1] Age-related hearing loss is one of



these changes and leads to a decrease in communication abilities of the person.

The need for use of hearing aids has increased with the rise in the average age of population due to modern life conditions. Hearing loss is listed as the 13th problem among chronic disorders seen in patients aged above 65 years.^[2] Furthermore, hearing loss can lead to poor life quality, depressive symptoms and social problems.^[3] Use of hearing aids is the only treatment method in patients who cannot be treated with surgical or medical treatment methods. A study by Vuorialho et al.,^[4] reported that speech discrimination and communication skills of older patients with hearing loss improved after using a hearing aid.

It is crucial to determine if the hearing aid is appropriate for the patient or not in order to achieve successful hearing aid treatment. Several inventories have been recently defined in order to assess the effectiveness of hearing aids. One of these methods is the International Outcome Inventory for Hearing Aids (IOI-HA). This inventory assesses the benefits of the hearing aid and patient satisfaction.^[5] This inventory with proven effectiveness was translated to Turkish by Kirkım et al.^[6] and used in their study.

The objective of this study is to investigate hearing aid using rate, patient satisfaction rate and effectiveness of these devices in patients who are advised to use one.

PATIENTS AND METHODS

A detailed anamnesis was obtained and physical examination was performed on all patients admitted to the Otolaryngology Clinic of Sakarya University Medical Faculty Hospital with the complaint of hearing loss between January 2013 and May 2013. Audiology tests were performed after these procedures. A total of 180 patients that were considered poor candidates for medical or surgical treatment based on test results were recommended to use a hearing aid. After being given a hearing aid approval report, they were considered for inclusion in this study.

One hundred and eighty patients who were considered suitable according to the criteria of the study were phoned. Seventy-seven patients could be contacted through telephone; 11 patients stated that they could not obtain the hearing

aid due to financial or other issues; 13 patients did not agree to join the study; and six patients stated that they would not use a hearing aid even if they bought the device. Forty-seven patients, who were considered eligible according to the inclusion criteria of the study were enrolled.

Patients with a hearing aid report were phoned for a control visit after three months of hearing aid usage. The Turkish version of the IOI-HA inventory test consisting of 7 questions was applied to all control patients by the same physician and free field audiograms were also performed by the same audiometrist (Table 1 and 2).

Five different choices were offered for each question and scored between 1 and 5. Patient satisfaction rates were analyzed statistically based on these scores. Patients who scored above 4 points were considered satisfied while patients who scored below 4 points were considered unsatisfied.

Mann-Whitney U test and Kruskal Wallis H test were used in statistical analysis by using a IBM SPSS Statistics version 20.0, software program (IBM Corporation, Armonk, NY, USA). $P < 0.05$ was defined as statistically significant.

RESULTS

All the patients used the hearing aid on single side, 19 (40.4%) on the left and 28 (59.6) on the right. Among patients using a hearing aid, mean air conduction threshold was calculated as 54.98 ± 11.9 dB and mean speech discrimination score was calculated as $63.34\% \pm 19.09$.

When the answers to inventory questions were assessed, it was observed that 87% of patients used a hearing aid more than four hours a day, 72% benefitted significantly from the hearing aid and 64% of the patients had no complaint or few complaints compared to the before-hearing aid period. Furthermore it was observed that life quality was improved considerably in 66% of the patients.

In the free field audiograms mean air conduction threshold was calculated as 32.32 ± 9.01 dB after hearing aid application. Mean air conduction threshold benefit was calculated as 22.66 ± 11.33 dB when audiograms before and after hearing aids were compared. This benefit was statistically significant

Table 1. International outcome inventory-hearing aids (IOI-HA)

1. Think about how much you used your present hearing aid(s) over the past two weeks. On an average day, how many hours did you use the hearing aid(s)?
 - None
 - Less than 1 hours a day
 - 1 to 4 hours a day
 - 4 to 8 hours a day
 - More than 8 hours a day

2. Think about the situation where you most wanted to hear better, before you got your present hearing aid(s). Over the past two weeks, how much has the hearing aid helped in that situation?
 - Helped not at all
 - Helped slightly
 - Helped moderately
 - Helped quite a lot
 - Helped very much

3. Think again about the situation where you most wanted to hear better. When you use your present hearing aid(s), how much difficulty do you STILL have in that situation?
 - Very much difficulty
 - Quite a lot of difficulty
 - Moderate difficulty
 - Slight difficulty
 - No difficulty

4. Considering everything, do you think your present hearing aid(s) is worth the trouble?
 - Not at all worth it
 - Slightly worth it
 - Moderately worth it
 - Quite a lot worth it
 - Very much worth it

5. Over the past two weeks, with your present hearing aid(s), how much have your hearing difficulties affected the things you can do?
 - Affected very much
 - Affected quite a lot
 - Affected moderately
 - Affected slightly
 - Affected not at all

6. Over the past two weeks, with your present hearing aid(s), how much do you think other people were bothered by your hearing difficulties?
 - Bothered very much
 - Bothered quite a lot
 - Bothered moderately
 - Bothered slightly
 - Bothered not at all

7. Considering everything, how much has your present hearing aid(s) changed your enjoyment of life?
 - Worse
 - No change
 - Slightly better
 - Quite a lot better
 - Very much better

Table 2. Correlations between total satisfaction scores and patient characteristics

	Total patient satisfaction scores	
	r	p
Pure tone audiometry gain	0.415	0.004
Age	0.267	0.070
Speech discrimination	-0.255	0.083

($p < 0.001$).

When answers were compared according to air conduction threshold benefit; a statistically significant increase in patient satisfaction was observed along with the increase in benefit achieved by hearing aid use ($p = 0.004$). However there was no significant effect of age and speech discrimination on patient satisfaction (Table 2).

The average of answers to inventory questions was calculated above 4 points in 64% of the patients. There was no significant difference between sides of hearing aid use (left-right) in terms of average value of questions ($p = 0.939$). Furthermore there was no remarkable relationship between the severity of hearing loss and the average of answers to inventory questions ($p = 0.059$). Five patients were not literate, and their educational level was elementary, secondary, high school and university in 25, 8, 6 and 3 of 47 patients, respectively. When the answers to inventory questions were assessed in terms of educational level; an increase in patient satisfaction was observed with the increase in educational status but this finding was not statistically significant ($p = 0.259$).

DISCUSSION

The hearing aid industry has a very large market. Hearing aid costs are concerns of the whole population in countries like Turkey, where social health care services are controlled and provided mainly by the government. Assessing the quality and effectiveness of this health care service imposing a great burden on the country's budget is both a financial and a medical necessity. One of the objectives of our study was to investigate the benefit level of hearing aids in patients who were determined as suitable for hearing aid use and supported by the government, and to address the difficulties in using hearing aid. To assess

the benefit and satisfaction levels of patients is important due to the reasons mentioned above. There are several inventories developed in order to assess the effectiveness of the device and patient satisfaction in recent years. Efficiency of the device, patient satisfaction, mean daily time of hearing aid use and effects of hearing aid use on quality of life can be assessed by using these inventories. The Turkish version of the IOI-HA inventory, a reliable and internationally accepted inventory, was used in our study in order to assess patient satisfaction in patients using a hearing aid.^[7-9] Furthermore, free field audiograms were performed and improvement in hearing loss was examined based on the results of before and after hearing aid application.

Regular daily use rate of the device was found significantly high in our study (87%). This rate was 58.5% in the study of Bertoli et al.^[10] and 56% in the study of Vuorialho et al.^[11] In our study, when patients who use the device rarely or not at all were asked why, the most common reason given was annoying noise. This finding was also observed in studies conducted in other countries.^[10] These patients were advised to get in touch with centers that they had bought the device from, for calibration. The most common reasons for annoying device noise are inappropriate fitting of ear molds, incorrectly manufactured long canals, failure to calibrate the device frequency specifically to the patient and failure to increase the volume of the device gradually. Centers that supply hearing aids should be trained in this regard and should adjust the device individually for each patient.

In our study, there was no significant correlation between age and answers given to the inventory questions, which is similar to the study of Kirkim et al.^[6] ($p = 0.070$). However a significant correlation was observed between age and answers of inventory questions in the study of Vestergaard et al.^[12]

In the assessment of IOI-HA-TR inventory the highest average value was found for the first question (average period of hearing aid use a day). The second highest value was found for the fourth question assessing the satisfaction with the device. Seventy-seven percent of the patients rated this question 4 or above 4 points. Those results are good indications for patient satisfaction with the hearing aid.

Our study is the first study to compare the free field audiograms performed before and after hearing aid use. The benefit acquired with hearing aid use was 22.66 ± 11.33 dB after comparing mean air conduction threshold before device use with that after device use. An increase in patient satisfaction was observed along with the increase in benefit achieved by using hearing aid and this finding was statistically significant ($p=0.004$).

The use of hearing aid provides positive social acquisitions in elder patients. However this is such a large market similar to those in which high-tech devices are included. Device expenditures are also a concern of the whole population in countries where the device is provided mainly by the government. Therefore effectiveness of this service should be assessed.

There are certain limitations to the present study. First, the inclusion of higher number of patients would definitely enable us to obtain more meaningful results. Research studies conducted in countries where patients' records are not kept regularly, face difficulties in reaching patients for retrospective research and the current study was no exception. Second, since private sector representatives undertake the planning process of hearing aids, the patient population in the study does not constitute a homogeneous one. Also in our study, private company representatives applied hearing aids on all patients, this status should affect the benefit of hearing aid usage and success of our study design. Employing the required amount of staff for planning and execution will not only increase the quality of service but will also be of great help for ensuring the patient homogenization for future studies.

We assert that specialized staff should be employed in public hospitals in order to increase the effectiveness of this considerable amount of health care cost by determining the most appropriate device for the patient.

Conclusion

In our study, device use and patient satisfaction rates were significantly high. However there was a group consisting of patients who did not obtain the device even when the use of a hearing aid was recommended, and patients who did not use hearing aid even after they had obtained the

device. The reasons that led these patients not to buy or use the device should be investigated. Finally, only otolaryngologists along with the centers that provide hearing aid devices should instruct patients about using the device and properties of the device.

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