Original Investigation

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Comparison of the Knowledge Levels of Turkish and Syrian Individuals Living in Türkiye Regarding Hearing and Balance

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ABSTRACT

Objective: Our study aimed to identify the knowledge levels related to hearing and balance of Syrian and Turkish nationals and address any deficiencies through planned training.

Methods: Our study is prospective descriptive research. The study was carried out in a public area. The study was conducted with two groups of Turkish and Syrian nationals. Participants were first given the "Hearing and Balance Knowledge Level Questionnaire", followed by a 30-minute structured training using brochures related to the topics in the questionnaire. After this training, they were administered the questionnaire again.

Results: In the first stage, the questionnaire scores of Turkish nationals were significantly higher than the Syrians ($p<0.05$), and after the training, no significant difference was found ($p=0.985$). Before the training, there was no statistical difference within the groups according to gender and working status of the participants ($p>0.05$). Before training, median questionnaire scores increased with education level, but only the bachelor's level showed a significant difference in scores. A moderate positive correlation between education level and pre-training scores was observed in Syrians ($p<0.05$), but not Turks. Both groups showed a low yet significant positive correlation between income and pre-training questionnaire scores ($p<0.05$). After the training, there was no statistically significant difference between the two groups based on education level, except middle and high school degrees, and monthly income. The question with the lowest rate of correct answers in both groups was the 20th question, which was about tinnitus.

Conclusion: In Samsun city of Türkiye, a knowledge gap regarding audiology, audiologists, hearing/balance loss, tinnitus, hearing aids, cochlear implants, and vertigo was identified in both groups, particularly among Syrian nationals, and educational interventions can address this gap.

Keywords: Balance, balance awareness, hearing, hearing awareness, Syrian national, Turkish national

INTRODUCTION

Health is an important concept for individuals and society; it is a type of service that should be prioritized (1). Healthcare, on the other hand, refers to a set of services provided by health institutions and professionals for the protection, improvement, treatment, and rehabilitation of public health (2). The healthcare infrastructure aiming to provide the best service in countries includes well-trained service providers, access to reliable and up-to-date scientific information, and well-developed facilities (3). However, significant events such as wars push countries into large-scale problems, disrupt all services, particularly healthcare, and lead to the forced migration of individuals living in these countries. One of these countries is Syria today. With the outbreak of the civil war in Syria in March 2011, the country's healthcare infrastructure collapsed; 50% of state hospitals became unusable, and half of the healthcare workforce left the country (4). Millions of people have been displaced within the country, and a large portion has been forced to leave their homeland. As of July 25, 2024, it is known that there are a total of 3,105,539 individuals under temporary protection in Türkiye who have come from Syria of these individuals, 73.9% are women and children (5).

Türkiye is a large country with a vast area, a growing economy, and a population of more than 85 million. According to the United Nations population projections, in 2023, Türkiye ranked

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18th in population size among 194 countries (6). On the other hand, Türkiye hosts the largest refugee population in the world, with Syrians having the highest population density among these refugees (7). The official language of Türkiye is Turkish (8).

One of the main reasons refugees in different countries do not benefit effectively and easily from healthcare services is the "language" barrier (limitations in expressing the complaint and understanding the other part), but a lack of knowledge about the healthcare facilities and infrastructure in the host countries can also prevent these individuals from accessing healthcare. By identifying knowledge levels in specific areas and addressing deficiencies, significant contributions can be made to the health of these individuals and the society they live in. Moreover, the conscious and accurate demand for healthcare services by individuals of different nationalities can allow the host countries to assess the performance of their healthcare systems and structure health reforms for refugees. In this context, the current study aims to determine the knowledge levels of Syrian nationals living in Samsun regarding hearing and balance health/diseases, and compare them with Turkish nationals. Another aim of the study is to evaluate the knowledge levels of both groups after the training. This study also aims to raise awareness on the subject.

METHODS

Our study is prospective and descriptive. For the present study, ethical approval was obtained from the Clinical Research Ethics Committee at Samsun Ondokuz Mayıs University (decision no: OMÜ KAEK 2023/14, date: 24.06.2024), and permission was also granted by the Atakum Municipality in Samsun, where the study was conducted. Research was carried out in accordance with the Declaration of Helsinki.

A stand was set-up between 03:00 and 07:00 p.m. for 1 week in a children's playground in a region with a high density of Syrian individuals. The individuals who visited this stand constituted the study's target audience. The study was conducted with two groups, one consisting of Turkish nationals and the other of Syrian nationals. Syrian nationals over 18 who have lived in Türkiye for two years, learned Turkish (no objective measurement was used to measure the individuals' Turkish proficiency; they were evaluated based on their ability to speak, understand, and maintain communication spontaneously during a 5-10 minute conversation), and volunteered to participate in the study were included. Turkish nationals over 18 who agreed to participate in the study were informed about the purpose of the study and signed an informed consent form. Individuals who did not wish to participate, those who were illiterate, those who could not communicate in Turkish, those who had previously received any training related to hearing and balance, individuals from different nationalities (e.g., Iran, Iraq), individuals with a history of ear surgery, and those with complaints of balance and hearing loss were excluded from the study. To raise public awareness, demos of ears, hearing aids, and cochlear implants were also displayed on the table in the stand. Those who did not agree to participate but visited the stand for information were allowed to examine the demos, and the researchers answered their questions.

The study's sample size was calculated as at least 88 participants, 44 in each group, with 95% power and 0.05 margin of error using the G*Power 3.1.9.7 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) package. Over one week, 1,000 people visited the stand, and 200 volunteers (100 Syrian, 100 Turkish nationals) were given questionnaires and asked to complete them. Individuals who agreed to participate were asked to complete a socio-demographic data collection form. Then, the "Hearing and Balance Knowledge Level Questionnaire", consisting of 27 items, was created by the researchers based on a literature review and expert opinions, and was applied to measure the participants' knowledge levels on hearing and balance issues. Then, a 30-minute structured training was provided with printed or electronic posters and brochures (which could also be accessed via smartphone QR codes) related to the topic. The training also covered any areas or questions the participants did not know or had incomplete knowledge of in the questionnaire. Finally, the participants' knowledge levels were re-assessed using the "Hearing and Balance Knowledge Level Questionnaire".

The questionnaire was designed to be answered with "yes", "no" or "I do not know". In the Hearing and Balance Knowledge Level Questionnaire, the first two items are related to audiology; items 3-8 and 17 are about hearing loss; items 9-11 are about newborn hearing screening; items 12-14 are about hearing aids; items 15-16 and 18-19 are about cochlear implants; items 20-22 are about tinnitus (ringing in the ears); item 23 is about noise; and items 24-27 are related to dizziness and balance.

For each item correctly answered in the questionnaire, one point was given, while incorrect answers or those marked as "I do not know" were given zero points. The total score was calculated. The questionnaire has a possible score range from zero to a maximum of twenty-seven points. An increase in the score obtained from the questionnaire indicates that the level of knowledge has increased. Correct answers to the Hearing and Balance Knowledge Level Questionnaire are shown in Table 1.

Statistical Analysis

IBM SPSS 22.0 software was used for data analysis. Frequency and percentage values were provided for qualitative variables. The quantitative variables were not normally distributed; therefore, these variables were presented as the median and interquartile range (25th-75th percentiles). Group differences were assessed using the Mann-Whitney U test; intra-group differences were assessed using the Wilcoxon rank test, and correlations were analyzed using Spearman's rank correlation coefficient. The internal consistency of the questionnaire items was examined using the Cronbach's alpha coefficient. A statistical significance level of $p<0.05$ was considered in the evaluations.

RESULTS

The mean age of the Turkish nationals participating in our study was 35.78±11.62 years (minimum: 18, maximum: 70), and for the Syrian nationals, it was 34.11±12.30 years (minimum: 18, maximum: 65). No significant difference was found between the groups (p>0.05). Two hundred people, 100 in each group, participated in the study. Fifty-one female participants (51.0%) and forty-nine male Turkish participants (49%), and fifty female (50%) and fifty male (50%) Syrian participants were included in the study, with no significant difference between the groups in terms of gender (p>0.05). The average duration of stay for Syrian nationals in Türkiye was 7.64±3.20 years. The socio-demographic information of the participants is shown in Table 2.

When the internal consistency of all the items in the Hearing and Balance Knowledge Level Questionnaire created by the researchers was examined, the Cronbach's alpha coefficient was found to be 0.897, indicating high consistency among the questionnaire items. The participants' responses to the 27-item Hearing and Balance Knowledge Level Questionnaire before and after training are shown in Table 3. The question that Turkish nationals answered correctly the most was question 9, related to newborn hearing screening, while the question that Syrian nationals answered correctly the most was question 6, which states that hearing loss may worsen over time, if not intervened. The question with the lowest percentage of correct answers in both groups was question 20, related to tinnitus.

The median pre-training questionnaire scores of Turkish nationality participants were 16.00 (14.00-21.00), and the median post-training questionnaire scores were 25.00 (25.00-26.00). The median pre-training questionnaire scores of Syrian nationality

Table 1. Hearing and Balance Knowledge Level Questionnaire and correct answers

Queationnaire items	Responses		
	Yes	No	I do not know
1. Audiology is a branch of science that deals only with hearing		X	
2. Audiologists only perform hearing tests		X	
3. There are different types of hearing loss	X		
4. There are degrees of hearing loss	X		
5. Hearing can sometimes be regained after a hearing loss has occurred	X		
6. If left untreated, some hearing loss may worsen over time	X		
7. The ear is an organ responsible only for hearing		X	
8. Early diagnosis and treatment are of no benefit in hearing loss		X	
9. Every newborn baby needs to have a hearing test (ABR)	X		
10. Newborn hearing screening test will hurt my baby		X	
11. Some diseases experienced by the mother during pregnancy (measles, etc.) negatively affect the baby's hearing	X		
12. A hearing aid amplifies sounds so a person with hearing loss can hear more	X		
13. Hearing aids can be purchased without a prescription in Türkiye		X	
14. Hearing aids vary depending on the degree of hearing loss	X		
15. Cochlear implants are devices popularly known as bionic ears	X		
16. A cochlear implant (bionic ear) is surgically attached to the inner ear	X		
17. Hearing loss in children affects language and speech development	X		
18. Patients with cochlear implants (bionic ear) can hear as well as those with normal hearing	X		
19. Children with severe hearing loss should receive cochlear implants early	X		
20. There is a difference between tinnitus and ear-ringing		X	
21. Tinnitus is a disease		X	
22. One of the most common causes of tinnitus is noise exposure	X		
23. Listening to music using headphones for a long time and at high volume does not hurt hearing		X	
24. Loss of balance, vertigo, or dizziness is caused only by problems in the inner ear		X	
25. Some medications have adverse effects on hearing and balance	X		
26. Some of the diseases that cause vertigo can be treated	X		
27. Some individuals with vertigo benefit from balance exercises	X		

ABR: Auditory brainstem response

participants were 16.00 (11.25-18.00), and the median post-training questionnaire was 25.00 (25.00-26.00). Although the questionnaire median values of Turkish and Syrian individuals were the same before the training, it was observed that there was a statistical significant difference between the groups ($p<0.05$). The distribution of questionnaire median values after training was compared between the groups using the Mann-Whitney U test, and no significant difference was found ($p=0.985$) (Figure 1).

The questionnaire median values of Turkish and Syrian nationals, based on education level and monthly income, are shown in Table 4. Before training, although there was no statistically significant difference between education levels in both groups, except for the bachelor group, it was determined that median values increased as education levels increased. There was no statistically significant difference between the questionnaire median values, except for participants with a monthly income of 30,001 Turkish lira and above. In the study, the post-training median values of the questionnaire, according to monthly income and education level (excluding middle and high school levels), were similar in both groups.

Before the training, the correlation and comparison of the Hearing and Balance Knowledge Level Questionnaire median values within groups were examined according to demographic variables such as gender, active employment status, education level, and monthly income. Although the median values of the pre-training questionnaire according to gender were not statistically significant ($p>0.05$), in both groups for male and female participants, women's scores were higher than men's in both groups. The pre-training questionnaire median values were similar between working and non-working participants in both groups ($p>0.05$). No correlation was found between education level and pre-training questionnaire median values in Turkish participants. However, a moderate positive correlation was observed between education level and pre-training questionnaire scores in Syrian participants ($p<0.05$). Both groups found a low but statistically significant positive correlation between monthly income and pre-training questionnaire scores ($p<0.05$). The within-group correlations and comparisons of pre-training questionnaire median values based on gender, employment status, education level, and monthly income are presented in Table 5.

Table 2. Socio-demographic information of participants

Variables		Participants of Turkish nationality n (%)	Participants of Syrian nationality n (%)
Gender	Female	51 (51%)	50 (50%)
	Male	49 (49%)	50 (50%)
Educational status	Primary school	2 (2%)	1 (1%)
	Middle school	5 (5%)	7 (7%)
	High school	19 (19%)	26 (26%)
	Associate degree	11 (11%)	15 (15%)
	Bachelor degree	57 (57%)	46 (46%)
	Postgraduate	6 (6%)	5 (5%)
Profession	Student	19 (19%)	32 (32%)
	Civil servant	16 (16%)	4 (4%)
	Teacher	18 (18%)	16 (16%)
	Self-employment	27 (27%)	27 (27%)
	Doctor	1 (1%)	3 (3%)
	Retired	4 (4%)	6 (6%)
	Housewife	14 (14%)	10 (10%)
	Dentist	1 (1%)	2 (2%)
Active working status	Working	50 (50%)	34 (34%)
	Not working	50 (50%)	66 (66%)
Monthly income	0-10,000 TL	6 (6%)	28 (28%)
	10,001-20,000 TL	20 (20%)	27 (27%)
	20,001-30,000 TL	20 (20%)	22 (22%)
	30,001 TL and above	54 (54%)	23 (23%)

N: Number, %: Percentage, TL: Turkish lira

Table 3. Distribution of participants' responses to the Hearing and Balance Knowledge Level Questionnaire before and after training

Questionnaire items	Pre-training				Post-training			
	Participants of Turkish nationality (n=100)		Participants of Syrian nationality (n=100)		Participants of Turkish nationality (n=100)		Participants of Syrian nationality (n=100)	
	Correct answer (n%)	Wrong answer (n%)	Correct answer (n%)	Wrong answer (n%)	Correct answer (n%)	Wrong answer (n%)	Correct answer (n%)	Wrong answer (n%)
1. Audiology is a branch of science that deals only with hearing	29 (29%)	71 (71%)	27 (27%)	73 (73%)	99 (99%)	1 (1%)	99 (99%)	1 (1%)
2. Audiologists only perform hearing tests	44 (44%)	56 (56%)	34 (34%)	66 (66%)	99 (99%)	1 (1%)	99 (99%)	1 (1%)
3. There are different types of hearing loss	84 (84%)	16 (16%)	87 (87%)	13 (13%)	100 (100%)	0 (0%)	100 (100%)	0 (0%)
4. There are degrees of hearing loss	90 (90%)	10 (10%)	90 (90%)	10 (10%)	100 (100%)	0 (0%)	100 (100%)	0 (0%)
5. Hearing can sometimes be regained after a hearing loss has occurred	61 (61%)	39 (39%)	45 (45%)	55 (55%)	95 (95%)	5 (5%)	99 (99%)	1 (1%)
6. If left untreated, some hearing loss may worsen over time	90 (90%)	10 (10%)	92 (92%)	8 (8%)	99 (99%)	1 (1%)	100 (100%)	0 (0%)
7. The ear is an organ responsible only for hearing	59 (59%)	41 (41%)	59 (59%)	41 (41%)	99 (99%)	1 (1%)	99 (99%)	1 (1%)
8. Early diagnosis and treatment are of no benefit in hearing loss	81 (81%)	19 (19%)	75 (75%)	25 (25%)	99 (99%)	1 (1%)	100 (100%)	0 (0%)
9. Every newborn baby needs to have a hearing test (ABR)	92 (92%)	8 (8%)	74 (74%)	26 (26%)	94 (94%)	6 (6%)	98 (98%)	2 (2%)
10. Newborn hearing screening test will hurt my baby	81 (81%)	19 (19%)	72 (72%)	28 (28%)	99 (99%)	1 (1%)	97 (97%)	3 (3%)
11. Some diseases experienced by the mother during pregnancy (measles, etc.) negatively affect the baby's hearing	63 (63%)	37 (37%)	40 (40%)	60 (60%)	96 (96%)	4 (4%)	94 (94%)	6 (6%)
12. A hearing aid amplifies sounds so a person with hearing loss can hear more	81 (81%)	19 (19%)	67 (67%)	33 (33%)	100 (100%)	0 (0%)	100 (100%)	0 (0%)
13. Hearing aids can be purchased without a prescription in Türkiye	51 (51%)	49 (49%)	33 (33%)	67 (67%)	58 (58%)	42 (42%)	63 (63%)	37 (37%)
14. Hearing aids vary depending on the degree of hearing loss	82 (82%)	18 (18%)	70 (70%)	30 (30%)	98 (98%)	2 (2%)	100 (100%)	0 (0%)
15. Cochlear implants are devices popularly known as bionic ears	44 (44%)	56 (56%)	32 (32%)	68 (68%)	96 (96%)	4 (4%)	97 (97%)	3 (3%)
16. A cochlear implant (bionic ear) is surgically attached to the inner ear	43 (43%)	57 (57%)	25 (25%)	75 (75%)	93 (93%)	7 (7%)	95 (95%)	5 (5%)
17. Hearing loss in children affects language and speech development	85 (85%)	15 (15%)	68 (68%)	32 (32%)	97 (97%)	3 (3%)	97 (97%)	3 (3%)
18. Patients with cochlear implants (bionic ear) can hear as well as those with normal hearing	40 (40%)	60 (60%)	14 (14%)	86 (86%)	79 (79%)	21 (21%)	90 (90%)	10 (10%)
19. Children with severe hearing loss should receive cochlear implants early	49 (49%)	51 (51%)	28 (28%)	72 (72%)	91 (91%)	9 (9%)	95 (95%)	5 (5%)
20. There is a difference between tinnitus and ear-ringing	22 (22%)	78 (78%)	13 (13%)	87 (87%)	97 (97%)	3 (3%)	92 (92%)	8 (8%)
21. Tinnitus is a disease	31 (31%)	69 (69%)	26 (26%)	74 (74%)	94 (94%)	6 (6%)	93 (93%)	7 (7%)
22. One of the most common causes of tinnitus is noise exposure	49 (49%)	51 (51%)	55 (55%)	45 (45%)	98 (98%)	2 (2%)	92 (92%)	8 (8%)

Table 3. Continued

Questionnaire items	Pre-training				Post-training			
	Participants of Turkish nationality (N=100)		Participants of Syrian nationality (N=100)		Participants of Turkish nationality (N=100)		Participants of Syrian nationality (N=100)	
	Correct answer (N%)	Wrong answer (N%)	Correct answer (N%)	Wrong answer (N%)	Correct answer (N%)	Wrong answer (N%)	Correct answer (N%)	Wrong answer (N%)
23. Listening to music using headphones for a long time and at high volume does not hurt hearing	79 (79%)	21 (21%)	48 (48%)	52 (52%)	100 (100%)	0 (0%)	93 (93%)	7 (7%)
24. Loss of balance, vertigo, or dizziness is caused only by problems in the inner ear	47 (47%)	53 (53%)	27 (27%)	73 (73%)	81 (81%)	19 (19%)	64 (64%)	36 (36%)
25. Some medications have adverse effects on hearing and balance	76 (76%)	24 (24%)	59 (59%)	41 (41%)	99 (99%)	1 (1%)	93 (93%)	7 (7%)
26. Some of the diseases that cause vertigo can be treated	70 (70%)	30 (30%)	62 (62%)	38 (38%)	100 (100%)	0 (0%)	97 (97%)	3 (3%)
27. Some individuals with vertigo benefit from balance exercises	69 (69%)	31 (31%)	56 (56%)	44 (44%)	97 (97%)	3 (3%)	98 (98%)	2 (2%)

N: Number, %: Percentage, ABR: Auditory brainstem response

Table 4. Median values of questionnaire before and after training based on socio-demographic variables in the groups

Variables	Pre-training		p-value	Post-training		p-value
	Questionnaire median values of Turkish nationalities participants median (25^{th} and 75^{th} quartiles)	Questionnaire median values of Syrian nationalities participants median (25^{th} and 75^{th} quartiles)		Questionnaire median values of Turkish nationalities participants median (25^{th} and 75^{th} quartiles)	Questionnaire median values of Syrian nationalities participants median (25^{th} and 75^{th} quartiles)	
Education status						
Primary school	14.00 (14.00-14.00)	6.00 (6.00-6.00)	-	24.50 [24.00- (-)]	20.00 (20.00-20.00)	-
Middle school	16.00 (12.00-20.00)	16.00 (10.75-17.25)	0.612	25.00 (25.00-26.00)	20.00 (20.00-20.00)	**0.003***
High school	16.00 (12.00-18.00)	16.00 (13.00-18.00)	0.459	25.00 (24.00-26.00)	25.50 (25.00-26.00)	**0.037***
Associate degree	16.00 (14.50-22.50)	16.00 (13.00-18.00)	0.470	25.00 (24.00-26.00)	25.00 (25.00-26.00)	1.000
Bachelor degree	18.00 (14.00-22.00)	15.00 (15.00-16.00)	**0.002***	25.00 (25.00-27.00)	25.00 (25.00-26.00)	0.694
Postgraduate	20.00 (16.50-23.00)	19.00 (13.50-22.00)	0.548	25.00 (24.00-26.00)	26.00 (25.00-27.00)	0.247
Monthly income						
0-10,000 TL	12.00 (7.50-16.25)	13.00 (7.25-16.00)	0.912	25.00 (24.00-26.00)	25.00 (24.00-26.00)	0.912
10,001-20,000 TL	16.00 (14.25-20.75)	17.00 (12.00-18.00)	0.294	25.00 (23.25-26.00)	25.00 (25.00-26.00)	0.557
20,001-30,000 TL	16.00 (13.25-18.75)	15.50 (11.75-18.25)	0.433	25.00 (24.25-26.00)	25.00 (25.00-26.25)	0.358
30,001 TL and above	18.50 (15.00-22.00)	16.00 (13.00-18.00)	**0.038***	25.00 (25.00-27.00)	25.00 (25.00-26.00)	0.865

*: $p<0.05$

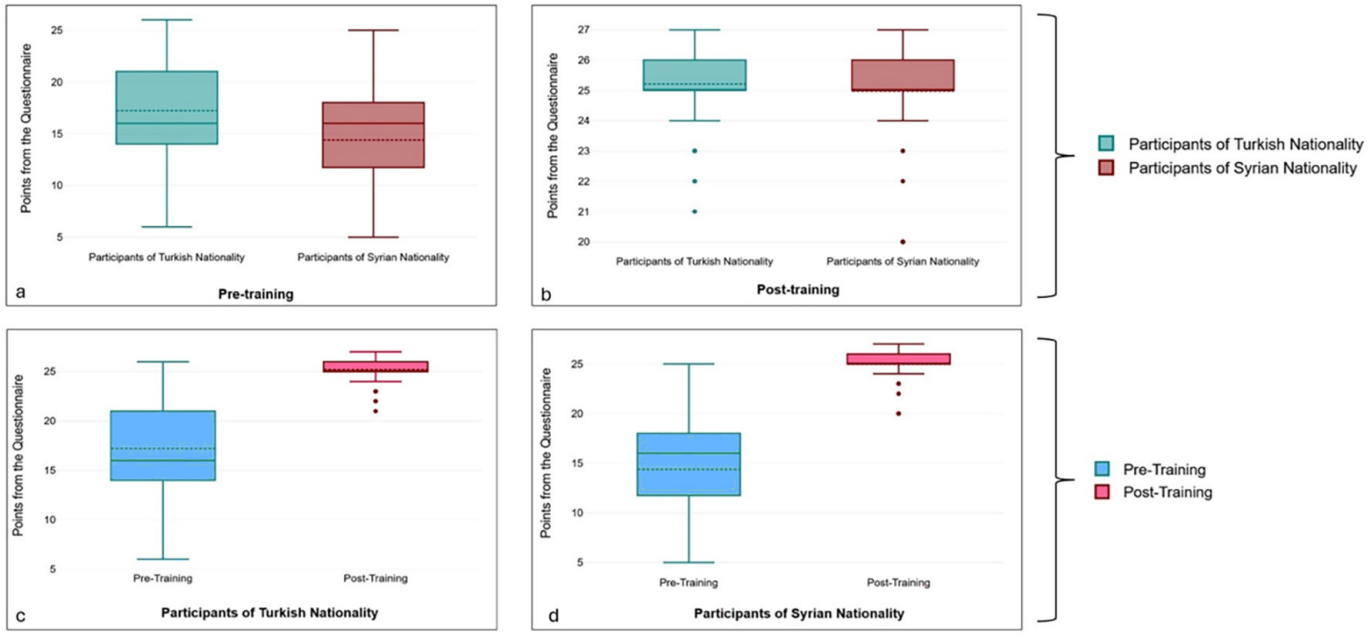

Figure 1. Distribution of questionnaire median values between groups (a,b) and within groups (c,d) before and after training. (a) Intergroup comparison of pre-training questionnaire median values, (b) intergroup comparison of post-training questionnaire median values, (c) intragroup comparison of pre-training and post-training questionnaire median values of Turkish nationality participants, (d) intragroup comparison of pre-training and post-training questionnaire median values of Syrian nationality participants

Table 5. Compare and correlation of hearing and balance knowledge level questionnaire scores within groups based on demographic variables before training

	Participants of Turkish nationality median (25th and 75th quartiles)	Participants of Syrian nationality median (25th and 75th quartiles)
Gender		
Female	17.00 (14.00-22.00)	16.00 (11.00-18.00)
Male	16.00 (14.00-20.00)	15.50 (12.00-17.00)
p-value	0.509	0.594
Active working status		
Working	18.00 (14.00-22.00)	15.00 (10.75-17.00)
Not working	16.00 (14.00-20.00)	16.00 (12.00-18.00)
p-value	0.098	0.286
Educational status	r=0.164, p=0.104	**r=0.333, p<0.001***
Monthly income	**r=0.251, p=0.012***	**r=0.286, p=0.004***

*: p<0.05

DISCUSSION

Access to essential services such as education and healthcare has been disrupted due to the war in Syria. Reasons like the destruction of schools and families fleeing their homes due to security concerns have led to a scientific gap that needs to be addressed. This study aimed to assess the levels of knowledge in audiology of Turkish nationals living in Türkiye and Syrian nationals who migrated due to difficulties in their country, specifically in audiology. In our study, for this purpose, the participants' knowledge levels regarding hearing and balance in two groups were assessed, and it was aimed to address any potential gaps through the planned training, which was then discussed with the literature.

According to the initial data obtained from our study, it was found that Syrian participants scored significantly lower than Turkish participants in terms of the accuracy of the questionnaire items. Specifically, for item 9 of the questionnaire, which states, "Every newborn should undergo a hearing test (Automated - auditory brainstem response)", 74% of Syrian participants answered correctly, while 92% of Turkish participants provided a much higher rate of correct responses. Although the same screening protocols are applied to refugees giving birth in Türkiye, according to these data, it is observed that the knowledge level of Syrian nationals regarding newborn hearing screening is more limited. The newborn hearing screening program (NHSP) in Türkiye was started in 2004 and is currently actively carried out in 81 provinces. According to the 2022 data from the General Directorate of Public Health, 95.8% of newborns in Türkiye undergo screening every year for hearing (9). The NHSP implemented in Türkiye is the responsibility of the Health Ministry, and the Joint Committee on Infant Hearing principles have been adopted in the program (10). In this regard, great importance is given to the hearing screening program in our country. Care is taken to inform families who have a new baby before the baby is discharged. In addition, hearing screenings are routinely performed for babies before they leave the hospital. Special care is taken to closely monitor babies who

have not passed the screening in case of potential hearing loss (11). An important factor contributing to the higher scores of Turkish participants on this item is the effective healthcare policies related to the hearing screening programs implemented in Türkiye.

When examining the questionnaire scores, Turkish and Syrian participants scored the lowest on item 20, about tinnitus, indicating a lack of shared knowledge. Overall, when looking at the average questionnaire scores, Turkish participants answered 17 out of 27 questions correctly (62%), while Syrian participants answered 14 correctly (51%). Based on these results, it can be concluded that awareness and knowledge regarding hearing and balance is not at the desired level in both groups. While hearing and balance disorders are quite common, they are often less well-known compared to other health issues they are generally not life-threatening. To increase awareness of hearing and balance loss, associations, various organizations and hearing professionals in Türkiye and around the world periodically conduct studies. The common conclusion of all these studies is a general lack of knowledge regarding hearing and hearing health issues (12-17). A study by Tuz et al. (13) conducted for World Hearing Awareness Day on March 3rd, concluded that educational efforts on hearing health are essential. Joubert et al. (18) in their study evaluating the public's awareness of Audiology profession, hearing, hearing losses, and hearing health, stated that there is a lack of awareness about audiologists and the services they offer. In Türkiye, while newborn and first-grade children's hearing screening programs are effectively implemented, a routine hearing screening program for adults and older persons does not exist. Furthermore, balance screening is not conducted in any age group. In summary, there is no routine screening program for hearing and balance health, and this lack concerns all age groups in our country (except newborns and first-grade children). On the other hand, the department of audiology, whose main area of interest is all kinds of hearing screening programs, hearing and balance health/diseases, has started as an undergraduate education in Türkiye since 2011 (19). Currently, audiologists continue to be trained in 25 universities in Türkiye (20). However, the employment of graduated audiologists in institutions affiliated with the Ministry of Health and other ministries is insufficient (21). We believe that the shortage of appointed audiologists and the insufficient level of related audiological activities affect all individuals living within Türkiye's borders, contributing to the lack of awareness regarding hearing and balance health/issues.

Syrian individuals have suffered significant losses in education, as well as in other areas, due to the ongoing war in their country for more than a decade. Considering the conditions in the region, many individuals have faced a lack of knowledge regarding hearing and balance issues, and treatment options. The lower questionnaire scores of these individuals compared to Turkish participants can be attributed to their adaptation process in a new country and community after migrating, as well as the disruptions in their education due to their primary focus on meeting basic needs. Moreover, following the training, which we provided using various materials, the correct response rates for Turkish and Syrian participants regarding items 9 and 20 increased. Overall, the percentage of correct answers given by both groups significantly improved, reaching an increase of approximately 25 percentage points (92%) for each group. We believe that the training we provided, particularly related to hearing and balance functions, will contribute to early diagnosis/intervention, rehabilitation, and preventive services for potential diseases or hearing and balance loss.

In a study conducted by Crandell et al. (22) with young adults, where knowledge and attitudes regarding hearing loss were assessed in terms of racial differences, similar results were found regarding knowledge levels across races, in contrast to the findings of our study. However, the researchers emphasized the need for comparisons based on socio-demographic characteristics such as gender, age, or income. According to our study data, especially before the training, the rate of correct answers given to the questionnaire was higher among women than among men, among both Turkish and Syrian participants. In other words, gender appears to be an important parameter affecting questionnaire scores. Similarly, in a study conducted by Di Berardino et al. (17) using a questionnaire to assess ear and hearing health, it was reported that women provided better answers to the questions and that societal awareness of hearing loss in infants was high. In a study conducted at Hacettepe University, the "Mothers' Views on Hearing Loss in Infants" questionnaire was translated into Arabic and administered to Syrian mothers. The results showed they had good knowledge about hearing loss and risk factors in infants and demonstrated a positive attitude towards early detection and intervention (23). Similarly, in a study measuring public awareness of ear health and hearing loss, it was reported that women provided a higher percentage of correct answers to the questions compared to men (24). Women's tendency to take more responsibility for the care of family members and health issues may have contributed to the higher questionnaire scores.

In the initial period before providing training, employment status did not have any effect on the scores of the questionnaire we used. However, as expected, level of education and monthly income affected the scores, with higher education levels (for Syrian nationals) and income levels (in both groups) leading to higher questionnaire scores. After the training, the questionnaire scores of both groups were similar in terms of education level (except middle and high school) and monthly income.

Although we set the condition that participants in our study had not previously received any training on hearing and balance, our data collection form did not inquire about the presence of diseases in the family, related to the specified areas. It should be noted that if individuals in the family have hearing and balance loss-related diseases, participants may have higher awareness and knowledge levels, which could affect the questionnaire scores. Moreover, when reviewing the literature, it can be seen that the questions used in the "Ear and Hearing Care Programme" manual prepared by the World Health Organization have been culturally adapted and used in various studies. In these studies,

broader topics such as hearing loss and its correct management in infants, ear cleaning, treatment and care, the effects of excessive exposure to loud noise and sound, and ear symptoms that lead to diagnostic delays have been investigated (17,24-26). In our study, however, we focused on more specific topics such as audiology, audiologists, newborn hearing screening, hearing aids, cochlear implants, tinnitus (ringing in the ears), dizziness, and balance. We also provided compensatory training in case of knowledge gaps and evaluated the contribution of this training.

Study Limitations

The limitation of our study is that we collected data from a single point in 1 week. Data collection from different locations (such as hospitals and universities) and over more extended periods may be useful for subsequent studies. Another limitation of our study is that we did not analyze questionnaire content or construct validity. In subsequent research, it would be beneficial to assess construct or content validity.

CONCLUSION

Based on the findings of our study, a knowledge gap regarding audiology, audiologists, hearing/balance loss, tinnitus, hearing aids, cochlear implants, and vertigo was identified in both groups, particularly among Syrian nationals, and can be addressed through educational interventions.

By determining the knowledge levels on selected health-related topics and addressing the gaps, significant contributions can be made to the health of all individuals living in the country. It can make positive contributions, especially in terms of protecting against diseases or consciously determining individual needs in case of illness and requesting the needs from health institutions. The conscious and informed demand for healthcare services by individuals of different nationalities living in Türkiye could allow the host country to review its healthcare system, evaluate its performance, and structure health reforms for refugees. Therefore, it is essential for academics, physicians, and especially audiologists working in ear nose and throat and audiology departments to play an important role in expanding informational activities on hearing and balance health and loss at the national level.

Our study was conducted on a relatively small population. Future research could benefit from including individuals from different regions within the country to determine regional differences.

Ethics

Ethics Committee Approval: For the present study, ethical approval was obtained from the Clinical Research Ethics Committee at Samsun Ondokuz Mayıs University (decision no: OMÜ KAEK 2023/14, date: 24.06.2024).

Informed Consent: Our study is prospective and descriptive. Turkish nationals over 18 who agreed to participate in the study were informed about the purpose of the study and signed an informed consent form.

Footnotes

Author Contributions: Surgical and Medical Practices - H.T.D.; Concept - H.T.D., A.K.; Design - H.T.D., A.K.; Data Collection and/or Processing - H.T.D., H.H., M.H., T.H.; Analysis and/or Interpretation - H.T.D., M.H.; Literature Search - H.T.D., A.K., H.H., M.H., T.H.; Writing - H.T.D., A.K.

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