

Knowledge and Perception on Hearing Loss, Hearing Management Modalities, Speech and Language Pathology among General Public in Al-Khobar, Kingdom of Saudi Arabia

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Abstract

Background: Hearing loss is considered a disability that hugely impacts the quality of life for 466 million people worldwide. The aim of the study was to assess the level of knowledge and perception on hearing loss, speech and language pathology, and to identify the effect of public educational campaign as an intervention to raise awareness among general public.

Methods: A repeated measure designed-study was conducted during 2019 in Al-Khobar, Saudi Arabia. To collect the data, an electronic questionnaire was randomly distributed targeting all adult visitors of the campaign including adults with no medical background. A total of 330 participants, filled the questionnaire twice; before and after the intervention. Any p-value less than 0.05 was considered statistically significant.

Results: The overall mean score of hearing loss was 5.43 ± 1.78 out of 11 points and higher awareness score toward hearing loss was significantly more after interventions ($P < 0.001$). For the awareness of ear and hearing management, the overall awareness score was 9.57 ± 1.96 out of 13 points and the awareness toward ear and hearing management was also significantly more after interventions ($P < 0.001$). In the awareness toward speech development, the total awareness score was 2.92 ± 0.98 out of 5 points and the awareness toward speech development was significantly higher at after interventions ($P < 0.001$). These results indicated that the answers after the intervention were significantly influenced by the campaign compared to the answers before the intervention.

Conclusion: Although the participants had some level of knowledge before intervening with an educational campaign, the intervention showed a significant improvement in their level of knowledge. Therefore, this study recommends the implication of more interventional educational campaigns to increase the awareness amongst general public in Saudi Arabia.

Background

Hearing loss is a common disability that hugely impacts daily living, education and social communication. It is defined as complete or partial inability to hear¹. The World Health Organization estimated that around 466 million people worldwide suffer from disabling hearing loss, and 34 million of these are children¹. In Saudi Arabia, a study was done to calculate the prevalence of hearing loss among children the study surveyed 10,000 results show that 1.27% of children had hearing loss in the left ear, 2.26% in the right ear and 9.47%².

In another study conducted in Riyadh, measuring prevalence of hearing loss among preschoolers, the prevalence was 1.75%³. Prevalence of noise induced hearing impairment among airport workers in Saudi Arabia was found to be 57%⁴. Prevalence of hearing loss among elderly in Saudi Arabia was revealed to be 69% unilateral hearing loss, in which 46% were conductive, 45% sensorineural and only 9% mixed hearing loss⁵.

A study conducted in South Africa reporting the individual awareness regarding audiology profession, hearing and hearing loss. Only 14% of the participants were aware of the presence of an audiology profession and only 5% had their hearing tested⁶. Another study conducted in Italy by Di Bernardino and Forti assessed the public awareness of ear and hearing management using a questionnaire. The findings of this study showed that females gave better responses to the items regarding the handling of problems such as deaf-mutism, ear wax, the fitting of hearing aids with a general overall positive response regarding awareness of such issues⁷. Similarly in a study conducted in Jeddah, Saudi Arabia female participants gave higher correct answers. Furthermore participants with positive history showed better knowledge⁸.

Non-genetic causes of hearing loss include the following; certain viruses, head trauma, noise, and ototoxic medications⁹. In study measuring the level of knowledge of ear infection among parents of children under five years of age and public, results reveal majority have good knowledge and practice^{7,10}. Another study conducted in Africa showed that over half of mothers were unaware that maternal rubella can lead to hearing loss. In addition, (78.4%) of the participants were aware that ototoxic medication consumed by their child and middle ear infections can result in hearing loss¹¹.

A study measuring level of awareness of 384 mothers on neonatal hearing loss in Al-Ahsa Saudi Arabia showed that 74.3% are aware ear infections can contribute to hearing loss¹², while 55% had high knowledge on ear infections in Riyadh, Saudi Arabia¹³. A study conducted to measure the level of awareness regarding noise induced hearing loss among soccer fans, results show that only 48% pre-tournament and 51% post-tournament were aware of risk of too much noise on their hearing¹⁴. A study conducted in Saudi Arabia measuring level of awareness on noise-induced hearing loss showed there was significant level of awareness among public¹⁵.

A cross-sectional study in Limpopo province measuring level of awareness on audiology profession, hearing, and hearing loss. Results revealed that only 14% were aware of audiology profession. Most participants (87%) knew the importance to undergo a hearing test, however only 5% have previously visited an audiologist. Majority believed ears must be clean and use of cotton buds to maintain hygiene⁶. "WISE EARS" campaign is a nationwide campaign that has been running for years to educate the public about hearing loss. To the best of the authors' knowledge, only one has publicly disseminated the result of the evaluation of the campaign¹⁶

In multiple studies measuring the public awareness of speech language pathology (SLPs). Results show that in Amman, 2014 about 66% of the participants had never read about SLPs¹⁷. In Upper Egypt, 2017, results reveal that 74.49% were aware of SLP¹⁸. There are two studies measuring the effect of phonological awareness program, one study in New Zealand the other in the United Kingdom, both studies revealed that children who underwent phonological awareness program intervention showed better performance^{19,20}.

To the best of the authors' knowledge, there are no regional studies regarding the public awareness of hearing loss. Although there is great a benefit of early identification and intervention in hearing loss using hearing aids, cochlear implants, speech therapy and also rehabilitation especially in children and the huge

socioeconomic impact of such disability.No action has been

taken to assess or improve the public awareness regarding such important issue. Hence the aim of this study was to identify the level of public knowledge about hearing loss, the management modalities, speech and language pathology and address the effect of the public educational campaign in Al-Khobar, Saudi Arabia as an intervention to raise the public awareness and knowledge.

Methodology

Design:

The study was conducted using repeated measure design.

Sitting and study period:

The questionnaire distribution took place during My life with Sounds Campaign, Al-Rashid mall, Khobar, Saudi Arabia (21, 22th March from 4:00 – 9:00PM). After the campaign, the remaining sample was collected using convenient sampling method throughout Al-Khobar, Saudi Arabia during a period of four months (September/2019 – December/2019).

Sample and data collection procedure:

The sample size was calculated assuming the prevalence of hearing loss and speech pathology awareness among visitors is assumed to be 50%, with confidence interval set at 95% with accepted margin error of 0.05 The minimum required sample was calculated to be $n = 317$ calculated using formula: $n = (z)^2 p (1 - p) / d^2$ in which $n =$ sample size, $z =$ level of confidence interval, $p =$ estimated proportion of population, $d =$ margin of error. The sample included adults (16 – 65) whom don't have medical knowledge background. After calculating sample size, the study used convenient sampling technique. Seven Data collectors were recruited from 2nd year medical students, the students were waiting by entrance of the campaign throughout the campaign time (21, 22th March from 4:00 – 9:00 PM) and three more data collectors after the campaign whom conveniently selected participants over period of four months. The data collectors explained material identical to that in the campaign, they

also made sure there was no contamination as in those who didn't finished from the booths were not asked to fill the questionnaire. The data were collected using self-administered questionnaires from previous studies. The questionnaire was translated from English to Arabic. A pilot study was conducted using a small group ($n=20$) to check the responses, and obtain feedback on the survey. Open ended questions were omitted from the questionnaire. Those in pilot study will be excluded from the

final sample of the study. The questionnaire was validated in previous studies^{6,7,18}. The questionnaire was distributed randomly among visitors in Arabic language to measure knowledge and perception of hearing loss and speech pathology. The same questionnaire was distributed once before going through the booths and then again after passing through hearing and speech development booths to identify the effect of the campaign as an interventional medium to raise awareness.

Questionnaire criteria

The overall awareness score toward hearing loss, hearing management and speech development was calculated by identifying the correct score for each question which were coded as 1 while the incorrect answers were coded with 0. Awareness to hearing loss and hearing management were composed of 11 and 13 questions, respectively. The awareness of speech development consisted of 4 questions. The total awareness score related to hearing loss, hearing management and speech development was obtained by adding all questions related to each domain, the higher the score, the higher awareness toward hearing loss, hearing management and speech development and by using the mean score obtained from each domain, participants above the mean were considered to have good awareness whereas those below the mean were considered to have poor awareness toward hearing loss, hearing management and speech development.

Ethical consideration:

Data collectors obtained a verbal consent from participants after explanation of the questionnaire and its purpose and before filling the questionnaire. All data were anonymous with no identifiers and used for research purposes only. Aggregate data were used for this publication.

Statistical Analysis

Descriptive statistics were presented using numbers, percentages mean and standard deviation, whenever applicable. The relationship of the socio demographic characteristics and the assessment of awareness toward hearing loss, hearing management and speech development before and after interventions had been conducted using Chi-square test. On the other hand, the statistical association between the awareness score of hearing loss, hearing management and speech development before and after interventions had been performed using independent t-test or Mann Whitney U test (non-parametric), as appropriate.

Results

Table 1
Socio demographic characteristics of
participants before and after interventions

Study Data	Overall N (%) (n=660)
Age Group	
16– 25 years	358 (54.2%)
26 – 35 years	172 (26.1%)
36 – 45 years	90 (13.6%)
46 – 65 years	40 (06.1%)
Gender	
Male	250 (37.9%)
Female	410 (62.1%)
Marital Status	
Never been married	418 (63.3%)
Been married	242 (36.7%)
Educational status	
Diploma or below	162 (24.5%)
Bachelor or higher	498 (75.5%)
Previous visit to audiologist	
Yes	158 (23.9%)
No	502 (76.1%)

A total of 330 participants were recruited in the study who filled the survey twice (once before the intervention and then after the intervention) with a total of 660 responses collected. Table 1 represent sociodemographic characteristic of 330 participants. The participants age group range from 16 – 65 years with mean of 27.8 ± 9.47 years. The most common age group was 16 – 25 years old (54.2%) with majority of participants being females (62.1%) and predominantly have never been married (63.3%). With respect to educational status, three quarters of them held bachelor degree or above (75.5%). Regarding audiologist visits, a little below one-fourth of them (23.9%) had visited audiologist.

Table 2
Assessment of awareness toward hearing and hearing loss before and after interventions

Statement	Overall N (%) (n=660)	Before N (%) (n=330)	After N (%) (n=330)	P-value §
1. Importance of hearing test:				
Greatly important *	319 (48.3%)	128 (38.8%)	191 (57.9%)	<0.001 **
2. Hearing test indication:				
Everyone *	436 (66.1%)	198 (60.0%)	238 (72.1%)	<0.001 **
3. Cause of hearing difficulties:				
Ear infection *	27 (04.1%)	21 (06.4%)	06 (01.8%)	<0.001 **
Noise (e.g. MP3 players, music) *	43 (06.5%)	35 (10.6%)	08 (02.4%)	
Some medications (e.g. TB, HIV, Malaria) *	33 (05.0%)	14 (04.2%)	19 (05.8%)	
Family member having a hearing loss *	79 (12.0%)	46 (13.9%)	33 (10.0%)	
Wax *	52 (07.9%)	29 (08.8%)	23 (07.0%)	
4. Referring to whom in case of hearing difficulties:				
Clinic *	200 (30.3%)	110 (33.3%)	90 (27.3%)	0.268
Doctor *	412 (62.4%)	195 (59.1%)	217 (65.8%)	
5. Hearing test location:				
Clinic *	125 (18.9%)	79 (23.9%)	46 (13.9%)	<0.001 **
Hospital *	172 (26.1%)	87 (26.4%)	85 (25.8%)	
6. Used to relief ear itching:				
Nothing *	180 (27.3%)	56 (17.0%)	124 (37.6%)	<0.001 **
* Signifies correct answer				
§ P-value has been calculated using Chi-square test.				
** Significant at $p \leq 0.05$ level.				

Table 2 (cont'd.)
Assessment of awareness toward hearing and hearing loss before and after interventions

Statement	Overall N (%) (n=660)	Before N (%) (n=330)	After N (%) (n=330)	P-value §
7. Music or noise can damage your hearing:				
Yes *	347 (52.6%)	171 (51.8%)	176 (53.3%)	0.008 **
8. Excessive loud noise can damage your hearings:				
Yes *	512 (77.6%)	239 (72.4%)	273 (82.7%)	0.010 **
9. Sounds that can damage hearing:				
All of the above *	265 (40.2%)	134 (40.6%)	131 (39.7%)	<0.001 **
10. Ear infection cause hearing loss:				
Yes *	274 (41.5%)	101 (30.6%)	173 (52.4%)	<0.001 **
11. Materials used to clean ears:				
Nothing *	108 (16.4%)	36 (10.9%)	72 (21.8%)	<0.001 **
* Signifies correct answer				
§ P-value has been calculated using Chi-square test.				
** Significant at $p \leq 0.05$ level.				

Table 2 described the assessment of awareness toward hearing and hearing loss before and after interventions. Based on the results, we have learned that, a little below a half of them (48.3%) believe that it is greatly important to examine hearing and two third of them (66.1%) thought that this statement should be applied to everyone. The most common cause of hearing difficulties was family history of hearing loss (12.0%), followed by noise i.e. MP3 players or music (6.5%). When asked to whom should consult in case of hearing difficulties, the majority of the participants answered visiting a doctor (62.4%) and clinic (30.3%). When asked where can hearing test be done, half of them indicated private doctor (50.6%), followed by hospital (26.1%). The most frequently cited items to be used when ears are itchy was cotton buds (48.5%). Furthermore, more than a half of them (52.6%) believe that music or noise can damage hearing while a great proportion of them (77.6%) thought that excessive loud noise can damage hearing. The most commonly mentioned sounds that can damage hearings was listening to cellphone (12.6%), although 40.2% of them believe that music in car, listening to MP3 player and listening to cell phone were particularly damaging to the hearing. In addition, approximately 42% of them considered ear infection as a cause of hearing loss. The most frequently cited material to clean ears was cotton buds (59.2%) followed by wet cloth (17.3%). When comparing the assessment toward hearing and hearing loss before and after interventions, it was found that, statement such as; "Importance of hearing test" ($P < 0.001$), "Hearing test indication" ($P < 0.001$), "Cause of hearing difficulties" ($P < 0.001$), "Hearing test location" ($P < 0.001$), "Used to relief ear itching" ($P < 0.001$), "Music or noise can damage you hearing" ($P = 0.008$), "Excessive loud noise can damage your hearing" ($P = 0.010$), "Sounds that can damage hearing" ($P < 0.001$), "Ear infection cause a hearing loss" ($P < 0.001$) and "Materials used to clean ears" ($P < 0.001$) were all significantly influenced by the educational campaign material as an intervention medium.

Table 3
Assessment of awareness toward hearing management before and after interventions

Statement	Overall N (%) (n=660)	Before N (%) (n=330)	After N (%) (n=330)	P-value §
1. Deafness diagnosed shortly after birth:				
True *	475 (72.0%)	218 (66.1%)	257 (77.9%)	0.001 **
2. Deaf-mutes cannot speak because of defects in the vocal tract:				
False *	456 (69.1%)	209 (63.3%)	247 (74.8%)	0.001 **
3. Hearing loss cause attention deficits thus reducing school performance:				
True *	526 (79.7%)	247 (74.8%)	279 (84.5%)	0.002 **
4. Cotton buds are necessary for ear cleaning and are the safest means:				
False *	385 (58.3%)	171 (51.8%)	214 (64.8%)	0.001 **
5. Ear drops are sufficient to treat earache				
False *	380 (57.6%)	205 (62.1%)	175 (53.0%)	0.018 **
6. Otitomycosis (itchy ears) can be contracted at the swimming pool:				
True *	515 (78.0%)	254 (77.0%)	261 (79.1%)	0.510
7. Drug abuse does not provoke auditory hallucinations or modifications of hearing quality:				
False *	515 (78.0%)	260 (78.8%)	255 (77.3%)	0.638
8. Hearing aids need to fit accurately to provide the maximum benefit:				
True *	591 (89.5%)	281 (85.2%)	310 (93.9%)	<0.001 **
9. Slaps on the ears do not cause hearing problems:				
False *	522 (79.1%)	263 (79.7%)	259 (78.5%)	0.702
10. Listening to music > 3h a day using earphones may cause permanent hearing loss				
True *	423 (64.1%)	204 (61.8%)	219 (66.4%)	0.224
11. No tables recommend reduction in the duration of exposure to high intensity noises				
False *	371 (56.2%)	173 (52.4%)	198 (60.0%)	0.050 **
* Signifies correct answer				
§ P-value has been calculated using Chi-square test.				
** Significant at $p \leq 0.05$ level.				

Table 3 (cont'd.)
Assessment of awareness toward hearing management before and after interventions

Statement	Overall N (%) (n=660)	Before N (%) (n=330)	After N (%) (n=330)	P-value §
12. Sudden hearing loss is an emergency and requires an immediate audiological assessment:				
True *	608 (92.1%)	298 (90.3%)	310 (93.9%)	0.083
13. Age-related hearing loss affect behavior:				
True *	548 (83.0%)	265 (80.3%)	283 (85.8%)	0.062
* Signifies correct answer				
§ P-value has been calculated using Chi-square test.				
** Significant at $p \leq 0.05$ level				

In table 3, it showed the assessment of awareness toward hearing management before and after interventions. Following the results, a little below 3 quarters of them (72%) thought that the possibility of deafness in infants can be diagnosed shortly after birth. Furthermore, majority of participants (69.1%) don't believe that deaf-mute cannot speak due to defects in vocal tract. While nearly all of them (79.7%) believe that hearing loss may cause attention deficits which affected their school performance. Moreover, approximately 60% of them don't believe that cotton buds are necessary for ear cleaning and 57.6% of them also disagreed that the ear drops are sufficient enough to treat earache. Likewise, a great proportion of them (78%) believe that Otomycosis can be contracted at the swimming pool. Meanwhile 78% of them disagreed that drug abuse does not provoke auditory hallucinations or modifications of hearing quality. In regards to the used of hearing aids, nearly all of them (89.5%) agreed that it need to fit accurately to provide the maximum benefit. Most of them (79.1%) disagreed that slaps on the ear may cause harm to hearings. Additionally, about two third of them (64.1%) agreed that listening to music for more than 3 hours per day using earphones may cause permanent hearing loss. More than a half of them (56.2%) opposed that no tables recommending a reduction in the duration of exposure to high intensity noises. Whereas almost all (92.1%) agreed that sudden hearing loss is an emergency and requires an immediate audiological examination. Most of participants (83%) concurred that age-related hearing loss may affect behavior. In the comparison of assessment of awareness toward hearing management before and after interventions. It was revealed that, the following statements that were significantly influenced by the intervention were; "Deafness diagnosed shortly after birth" (P=0.001), "deaf-mutes cannot speak because of defects in the vocal tract" (P=0.001), "hearing loss may cause attention deficits (P=0.002), "Cotton buds are necessary for ear cleaning" (P=0.001), "Ear drops are sufficient to treat earache" (P=0.018), "Hearing aids need to fit accurately" (P<0.001) and "There are not tables recommending a reductions in the duration of exposure to high intensity noises" (P=0.050).

Table 4
Assessment of awareness toward delayed language development before and after interventions

Statement	Overall N (%) (n=660)	Before N (%) (n=330)	After N (%) (n=330)	P-value §
1. Awareness of Delayed Language Development (DLD) disorder in children:				
Yes *	533 (80.8%)	247 (74.8%)	286 (86.7%)	<0.001 **
2. Advice to parent of a child with DLD:				
Consult a doctor *	602 (91.2%)	290 (87.9%)	312 (94.5%)	0.010 **
3. Best doctor in treating DLD:				
Phoniatician *	318 (48.2%)	122 (37.0%)	196 (59.4%)	<0.001 **
4. Age to seek medical advice for delayed language:				
Two years *	471 (71.4%)	201 (60.9%)	270 (81.8%)	<0.001 **

In the assessment of awareness toward language development before and after interventions, the study showed that nearly all (80.8%) were aware of the DLD disorder in children and participants were significantly more aware after the intervention (P<0.001). The study also observed that to consult a doctor was the main advice for a parent with 2-year-old child with delayed language, and this was also significantly more after the intervention (P=0.010). The most frequently mentioned specialized doctor who were capable of treating DLD in children was phoniatician (48.2%) which was likewise significantly more after the intervention (P<0.001) and the most common age in which the parents should seek medical advice for a child with delayed language was two years (71.4%) which was significantly higher after intervention (P<0.001) (Table 4).

Figure 1 depicted the sources of information about DLD disease in children. It was determined that the most commonly cited sources of information were relatives and acquaintances (40.5%), followed by internet (33.4%) and media (26.1%).

Table 5:

Table 5
Descriptive statistics of the overall awareness toward Hearing Loss, Hearing Management Modalities, Speech and Language Pathology before and after interventions

Awareness Domains	Overall	Before	After	P-value ^a
	Mean ± SD	Mean ± SD	Mean ± SD	
	(n=660)	(n=330)	(n=330)	
Awareness Total Score				
Hearing loss (Score =11)	5.43 ± 1.78	5.09 ± 1.78	5.77 ± 1.72	<0.001 **
Ear and Hearing Management (Score = 13)	9.57 ± 1.96	9.24 ± 1.93	9.90 ± 1.94	<0.001 **
Speech development (Score = 4)	2.92 ± 0.98	2.61 ± 0.99	3.22 ± 0.87	<0.001 **
Level of Awareness	N (%)	N (%)	N (%)	P-value ^b
Hearing Loss				
Poor	348 (52.7%)	201 (60.9%)	147 (44.5%)	0.001 **
Good	312 (47.3%)	129 (39.1%)	183 (55.5%)	
Ear and Hearing Management				
Poor	300 (45.5%)	175 (53.0%)	125 (37.9%)	<0.001 **
Good	360 (54.5%)	155 (47.0%)	205 (62.1%)	
Speech development				
Poor	196 (29.7%)	142 (43.0%)	54 (16.4%)	<0.001 **
Good	464 (70.3%)	188 (57.0%)	276 (83.6%)	
^a P-value has been calculated using Independent t-test.				
^b P-value has been calculated using Chi-square test.				
** Significant at p≤0.05 level.				

Table 5 showed the descriptive statistics of the overall awareness toward hearing loss, hearing management modalities, speech and language pathology before and after interventions. Based on our assessment, the overall mean score of hearing loss was 5.43 (1.78) out of 11 points and higher awareness score toward hearing loss was significantly more associated with after interventions ($P < 0.001$). For the awareness of ear and hearing management, the overall awareness score was 9.57 (SD 1.96) out of 13 points and the awareness toward ear and hearing management was also significantly more after interventions ($P < 0.001$). In the awareness toward speech development, we found that the total awareness score was 2.92 (SD 0.98) out of 5 points and the awareness toward speech development was significantly higher at after interventions ($P < 0.001$). With regards to the level of awareness toward hearing loss, we have learned that poor and good awareness had been detected to 52.7% and 47.3% of participants respectively. Accordingly, those with poor awareness were significantly less after intervention ($P = 0.001$). With respect to the level of awareness for ear and hearing management, we have known that, poor and good awareness were accounted to 45.5% and 54.5% of participants, respectively with good awareness were significantly better after interventions ($P < 0.001$). Finally, with regards to awareness toward speech development, we determined that good and poor awareness had been found among 70.3% and 29.7% of participants, accordingly with good awareness was significantly higher at after interventions ($P < 0.001$).

Statistical Association between the total score of awareness to hearing loss and the Socio demographic characteristics of participants before and after interventions:

When measuring the association between the total score of awareness toward hearing loss and the socio demographic characteristics of participants, we observed that before interventions, the older age group (>25 years) ($T = -4.324$; $P < 0.001$) and those who had been married ($T = -4.036$; $P < 0.001$) had significantly better awareness score. While on the other hand, male participants had significantly higher awareness toward hearing loss which was measured after interventions ($T = 2.833$; $P = 0.003$).

Statistical Association between the total score of awareness to ear and hearing management and the Socio demographic characteristics of participants before and after interventions:

The association measured between the total score of awareness toward ear and hearing management and the socio demographic of participants. Based on the results, the awareness score of those who had been married was significantly higher before interventions ($T = -1.623$; $P = 0.050$). We also found that the

awareness score of those with bachelor or higher degree was significantly higher compared to those with diploma or below which was measured after interventions ($T=-2.048$; $P=0.017$). On the other hand, age group and gender did not significantly influence the two types of interventions.

Statistical Association between the total score of awareness to speech development and the Socio demographic characteristics of participants before and after interventions:

The study evaluated the association between the total score of awareness to speech development and the socio demographic characteristics of participants before and after interventions. Based on our estimates, before interventions, older age group (>25 years) ($T=-2.537$; $P=0.010$), female participants ($T=-3.116$; $P=0.001$) and those who had been married ($T=-3.858$; $P<0.001$) were significantly more associated with having better awareness score while after interventions, only those who had been married showed significant increase in the awareness associated towards speech development ($T=-2.754$; $P=0.014$).

Discussion

the discussion starts with reminding the reader with purpose of the study and the most important and significant findings. Then you will compare and contrast your findings with other studies and tell us why the results were different if any.

Similar studies on the public awareness towards hearing loss were reported in the literature, such as that been carried by Joubert and colleagues on 297 households (18 years and older). However, in our study (75%) of participants held bachelor's degree or above while almost half of participants in Joubert's had only some form of high school education. Joubert and colleagues proposed a self-developed questionnaire targeting awareness of hearing, hearing loss and hearing health. The same questionnaire was used in our study, and results showed similarities regarding; hearing test indications, type of excessive noise that can damage hearing, music and noise can damage hearing. However, our sample had less knowledge about hearing test importance (38.8%) and ear infection causing hearing impairment (30.6%), but it was then significantly influenced by the educational intervention; hearing test importance (57.9%) and ear infection causing hearing impairment (52.4%)⁶. We need here to tell us why these differences occur: As difference in the population, education level, gender etc.

A study on the public awareness towards hearing management carried by Di Berardino and colleagues on 254 volunteers (aged 13 – 83 years), which our study adapted the questionnaire from. The results of our study were similar to that of Di Berardino's study on the questions of deafness in infancy, deaf-mute due to vocal tract, hearing causing attention deficits, otomycosis, drug abuse, slaps, listening to music, sudden hearing loss and age-related hearing loss affect behavior. Despite that, our sample had more knowledge about accurate fitting (89.5% answered correctly) as compared to (35.8%) from Di Berardino's study. On the contrast, our sample had less knowledge about noise exposure tables (56% answered correctly), cotton buds (58.3% answered correctly) and ears drops (57.6%) compared to (83%), (91%), and (95%) respectively from Di Berardino's study. It was also interesting to note that as much as (30.9%) believed that deaf-mute cannot speak due to defects in the vocal tract. Furthermore, our sample's mean age (27.8 ± 9.47 years) is younger than Di Berardino study's mean (51.83 ± 16.57 years). It was also revealed that the intervention has significantly influenced the following statements (1,2,3,4,5,8, and 11)⁷. Also here we need reasons for the differences and this is the most important part of the discussion.

Some other studies on the public awareness towards speech development have been reported in the literature such as that carried by Mostafa and Ahmed on 1380 volunteers who are aged 20 – 66 years with (40.7%) females and (59.2%) males. Likewise, in our study, ages were 16 – 65 with (62.1%) females and (37.9%) males. Volunteers' awareness of delayed language development disorder in children was assessed in both studies. In Mostafa's study, (74.4%) stated that they are aware, similarly, in our study, (74.8%) stated that they are aware before the intervention, which has been significantly influenced after the intervention (86.7%). Comparably, our study sample and Mostafa's study sample had good knowledge about advising the parents of a child with DLD to consult a doctor with a percentage of (94.5%) and (81%) respectively. Regarding the age to seek medical advice for delayed language, (60.9%) of our sample has answered "2 years" before the intervention. On the contrast, in Mostafa's study, only (48.8%) has answered the same answer. This implies that our study sample has more knowledge about speech development even prior to our intervention than Mostafa's study sample¹⁸. Also here why you have this result, there should be an explanation (s). Moreover, it implies that our intervention had a significant effect on the public awareness.

Nevertheless, the previously mentioned studies were only limited to awareness on hearing loss⁶, hearing management⁷ and speech pathology¹⁸. While, our study combined these domains all together in the questionnaire. Moreover, our study used an intervention medium (the campaign) to compare knowledge and awareness on hearing loss, hearing management and speech pathology which revealed significant increase in knowledge in various domains of the questionnaire.

Conclusions

Hearing loss is a disabling condition that greatly impacts daily living. In this study, the sample of the general public of adults did not have a medical background. Although the participants had some level of knowledge before intervening with an educational campaign, the intervention showed a significant improvement in their level of knowledge. The survey targeted three areas of hearing loss awareness which are hearing loss causes, speech pathology, language pathology and its management which have all improved after the intervention. This highlights the important effect of intervening using educational campaigns to raise the awareness especially in such conditions where prevention and early management is of great value.

Limitation And Recommendation

This study like many others was subjected to some limitation throughout the course of it. The study was conducted in one urban region (Al-Khobar), consequently affecting the generalizability of the study finding to other regions in the province and the country. The sample size was influenced by the time

restraints and the availability of people at the campaign who were willing to participate, and thus may have hindered the collection process. Another limitation of this study is the length of the survey and its process required the participant to fill it first then listen to the explained educational material of the campaign and then filling the same

survey again, possibly making participants give random answers by the end of the survey. This study showed significant increase in the level of the awareness following the intervention, hence its recommended to implicate more interventional educational campaigns among general public in other regions of Saudi Arabia. Furthermore, there is a lack of locally made studies regarding the public awareness of hearing loss, hearing management and speech and language pathology, the study recommends further research to identify the level of knowledge and perception on hearing loss among general public in Saudi Arabia.

List Of Abbreviations

Delayed Language Development (DLD)

Declarations

Ethics approval and consent to participate:

Approval was granted by the IRB committee at the Imam Abdulrahman University. All participants signed an informed consent.

Consent for publication:

Not applicable; the study is anonymous.

Availability of data and material:

all data generated or analyzed during the study are included in this article and its supplementary information files.

Competing interests:

there is no conflict of interest.

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Authors' contribution:

all authors participated in the study design, data analysis, writing and editing of manuscript. All authors read and approved final manuscript.

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Figures

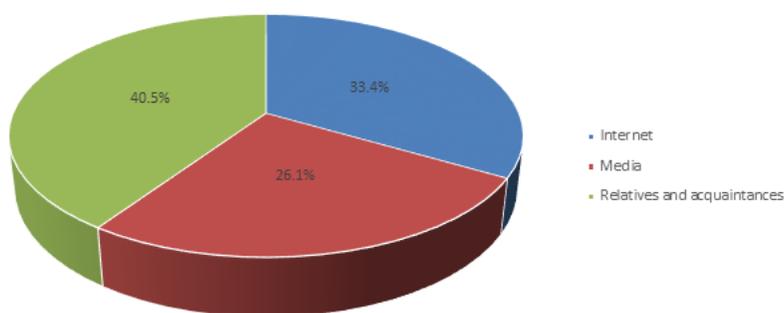


Figure 1

Sources of information about Delayed Language Development disease in Children again we do not need the fig

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