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Parents' awareness of ear health in Madinah region, Saudi Arabia

Reenad Hussain Bedaiwi^{1*} , Marzouqi Abdulaziz Salamah² and Roa Talal Halawani³

Abstract

Background: Hearing is fundamental for language acquisition and socioemotional development. Public awareness of ear health and hearing loss is essential for early intervention and treatment, but the level of parents' awareness of ear health in Madinah region, KSA, is yet unknown.

Objectives: To evaluate parents' awareness of ear health and hearing loss in Madinah region, Saudi Arabia.

Methods: This is a cross-sectional study. It had been conducted with a 2 months' duration (October to November 2020). A self-administered electronic questionnaire was distributed among 1577 Saudi parents using simple random sampling. Non-Saudi parents and those who live outside Al-Madinah region were excluded.

Results: Out of 1577 parents who participated in the questionnaire, 65.3% were mothers, and 34.7% were fathers. Females had the highest mean of correct responses compared to males ($0.745 \pm .1265$ vs $0.743 \pm .1335$). Furthermore, the mean number of correct responses differed significantly among various age groups ($P = 0.001$). Parents aged 50–59 years old had the highest mean of correct answers ($.758 \pm .1247$).

The educational level had been also significantly associated with awareness level ($P = 0.011$). Parents who completed their intermediate school had the highest mean of correct answers ($.803 \pm .1219$). Also, high monthly income had been significantly associated with parents' awareness level ($P = 0.002$).

Conclusion: Parents' awareness of ear health is good, particularly among older aged parents and high monthly income groups. Thus, we suggest implementing an educational program/material to be available for new parents as well as the general population.

Keywords: Awareness, Hearing loss, Ear health, Madinah, Saudi Arabia

Background

Hearing is fundamental to language acquisition, good academic performance and social engagement [1]. Hearing loss in early childhood harms education, speech, language, and socioemotional development [1, 2]. It also leads to stigmatization that may lead to parental denial of the condition as well as creating a social cost as a long-term effect [1, 3].

For prevention and early treatment, a public understanding of ear health and hearing loss is important [2].

Hearing impairment can be attributed to hereditary, acquired, and unknown causes, which represent 50%, 25%, and 25% in consequence, respectively [3]. Consanguineous marriage is one of the most important risk factors of hereditary hearing impairment [1, 3]. Acquired causes include congenital infections, birth asphyxia, hyperbilirubinemia, and childhood infections including measles, mumps, meningitis, and otitis media [3].

Several studies have been conducted to determine the awareness and treatment of ear diseases in the public. One of these studies was conducted in Italy and showed that women knew more about non-verbal people with extreme hearing loss and the use of cotton buds for cleaning than men [2]. In addition, there is another study

*Correspondence: reenad.bedaiwi@gmail.com

¹ ENT Department, KFMC, Riyadh, Saudi Arabia

Full list of author information is available at the end of the article

conducted in South Africa showed that there was a lack of knowledge about audiologists and their role in hearing health [4]. Furthermore, another study conducted in India showed the importance of awareness and education about hearing loss in the community. It was found that parents unfamiliar with this knowledge were less likely to understand that delayed speech production and speech response could be due to hearing loss [3]. The World Health Organization estimated that 360 million people suffered from hearing loss, of whom 32 million were children. Furthermore, it was noted that 60% of hearing loss in childhood was preventable. In low-and middle-income countries (75%), this figure is higher, while in high-income countries, it is low (49%) [5]. The highest prevalence of disabling hearing loss was found in South Asia, Asia-Pacific, and sub-Saharan Africa, where access to health care facilities has been difficult. These difficulties have been attributed to poor public awareness, geographical barriers, and limited resources and healthcare professionals. These problems also extend to urban and rural regions and developing countries [2].

Parental awareness of risk factors associated with childhood hearing loss is essential, as most of them are preventable. Therefore, it is critical to study parental understanding of ear health and the risk factors that affect hearing. Our study aimed to assess parents' awareness of ear health in Al-Madinah region, which is considered one of the biggest cities in Saudi Arabia, with a population of 1,489,000 in 2020 [6].

Methods

Study setting and participants

This is a descriptive cross-sectional study with an analytical component that had been conducted among parents from October to November, 2020. An electronic questionnaire was distributed by trainee data collectors. The participants accessed the survey link through their phones. Non-Saudi parents and those who lived outside the Al-Madinah region were excluded. Before completing the questionnaire, guidance on the intent of the study was provided, and an informed consent was obtained. We also added the WHO Arabic educational site link at the end of the survey, where the participants could get more information and answers for any query which they might have (<https://www.who.int/ar/news-room/factsheets/detail/deafness-and-hearing-loss>).

The study relied on the selection of a simple random sample from the study population. The sample size was calculated using the sampling equation $n = [\sigma z/E]^2$. The inputs entered were standard deviation, estimated from the pilot study equal to 0.5, z equal to 1.96, and E represents the allowable margin of error (AMOE) equal to 0.05. These inputs yielded a sample size of at least 384

participants. The researchers applied the questionnaire to 1577 parents to avoid classification errors.

Questionnaire (Annex 1)

The self-administered electronic survey with its Arabic version was adopted from Alshehri et al. [2]. It consisted of two sections:

1. The first section included personal and sociodemographic information.
2. The second section aimed to assess knowledge and perception of ear health and hearing management among parents (Table 1).

The participants were instructed to evaluate each sentence from the questionnaire as either true or false.

Validity and reliability

1. Validity
 - a. Face validity

The questionnaire was evaluated by a group of experts, academics, and specialists, who were asked for their opinion on every paragraph in the questionnaire. They also judged its suitability for measuring what was the identification designed to measure.

- b. Internal consistency

Internal consistency refers to the consistency of each paragraph of the questionnaire with the axis that belongs to that specific paragraph. Correlation coefficients were calculated to verify the validity of the questionnaire. Results were considered significant at $P = 0.05$. The results indicate validity consistency of internal data in the study, where values of correlation coefficient ranged for all phrases in all study axes between 0.398 and 0.906, and these values were significant at $P = 0.05$.

2. Reliability

Cronbach's alpha method was used to calculate the reliability of the data collected through the study tool (questionnaire) at a 95% confidence interval. This was 0.796 (95% CI 0.671–0.889), indicating the presence of high reliability.

Performing tests of validity and reliability after applying the questionnaire to the parents revealed high validity and reliability of the questionnaire. Accordingly, the data collected from the study sample were considered

Table 1 Questionnaire to evaluate parents' awareness of ear health and hearing loss

Statement	Correct response
Infant hearing loss	
1. It is possible to diagnose deafness in infants shortly after birth	True
2. A deaf-mute cannot speak because of defects in the vocal tract	False
3. Hearing loss may cause attention deficits, thus reducing school performance	True
Cleaning and treating	
4. Cotton buds are necessary for ear cleaning and are the safest means	False
5. Ear drops are sufficient to treat earache	False
6. Otitomycosis (itchy ears) can be contracted at the swimming pool	True
7. Drug abuse does not provoke auditory hallucinations or modifications of hearing quality	False
8. Hearing aids need to fit accurately to provide the maximum benefit	True
Physical agents and overexposure	
9. Kisses or slaps on the ears do not cause hearing problems	False
10. Listening to music for more than 3 h a day using earphones may cause permanent hearing loss	True
11. There are no tables recommending a reduction in the duration of exposure to high-intensity noises	False
Diagnostic delay	
12. Irritating perception of sound (e.g., hearing metallic voices) and/or a reduction in hearing clarity (such as a sensation of having cotton wool in the ears) require medical advice	True
13. Sudden hearing loss is an emergency and requires an immediate audiological assessment	True
14. Age-related hearing loss may affect behavior	True

good and suitable for analysis and also representable to population.

Statistical methods (data collection and analysis)

Data were entered and analyzed using the software Statistical Package for Social Scientists (SPSS) version 26 (IBM Corp., Armonk, NY), using the statistical methods required to achieve the objectives of the study.

Descriptive statistics were presented as frequencies and percentages for categorical variables and as a measure of central tendency (median) and measure of dispersion (minimum-maximum) for continuous variables.

Associations between independent variables (age, gender, marital status, educational level, monthly income, employment status and work field, number of children in the family, age of the youngest child, and so on) and the outcome measure (knowledge of infant hearing loss, management of ear problems including cleaning and treating, effects of overexposure to noise, and underestimated ear symptoms leading to diagnostic delay) were tested using one-way analysis of variance (ANOVA) and independent *t*-tests. *P*-value ≤ 0.05 was considered significant.

Results

Of the 1577 parents who participated in the questionnaire, 65.3% were mothers, 34.7% were fathers, 36.8% were 40–49 years old, and 28.5% were 30–39 years old. The vast majority of the participants were married,

employed, and had a higher degree of education/post-graduate degree (93.1%, 62.5%, and 79.7%, respectively).

Regarding monthly income of the participants, 28.9% had an income between 5000 and 10,000 riyals, 27.4% had a monthly income between 10,000 and 15,000 riyals, and 22.3% had an income between 15,000 and 20,000 riyals.

The average number of children in a family among the Al-Madinah residents was around three with a standard deviation of 2, while the average age of the youngest child in the family was 5.64 ± 4.44 years.

In addition, 23.2% of the participants' children were exposed to second hand smoke. Of these, 41.2% were frequently exposed to auditory noise.

The percentages of participants who reported that their children had been diagnosed with hearing loss and had a positive family history of hearing loss were 5.5% and 23%, respectively. The demographics of the participants are presented in Table 2.

In the true/false questionnaire, there were 14 statements, and the mean number of correct responses was 10.42 ± 1.81 . The thirteenth statement had the highest rate of correct responses (95.2%), while the second statement had the lowest rate of correct responses (32.3%). The prevalence of correct responses for all questions is shown in Table 3.

We concluded from Table 4 that there were statistically significant differences in parents' awareness of ear health according to age (*P*-value = 0.001 < 0.05).

Table 2 Demographic characteristics of the participants (n = 1577 parents)

		Frequency	Percent
Gender	Male	548	34.7
	Female	1029	65.3
Total		1577	100.0
Age	Less than 20 year	26	1.6
	20–29	211	13.4
	30–39	450	28.5
	40–49	580	36.8
	50–59	310	19.7
Total		1577	100.0
Marital status	Married	1468	93.1
	Divorced	72	4.6
	Widow/er	37	2.3
Total		1577	100.0
Educational level	Illiterate	5	.3
	Primary school	18	1.1
	Intermediate school	37	2.3
	High school	260	16.5
	University and above	1257	79.7
Total		1577	100.0
Monthly income	Less than 5000	186	11.8
	5000–10000	455	28.9
	10000–15000	432	27.4
	15000–20000	351	22.3
	More than 20,000	153	9.7
Total		1577	100.0
Employee	Yes	985	62.5
	No	592	37.5
Total		1577	100.0
If you are an employee, in which domain	Health domain (medicine, nursing, pharmacy, laboratory, nutrition, physiotherapy)	120	12.2
	Educational domain (teacher)	586	59.5
	Administrative domain	151	15.3
	Media domain (television, media, social media...)	18	1.8
	Others	110	11.2
Total		985	100.0
Exposure of the child to secondhand smoke	Yes	366	23.2%
	No	1211	76.8%
Total		1577	100.0
Do you have any relatives with hearing loss:	Yes	363	23.0
	No	1214	77.0
Total		1577	100.0
Was your child diagnosed with hearing loss	Yes	86	5.5%
	No	1491	94.5%
Total		1577	100.0
Is your child exposed to noise frequently	Yes	649	41.2%
	No	928	58.8%
Total		1577	100.0

Table 2 (continued)

		Frequency	Percent
Number of children in family:	Minimum	0	
	Maximum	16	
	Mean	3.33	
	Std. deviation	2.12	
Age of youngest child	Minimum	0	
	Maximum	26	
	Mean	5.64	
	Std. deviation	4.44	

Table 3 The percentage of correct responses to the true or false questionnaire among parents ($n = 1577$)

Domain	No.	Item	No. of correct responses	Frequency
Infant hearing loss	1.	It is possible to diagnose deafness in infants shortly after birth	1201	76.2%
	2.	A deaf-mute cannot speak because of defects in the vocal tract	509	32.3%
	3.	Hearing loss may cause attention deficits, thus reducing school performance	1387	88.0%
Cleaning and treating	4.	Cotton buds are necessary for ear cleaning and are the safest means	1131	71.7 %
	5.	Ear drops are sufficient to treat earache	1254	79.5 %
	6.	Otomycolosis (itchy ears) can be contracted at the swimming pool	1145	72.6%
	7.	Drug abuse does not provoke auditory hallucinations or modifications of hearing quality	1215	77.0 %
Physical agents and overexposure	8.	Hearing aids need to fit accurately to provide the maximum benefit	1496	94.9 %
	9.	Kisses or slaps on the ears do not cause hearing problems	1129	71.6%
	10.	Listening to music for more than 3 h a day using earphones may cause permanent hearing loss	1025	65.0 %
Diagnostic delay	11.	There are no tables recommending a reduction in the duration of exposure to high-intensity noises	869	55.1 %
	12.	Irritating perception of sound (e.g., hearing metallic voices) and/or a reduction in hearing clarity (such as a sensation of having cotton wool in the ears) require medical advice	1418	89.9%
	13.	Sudden hearing loss is an emergency and requires an immediate audiological assessment	1502	95.2%
	14.	Age-related hearing loss may affect behavior	1156	73.3%

According to the LSD test, it appears that the age group 20–29 is significantly different from both age groups 40–49 and 50–59.

And the age group 30–39 is significantly different from both the 40–49 age group and the 50–59 age group.

The educational level had been also significantly associated with awareness level ($P = 0.011 < 0.05$). According to the LSD test, it appears that the primary group is significantly different from the preparatory group, and the preparatory group is significantly different from the secondary group.

For monthly income, there is a significant association between parents' awareness and economic status (P -value = $0.002 < 0.05$).

According to the LSD test, it appears that the monthly income group 5000–10,000 is significantly different from both the 15,000–20,000 group and the 20,000 or more group.

And the monthly income group 10,000–15,000 is significantly different from the 15,000–20,000 group.

In addition, the work field had been significantly associated with parents' awareness level (P -value = $0.009 < 0.05$).

According to the LSD test, it appears that the health field group is significantly different from both the administrative field group and the others.

And the educational field group is significantly different from both the administrative field group and the

Table 4 The mean of correct responses to True/False Questionnaire among the study participants ($n = 1577$)

	N	Mean	Std. deviation	T-test/F-test	Sig
Gender					
Male	548	.743	.1335	0.374	0.708
Female	1029	.745	.1265		
Age					
Less than 20 year	26	.709	.1123	4.804	0.001
20–29	211	.718	.1460		
30–39	450	.737	.1321		
40–49	580	.754	.1208		
50–59	310	.758	.1247		
Marital status					
Married	1468	.746	.1277	2.709	0.067
Divorced	72	.710	.1453		
Widow	37	.739	.1391		
Educational level					
Illiterate	5	.743	.1195	3.278	0.011
Primary school	18	.690	.1530		
Intermediate school	37	.803	.1219		
High school	260	.733	.1382		
University and above	1257	.746	.1263		
Monthly income					
Less than 5000	186	.742	.1295	4.331	0.002
5000–10000	455	.728	.1328		
10000–15000	432	.742	.1325		
15000–20000	351	.762	.1155		
20000 or more	153	.763	.1302		
Job					
Employee	985	.746	.1261	0.409	0.683
Unemployed	592	.743	.1335		
Work field					
Health field (medicine, nursing, pharmacy, laboratories, nutrition, physiotherapy)	120	.765	.1358	3.392	0.009
Educational field (teacher)	586	.752	.1193		
Administrative field	151	.727	.1291		
Media field (TV and media, social media ...)	18	.738	.1225		
Others	110	.717	.1409		
Exposure of child to second hand smoke					
Yes	366	.726	.1295	3.108	0.002
No	1211	.750	.1283		
Do you have any relatives with hearing loss:					
Yes	363	.740	.1308	0.780	0.436
No	1214	.746	.1284		
Does your child diagnosed with hearing loss					
Yes	86	.738	.1276	0.453	0.651
No	1491	.745	.1290		
Does your child exposed to noise frequently					
Yes	649	.748	.1269	0.865	0.387
No	928	.742	.1303		

others, although there is no significant difference among the mean of correct responses between employees and unemployed.

Regarding exposure of a child to second-hand smoke, non-smoker parents had the highest mean of correct responses compared to the smoker ones ($0.750 \pm .1283$ vs $0.726 \pm .1295$, respectively). These results show statistically significant differences (P -value = $0.002 < 0.05$).

Details of the mean number of correct responses within the study participants are presented in Table 4.

Discussion

In this study, we administered a questionnaire about general knowledge of ear health and hearing management and received answers from 1577 parents who live in Madinah, Saudi Arabia. Our results show that most answers to each question were correct.

Our study showed that the mean number of correct responses was 10.42 ± 1.81 . The mean number of correct answers among mothers was higher than that among fathers (0.745 ± 0.1265 vs. 0.743 ± 0.1335 , respectively). This is in agreement with the results of Bernardino et al. [7] and Alshehri, KA et al. [2], who found that females had the highest rate of correct answers. This can be attributed to that mothers are more likely be responsible for the care of other family members' health. However, there was no statistical significant difference between parents' awareness level and gender (P -value = $0.708 > 0.05$) [2, 7].

The highest rate of correct responses (95.2%) was for the statement "Sudden hearing loss is an emergency and requires an immediate audiological assessment," while the statement "a deaf-mute cannot speak because of defects in the vocal tract" had the lowest rate of correct responses (32.3%), followed by "no tables are recommending a reduction in the duration of exposure to high-intensity noises" with a response rate of (55.1%).

The response rate of "hearing aids need to fit accurately to provide the maximum benefit" had a response rate of (94.9%) in our study, compared to Alshehri et al. who reported that the highest correct answer rate was (93%), while in Lass's study, it was 82.6% [2, 8].

Our study showed that there was a significant relationship between parents' awareness of ear health and age (P -value = $0.001 < 0.05$). Participants aged 50–59 years had the highest rate of correct responses. While those less than 20 years of age had the lowest the lowest correct response rate. This result agrees with the results of Alshehri, KA et al. [2]. Those authors reported also a significant relationship between parents' awareness level and age. They reported that participants of 40 years or older had the highest rate of correct answers which should be explained by increased exposure as

participants age increased. They also reported that those aged ≤ 18 years with the lowest rate of correct answers [2].

Similarly, according to the results of Di Bernardino et al. [7] and Alshehri, KA et al. [2] study, there was no significant relationship between awareness of ear health and exposure to noise [2, 7]. Our findings also suggest that there is no substantial correlation between awareness of ear health and family history of hearing loss. On the other hand, the study of Alshehri, KA et al. [2] reported a reversed relationship, indicating that participants with affected relatives were less likely to realize that ear drops were inadequate to treat earache ($P < 0.0001$) [2].

With an average score of 10.42 out of 14, our research demonstrates good understanding of ear health and hearing loss, while lack of information in others could affect ear health and well-being. For example, lack of knowledge about delayed speech development and delayed response to speech could be attributed to hearing loss, delayed patient diagnosis, and its response to treatment, which agree with data reported in Merugumala et al. [5]. Furthermore, lack of knowledge about the harms of using cotton buds, listening to loud noises for a long duration, recommended duration of noise exposure, and the association between misbehavior and hearing loss in the elderly leading to delayed diagnosis and management of hearing loss [2, 9, 10].

The variation in the level of awareness in the study findings among the participants indicates the need for educational programs to be implemented on new parents as well as the general population.

The limitation of our study is that we need to perform a nationwide-survey to assess awareness of ear health and hearing loss among the entire population in Saudi Arabia.

Conclusions

The overall awareness of ear health and hearing loss management among parents in Madinah was fair. However, we need more educational programs to be implemented to raise parents' awareness. Furthermore, the development of more broad-national screening programs at various age groups will aid in the prevention, early diagnosis, and management of HL.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s43163-022-00232-y>.

Additional file 1: Annex 1. Questionnaire.

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Authors' contributions

RB (Main Author)- Collecting data and writing the manuscript. MS - writing the manuscript. RH - writing the manuscript. All authors have read and approved the final version of the manuscript.

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Availability of data and materials

Data are available on request from the authors.

Declarations**Ethics approval and consent to participate**

Ethical approval was obtained from Ohud Hospital and the Institutional Review Board, General Directorate of Health Affairs in Madinah, with project number H-03-M-084. All research procedures were performed in accordance with the Declaration of Helsinki on ethical principles for medical research involving human subjects [11]. Before completing the questionnaire, guidance on the intent of the study was provided and an informed consent was obtained.

Consent for publication

Our manuscript does not contain data from any individual person. Not applicable.

Competing interests

The authors declare that there are no other relationships or activities that could appear to have influenced the submitted work.

Author details

¹ENT Department, KFMC, Riyadh, Saudi Arabia. ²King Abdullah Ear Specialist Center(KAESC), College of Medicine, King Saud University Medical City(KSUMC), King Saud University, Riyadh, Saudi Arabia. ³ENT Department, Ohud Hospital, Madinah, Saudi Arabia.

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