

Oral Health Knowledge and Attitude of Caregivers and Oral Health Status of Children with Hearing Impairment

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Abstract: Aim: This study was carried out to determine the prevalence of oral health problems and treatment needs of children with hearing loss, and to assess the parents' and/or caregivers' attitude and knowledge towards oral health care. **Subjects and Methods:** This study was performed on a hundred children and their parents, attending the Hearing and Speech Institute, Imbaba, Giza, for audiological examination. The age of the children ranged from 3-12 years old. Data was collected through a questionnaire-based survey; the children were examined for dental caries experience, unmet treatment needs, oral hygiene level, dental occlusion, oral habits and teeth abnormalities. The history of dental visits and frequency of tooth brushing were recorded. The dmf, def and DMF indices were used for caries assessment and the OHI-S was used for oral hygiene assessment. The oral health attitudes and behavior of parents were recorded using the HU-DBI questionnaire.

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1. Introduction:

Hearing loss is the most common sensory deficit in childhood. At least 2-3 children per thousand have some level of permanent congenital hearing loss. ^(1,2)

Studies in Egypt showed a higher prevalence, where the age group 0-4 years had a high frequency of hearing loss 22.4- 23.11%, and between 6-12 years was 10- 12.19%. Heredity and infection were pointed as the main etiologies of hearing loss in Egypt. ^(3,4)

Infants and young children with permanent hearing loss almost always experience delayed development of speech, language and cognitive skills, which results in slow learning and difficulty progressing in school. ⁽²⁾

Several studies have shown that the best predictors for proper cognitive, language, communication, social and emotional development are: neonatal screening and early detection of hearing loss, high level of parental participation, use of hearing aids and early cochlear implantation. ⁽⁵⁻¹⁰⁾

Children with developmental disabilities often have unmet complex health care needs as well as significant physical and cognitive limitations. Children with more severe conditions and from low-income families are particularly at risk with high dental needs and poor access to care. Characteristically, it has been reported, 'dental treatment is the greatest unattended health need of the disabled'. ⁽¹¹⁻¹³⁾

Parents are the principal decision makers in matters of healthcare for children; thus, they play an imperative role in achieving the best oral health outcomes for their young children. It's therefore expected that preventive oral health behavior of parents would influence their children's behavior in adapting preventive oral health practices as they grow along, and also their treatment choices. ⁽¹⁴⁻¹⁶⁾

2. Subjects and methods:

The target population in this study was a hundred children and their parents attending the Hearing and Speech Institute, Imbaba, Giza, for audiological examination.

All children had to be diagnosed as having any degree of hearing loss to be included. Their age ranged between 3-12 years old. They were selected irrelevant to their gender i.e. females and males were included. Patients free from any systemic disease or medical conditions other than hearing loss were included.

The hearing assessment by audiological evaluation was performed through tympanometry, audiometry, and auditory brain stem response (ABR).

The patients' use of hearing aid was determined as monoaural or binaural, regular or irregular, and the age at which the patient started using the aid.

Informed consents were obtained from the parents, after explaining the aim of the study. Data was collected through a questionnaire-based survey,

where assessment of dental caries and oral health status for each child was performed using a patient assessment chart.

The children were examined for dental caries experience, unmet treatment needs, oral hygiene level, dental occlusion, oral habits and teeth abnormalities. The history of dental visits and frequency of tooth brushing were recorded.

The dmf, def, DMF and def+DMF indices were used for caries assessment, UTN index for unmet treatment needs and the OHI-S was used for oral hygiene assessment.⁽¹⁷⁻²²⁾

Oral health attitudes and behavior of parents or caregivers were recorded using the Hiroshima University- Dental Behavioral Inventory (HU-DBI). The English version of the questionnaire was used, which was developed by Kawamura *et al.*, 1988. Two additional items were added by the examiner to assess the oral hygiene behavior and diet knowledge of the parents. The questionnaire was translated into Arabic.^(23, 24)

The children were examined on an ordinary chair in the audiology clinic using a hand torch for illumination. All were examined by a single examiner, using disposable mirrors and dental explorers.

Data was tabulated, and statistical analysis was performed using Chi square comparison test, Pearson's or Spearman's correlation tests and independent t-test.

3. Results:

Age and Gender distribution of the children: (figure 1)

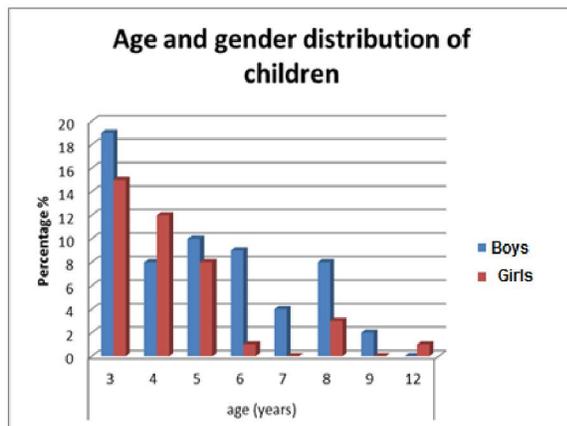


Figure (1): Bar chart showing description of age and gender distribution of the children under study

Oral Health Status:

- Regarding the caries experience, 48% of the children included in this study had dental caries. The mean values of dmf, def, DMF and def+DMF were (3±4, 5±4, 0±1 and 5±4), respectively.

- Regarding the unmet treatment needs, the mean percentage of UTN index was 64.5±42.67%, as shown in table (1).

Table (1): Description of caries indices and UTN index of the children under study:

	M	±SD
d	2	4
m	0	0
e	1	2
f	0.10	0.539
D	0	1
M	0	0
F	0	0
dmf	3	4
def	5	4
DMF	0	1
def+DMF	5	4
UTN%	64.5	42.67

- Regarding the oral hygiene of the patients, the mean values of the CI-S score and DI-S were (0±0 and 1±0), respectively.

- The OHI-S scores were good in 76%, and fair in 24% of the patients, with a mean value of 1.18±0.59, as shown in figure (2).

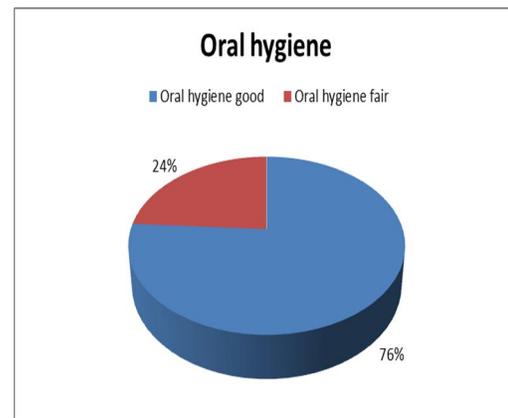


Figure (2): Pie chart showing description of oral hygiene level of the children under study

- Malocclusion was found in 51% of the patients, while 41% exhibited abnormal oral habits and 14% had teeth abnormalities.

- The percentage of children with a previous history of dental visits was 21%, while 79% never visited the dentist.

- The frequency of toothbrushing among the children was 5%, 32% and 63%, for regular, irregular and no toothbrushing, respectively.

- The children were divided according to the frequency of hearing aid use into three groups: regular, irregular and no use of aid. Their percentages were 23%, 33% and 44%, respectively.

Regarding the comparison between the frequency of hearing aid use of the children with hearing loss, to their history of dental visits and frequency of toothbrushing, there was no significant difference with neither of history of dental visits nor the frequency of toothbrushing, as shown in figures (3, 4).

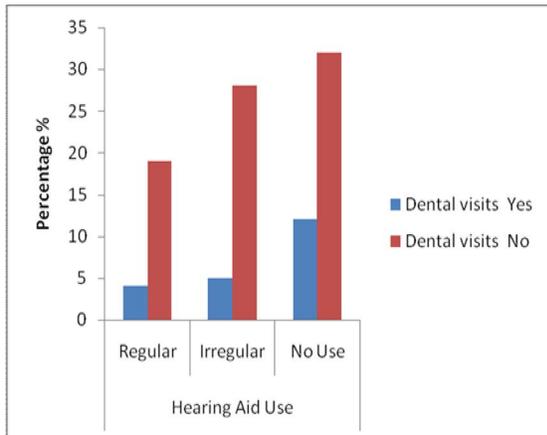


Figure (3): Bar chart showing comparison of frequency of hearing aid use to the history of dental visits of children under study

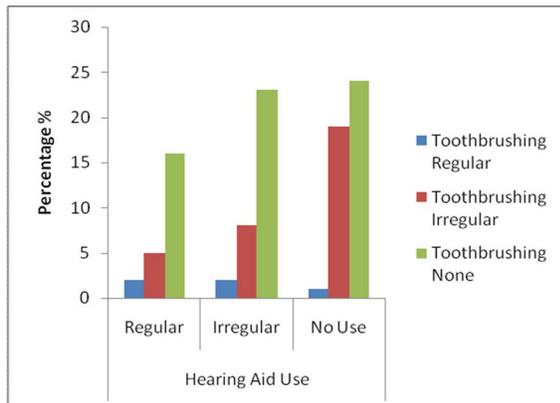


Figure (4): Bar chart showing comparison of frequency of hearing aid use to the frequency of toothbrushing of children under study

- The children were divided according to the severity of hearing loss into 3 groups: mild and moderate, moderately severe and severe, and severe to profound and profound. Their percentage was 15%, 26%, and 59% respectively.

Regarding the comparison between these groups of children, to their unmet treatment needs index, a significant difference was found with the mild and moderate, and the severe to profound and profound groups ($p < 0.05$), as shown in figure (5).

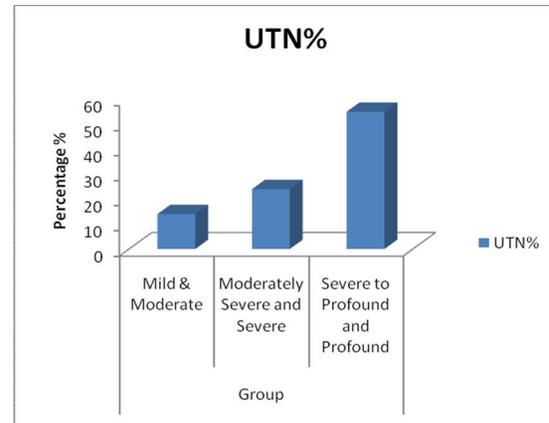


Figure (5): Bar chart showing comparison of groups with different severity of hearing loss to the unmet treatment needs of children under study



Figure (6): Bar chart showing comparison of groups with different severity of hearing loss to the mean OHI-S of children under study

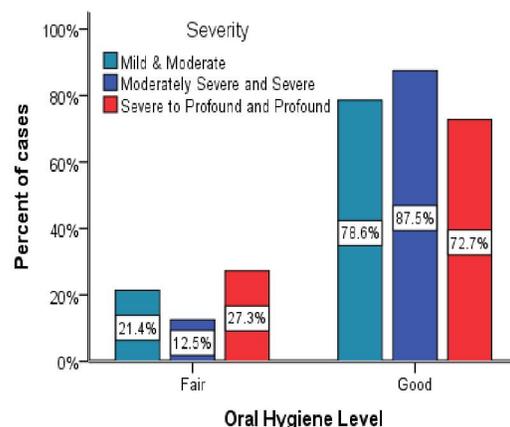


Figure (7): Bar chart showing comparison of groups with different severity of hearing loss to the oral hygiene levels of children under study

Regarding the comparison between these groups of children, with the OHI-S index and the oral hygiene

level, there was no significant difference with neither of the OHI-S index nor the oral hygiene level, as shown in figures (6, 7).

The results of the HU-DBI questionnaire were as follows: (table 2).

Table (2): Description of parent's attitude, behavior, self-reported oral health and diet knowledge:

	Total Score	Gender		
		Male Percentage %	Female Percentage %	
Oral Health Attitude	Item (3) I worry about the color of my teeth.	0	2	2
	Item (6) I think I cannot help having false teeth when I am old.	1	11	11
	Item (7) I am bothered by the color of my gums.	2	20	11
	Item (13) I worry about having bad breath.	3	15	10
	Item (14) It is impossible to prevent gum disease with toothbrushing alone.	4	8	4
Missing value		6		
Oral Hygiene Behavior	Item (4) I have noticed some white sticky deposits on my teeth.	0	9	3
	Item (9) I brush each of my teeth carefully.	1	9	17
	Item (10) I have never been taught professionally how to brush.	2	20	10
	Item (12) I often check my teeth in a mirror after brushing.	3	15	7
	Item (A) I brush my teeth twice daily or more.	4	7	3
Self-reported Oral Health	Item (2) My gums tend to bleed when I brush my teeth.	0	33	27
	Item (15) I put off going to the dentist until I have toothache.	1	26	14
Knowledge	Item (B) I know that carbohydrates are cariogenic foods.	0	20	16
		1	39	25

- Parent's oral health attitude, oral hygiene behavior, self-reported oral health and dental visits, and diet knowledge were compared and correlated with unmet treatment needs, OHI-S, dental occlusion, oral habits and teeth abnormalities of the children under study.

- A weak positive correlation was found between the parent's oral health attitude and oral hygiene behavior in relation to dental occlusion and teeth abnormalities of the children.

- A weak positive correlation with a significant difference was found between the diet knowledge of the parents and the unmet treatment needs of the children.

- A weak positive correlation was found between the parents' self-reported oral health and

dental visits with unmet dental needs, OHI-S, dental occlusion, and teeth abnormalities of the children.

- A weak negative correlation was found between the parent's oral health attitude and oral hygiene behavior in relation to unmet treatment needs, OHI-S, and oral habits of the children.

- A weak negative correlation was found between the parent's diet knowledge in relation to OHI-S, dental occlusion, oral habits and teeth abnormalities of the children.

- Regarding the total score of the HU-DBI, the mean value was 4.6 ± 1.65 , indicating poor oral health attitude and behavior. There was no significant difference between male and female parents' scores, as shown in table (3).

Table (3): Comparison of parent's gender in relation to HU-DBI score:

	Gender	M	±SD	p-value
Total score	Male	4.67	1.863	0.717
	Female	4.52	1.578	

- A weak positive correlation was found between the parent's total score in relation to the unmet treatment needs of the children.

- A weak positive correlation with a significant difference was found between the parent's

total score in relation to the teeth abnormalities of the children.

- A weak negative correlation was found between the parent's total score in relation to the

OHI-S, dental occlusion, and oral habits of the children.

4. Discussion:

The results of this study showed that almost half of the patients with hearing loss under study had a caries experience, almost similar to the results obtained in India by **Kamatchy et al., 2003** and **Suma et al., 2011**^(25,26), higher than those obtained previously in the studies conducted in Egypt by **El Deeb, 2011**⁽²⁷⁾, Iran by **Ajami et al., 2007**⁽²⁸⁾ and India by **Reddy et al., 2013**⁽²⁹⁾, and lower than those obtained in the studies conducted in Saudi Arabia by **Al-Qahtani and Wyne, 2004**⁽³⁰⁾ and in India by **Avasthi et al., 2011**⁽³¹⁾.

Regarding the unmet treatment needs, almost two thirds of the children under study had unmet treatment needs, which agrees with the results recorded in Kuwait by **Shyama et al., 2001**⁽³²⁾, and in India by **Suma et al., 2011** and **Jain et al., 2013**^(26,33), where the largest component was the decayed component and the filled component was far lower.

Our results can be explained by lack of knowledge about caries prevention practices, lack of motivation, the low priority given to oral health care in the society, the restricted ability of these children to respond to instructions, and sometimes their inability to complain when there is mild pain; which causes the condition to go unnoticed until it reaches the acute phase. Also the low socio-economic status of the children included in this study; a factor that many studies had correlated to high levels of caries and poor oral hygiene. Moreover, oral health needs are competing with the already burdensome chronic health condition (**Reisine and Psoter, 2001, Rao et al., 2005, Jain et al., 2008, Oredugba and Akindayomi, 2008 and Jain et al., 2013**)^(34-37,33).

Regarding the oral hygiene, most of the patients had good level of oral hygiene. This result was better than those recorded in most previous studies where most patients showed a fair to poor level of oral hygiene (**El Deeb, 2011, Al-Qahtani and Wyne, 2004, Rao et al., 2005 and Reddy et al., 2013**)^(27,30,35,29). This may be explained by the fact that most of the children included in our study were in the primary dentition stage, while the children included in the studies mentioned above were mostly in the mixed and permanent dentition stages. **Rao et al., 2005**⁽³⁵⁾ observed that the mean OHI-S increased from primary dentition towards mixed dentition.

Regarding the comparison between the frequency of hearing aid use of the children with hearing loss, to their history of dental visits and frequency of toothbrushing, there was no significant difference with neither history of dental visits or the frequency of toothbrushing. This can be explained by

the generally poor socio-economic status of the sample's parents. Also the lack of specialty centers in most Egyptian governorates; most children in our study were rural residents, they have to travel to receive medical care. A study held in Burkina Faso had shown that rural and underprivileged people had lower dental attitude and knowledge about prevention of oral diseases (**Varenne et al., 2006**)⁽³⁸⁾.

The lack of dental insurance, the dental care cost and the communication barriers were recorded as the most common reasons for not receiving the dental care (**Kenney et al., 2008, Christensen et al., 2010 and Sandeep et al., 2014**)^(14,39,40).

The results of the HU-DBI questionnaire indicated poor oral health attitude and behavior. This is similar to the results obtained by **Abd El-Magied, 2013**⁽²⁴⁾ in Egypt, and less than the results obtained in Japan by **Okada et al., 2002 and Okada et al., 2008**^(41,42). This may be explained by culture variations, or vague understanding of the nature of some questions (**Abd El-Magied, 2013**)⁽²⁴⁾.

A weak negative correlation was found between the parent's oral health attitude and oral hygiene behavior in relation to unmet treatment needs, OHI-S, and oral habits of the children. This agrees with the results of **Arnrup et al., 2002, Okada et al., 2002, Okada et al., 2008, Adeniyi et al., 2009, Suresh et al., 2010 and Nagarajappa et al., 2013**^(43,41,42,44,45,15), where they concluded that a more positive parental attitude is related to a lower incidence of caries in the child, better child oral hygiene and more dental treatment received by the child. However, other studies like that conducted by **Poutanen et al., 2006 and Qiu et al., 2013**^(46,47) concluded that the parents' behaviors and not the attitudes that were associated with children's oral health behavior.

There was a weak positive correlation between the diet knowledge of the parents and the unmet treatment needs of the patients. This can be explained by the fact that the knowledge about cariogenicity of carbohydrates does not necessarily indicate that the patient is not consuming them (**Mani et al., 2010 and Shakya et al., 2013**)^(48,49).

The correlation between the unmet treatment needs and dental occlusion of the patients, with the total score of the HU-DBI, was different than that obtained upon correlating them with the parents' oral health attitude. This can be explained by the fact that the items used to evaluate the parents' oral health attitude were more collective in nature, separating the oral health attitude from the oral hygiene behavior (**Abd El-Magied, 2013**)⁽²⁴⁾.

On searching for studies conducted on the HU-DBI questionnaire, it was found that most studies used it on dental and medical students, rather than on

parents correlating them to their children's oral health status. That led to difficulties in comparing our results to many studies.

Conclusions:

1. Hearing impaired children have high prevalence of dental caries.
2. Preventive and restorative treatment needs are unmet in these children.
3. Malocclusion and/or oral habits are reported in children with hearing loss.
4. The frequency of hearing aid use is matching with the history of dental visits and the frequency of toothbrushing.
5. The parents of children with hearing loss had poor oral health attitude and knowledge.
6. The parents of the children with hearing loss have oral health attitude and oral hygiene behavior that are negatively correlated to unmet treatment needs, OHI-S and oral habits of their children.
7. The parents of the children with hearing loss have diet knowledge; however alone it is not enough, the implementation of this knowledge is equally important.

Recommendations:

1. Epidemiological surveys on larger number of children with hearing loss, followed by the implementation and evaluation of a long-range public dental health care plan for children with hearing loss is highly recommended.
2. Oral health care for children with hearing loss should be approached jointly with general health care in order to achieve a more holistic view of the individual's physiological and psychological well-being.
3. In order to prevent inequalities in dental care and orofacial health in children with hearing loss, it is important to:
 - a. Identify and give priorities to children with hearing loss.
 - b. Allocate resources in terms of finances and dental care personnel to these patients.
 - c. Access to general practitioners, pediatric dentists and orthodontists should be improved, and referral mechanisms established whereby high risk can obtain priority treatment.
4. Dental health education programs for both children with hearing loss and their parents should be conducted to improve their oral health knowledge and practices.

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