

Oral Health-related Quality of Life and Oral Hygiene of Children and Adolescents with Hearing Impairment

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ABSTRACT

Background: Hearing impairment affects communication and oral hygiene practices.

Aim: To determine the effect of dental education and motivation on oral health-related quality of life (OHRQoL) and oral hygiene in children and adolescents with hearing impairment.

Materials and methods: Ninety children aged 8–16 years were selected from a special school of hearing impaired. Their OHRQoL was assessed using child oral health impact profile short form (COHIP-SF) at baseline and at 12 months. Oral hygiene was assessed using Silness and Loe plaque index and Loe and Silness gingival index. Oral health education followed by motivational sessions once a month was carried out for 12 months. Data was statistically analyzed using student paired *t*-test and Karl Pearson correlation test. Level of significance was considered as 5%.

Results: COHIP score showed a significant improvement from 39.7 at baseline to 48.0 at 12 months ($p < 0.05$). A significant reduction was seen in plaque ($p = 0.002$) and gingival inflammation ($p < 0.05$) at 6 and 12 months. An inverse relation was seen between the COHIP score and gingival health.

Conclusion: OHRQoL of children and adolescents with hearing impairment significantly improved from baseline to 12 months.

Keywords: Hearing impairment, Oral health quality of life, Oral hygiene.

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INTRODUCTION

According to World Health Organization, 6.1% (466 million) of the global population has a hearing disability, and 34 million of these are children.¹ The main causes of hearing impairment include bacterial and viral infections such as measles, mumps, rubella and meningitis, genetic causes, complications at birth, including prematurity, low birth weight, and neonatal jaundice.² Children with sensory deficits have poor oral health as compared to normal children due to their inaccessibility to dental care and difficulties in communication.³

Children with hearing impairment (HI) are at a reduced likelihood of academic progress due to reduced cognitive skills.⁴ These children scuffle to communicate with their hearing parents, resulting in resentment on the part of parent and child. Furthermore, hearing guardians of deaf children will in general be more mandated and controlling in their interaction with the child.⁵ Parents of these children enroll them in schools for the deaf, where education is imparted through sign language. Hearing impairment affects behavior and impairs the ability of the child to participate in social activities.⁶ It could also influence their oral hygiene practices and quality of life.

Locker described the ways in which oral conditions influence the quality of life. Oral health is an essential component of general health and well-being and hence it has an impact on an individual's quality of life.⁷ An individual's perception of how his oral conditions influence his functioning and psychosocial well-being is known as oral health-related quality of life (OHRQoL).⁸ Initially, the child oral health impact profile (COHIP) a 34-item instrument was developed to measure OHRQoL in children aged 8–17 years.⁹ Later, a shorter version (COHIP-SF) was designed to assess self-reported oral health-related quality of life.^{9,10}

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As dental plaque (biofilm) is the main etiological factor for the development of dental caries and gingivitis, it is important to remove plaque regularly. The severity of gingivitis depends on tooth brushing frequency,¹¹ dental caries,¹² and diet.¹³ Toothbrushing is a simple and effective method to disrupt plaque and reduce micro-organisms. Children with sensory deficits may have limitations in understanding and practicing proper brushing. Teaching these children proper tooth brushing and monitoring them in school can prevent the onset of gingivitis.¹⁴

Measuring oral health-related quality of life can be useful in the determination of dental treatment needs of individuals at risk. Children with hearing disorders are reported to have more oral diseases. Educating these individuals and their caregivers can make them aware of the relationship between oral health and general well-being. Therefore, this investigation was carried out to determine the effect of dental education and motivation on OHRQoL and oral hygiene in children and adolescents with hearing impairment.

MATERIALS AND METHODS

Children aged 8–16 years were initially selected from a special school for the hearing impaired. Prior approval to carry out the investigation was taken from the Institutional Ethics Review Board. The purpose and protocol of the investigation were submitted to the school authorities, for granting permission. The study also briefly described to the parents and their written informed consent was taken. Ten children were excluded as permission for participation was not obtained. Thus, 90 children and adolescents formed the study group. Cooperative children and adolescents with good general health (ASA I and II) were included in the study. Anyone with systemic diseases/syndromes and uncooperative children was excluded from the study.

The severity of the hearing impairment in the children included in the study was mild to moderate (26–40dBHL to 41–55dBHL) and speech impaired. Children who had congenital and acquired hearing disabilities in early life were considered. Children in our study were able to follow the instructions and respond to the valuable information given by their class teachers in sign language. The oral health quality of life of these children and adolescents was determined at baseline using an abridged version of the child oral health impact profile (COHIP-SF).^{9,10} This 19-item questionnaire was given to each participant to determine their oral health, and functional and socioemotional well-being (Table 1). Instructions on how to answer the questions were explained by the teachers in sign language (gesture language). They were told to read every question carefully, understand it and then choose a response that most appropriately described them in the recent three months.

The responses were recorded as never (score 0), almost never (score 1), sometimes (score 2), fairly often (score 3), and almost all of the time (score 4). Positively worded items, (scores 3 and 4) imply the

better quality of life. Higher scores reflect a more positive OHRQoL, while lower values reflect lower OHRQoL.¹⁵

Oral examination was carried out at the school premises in a room assigned for the same, with each participant being made to sit in an erect posture. Dental plaque and gingival health were recorded using a sterilized mouth mirror and CPITN probe under artificial illumination.¹⁶

The children were then divided into smaller groups of 30 each for imparting oral health education. Oral hygiene instructions were given in a classroom by the investigator, with the assistance of two teachers who communicated with the children. Teachers were aware of the level of disability in the children. Same teachers were told about the study and they instructed all the children. Thus, standardizing the evaluation process. The class teachers who knew these children who helped in learning sign language were particularly selected for the study. So that children feel comfortable asking questions to the class teacher for any query.

Visual aids on oral hygiene instructions including models, and posters/charts were used. The participants were also made to view a customized educational video presentation using nonverbal communication. Additionally, one of the teachers interpreted with the sign language (gesture language). The video presentation included information on the etiology and development of dental caries, periodontal disease, tooth brushing technique, flossing, mouth rinsing, and diet. This was followed by the investigator demonstrating tooth brushing on dental models.

Oral prophylaxis was then carried out in all children and adolescents. If indicated, pit and fissure sealants were applied¹⁷ and teeth with d1, d2 carious lesions¹⁸ were restored using glass ionomer cement type II (GC Corporation, Tokyo, Japan).

Regular motivational sessions on oral hygiene practice were carried out by the investigator in the 2nd week of every month, over a period of twelve months. It included a demonstration of tooth brushing and dental flossing on dental models and a reiteration of the importance of mouth rinsing following meals. These instructions were reinforced by the teachers twice a week.

The plaque and gingival indices were recorded at 6-month intervals, as described earlier. At twelve months, the participants were again asked to complete the COHIP-SF questionnaire.

Data obtained was analyzed using Statistical Package for Social Sciences (SPSS) software V.22, IBM. Corp. Student paired *t*-test was applied to observe the difference in the mean scores of clinical parameters at different time intervals and the Karl Pearson correlation test was used to find the relationship between oral hygiene parameters and COHIP. The level of significance was considered at 5%.

RESULTS

There were 34 girls (37.8%) and 56 boys (62.2%) (Table 2) plaque index significantly reduced from baseline (1.41) to 6 months (1.31) and it continued to remain the same at 12 months ($p = 0.002$). Whereas, there was a more than 50% reduction in the Gingival Index scores at 6 and 12 months ($p < 0.05$) (Table 3).

Scores obtained for each of the items of well-being in COHIP increased significantly from baseline to 12 months ($p < 0.05$) Socioemotional well-being improved by 30.05%, followed by oral health well-being (15.63%) and functional well-being by 9.3%. The overall mean COHIP score increased by 20.9% at 12 months, which was significant ($p < 0.05$) (Tables 4 and 5).

Table 1: Items in child oral health impactprofile-short form^{9,10}

<i>Oral health—Well-being</i>
Had pain in your teeth/toothache.
Had discolored teeth or spots on your teeth.
Had crooked teeth or spaces between your teeth
Had bad breath.
Had bleeding gums.
Functional well-being
Had difficulty eating foods you would like to eat
Had trouble sleeping
Had difficulty saying certain words
Had difficulty keeping your teeth clean
Socio-emotional well-being
Been unhappy or sad
Felt worried or anxious
Avoided smiling or laughing with other children
Felt that you look different
Been worried about what other people think about you
Been teased, bullied or called names by other children
Missed school for any reason
Not wanted to speak/read out loud in class
Been confident
Felt that you were attractive (good looking)

Note: above questions end with “because of your teeth, mouth, or face”

Table 2: Age- and gender-wise distribution of study participants

Age (years)	Boys		Girls		Total	
	n	%	n	%	N	%
8	8	14.3	5	14.7	13	14.4
9	3	5.4	1	2.9	4	4.4
10	6	10.7	4	11.8	10	11.1
11	6	10.7	4	11.8	10	11.1
12	5	8.9	4	11.8	9	10.0
13	12	21.4	7	20.6	19	21.1
14	9	16.1	6	17.6	15	16.7
15	5	8.9	3	8.8	8	8.9
16	2	3.6	0	0.0	2	2.2
Total	56	62.2	34	37.8	90	100

Table 3: Comparison of mean scores of oral hygiene index at different time intervals

Oral hygiene variable	Time	Mean ± SD	t	p-value
Plaque index	Baseline	1.42 ± 0.51	3.233	0.002*
	6 months	1.31 ± 0.54		
	Baseline	1.42 ± 0.51	3.233	0.002*
	12 months	1.31 ± 0.54		
	6 months	1.31 ± 0.54
Gingival index	Baseline	1.79 ± 0.41	14.075	<0.001*
	6 months	0.62 ± 0.68		
	Baseline	1.79 ± 0.41	13.875	<0.001*
	12 months	0.63 ± 0.68		
	6 months	0.62 ± 0.68	-0.939	0.35
	12 months	0.63 ± 0.68		

*p < 0.05 is significant

Table 4: Comparison of oral, functional and socio-emotional well-being

Items in COHIP for well-being	Baseline (Mean ± SD)	Twelve months (Mean ± SD)	t	p-value
Oral health	12.8 ± 3.2	14.8 ± 2.9	-4.843	<0.001*
Functional	8.6 ± 1.5	9.4 ± 1.6	-3.894	<0.001*
Socio-emotional	18.3 ± 3.6	23.8 ± 4.7	-9.561	<0.001*

*p < 0.05 is significant

Table 5: Comparison of COHIP score

Time	Mean COHIP score		
	Mean ± SD	t	p-value
Baseline	39.7 ± 7.0	-8.744	<0.001*
12 months	48.0 ± 7.2		

*p < 0.05 is significant

At baseline, a significantly weak correlation was seen between plaque index and individual items of COHIP ($p < 0.05$). At 12 months, plaque index showed a weak negative correlation with functional well-being only and no correlation with socioemotional well-being. Whereas, the gingival index had a negative correlation with all items of well-being at baseline and at 12 months (Tables 6 and 7).

DISCUSSION

Oral health-related quality of life (OHRQoL) records one's wellbeing and perceptions. Although several studies have reported on

OHRQoL in children,^{19,20} reports on OHRQoL in children with hearing impairment are lacking.²¹ An abridged version of the child oral health impact profile (COHIP-SF) was used in the present study. The COHIP-SF is suitable for use in participants aged between 8 and 15 years because they have abstract thoughts, they can think logically in retrospect, and relate them to their experiences.

Children with hearing impairment can be at a higher risk of gingival inflammation due to poor oral hygiene. Although the participants were able to independently brush their teeth, it was merely performed without understanding the relationship

Table 6: Relationship between COHIP and oral hygiene at baseline

Oral hygiene Variables	COHIP							
	Oral health		Functional		Socio-emotional		Overall well-being	
	r	p-value	r	p-value	r	p-value	r	p-value
Plaque index	0.26	0.01*	0.21	0.04*	0.32	0.002*	0.32	0.002*
Gingival index	-0.05	0.61	-0.07	0.51	-0.10	0.33	-0.10	0.34

*p < 0.05 is significant

Table 7: Relationship between COHIP and oral hygiene at 12 months

Oral hygiene Variables	COHIP							
	Oral health		Functional		Socio-emotional		Overall well-being	
	r	p-value	r	p-value	r	p-value	r	p-value
Plaque index	0.08	0.47	-0.03	0.78	0.00	0.99	0.03	0.77
Gingival index	-0.15	0.15	-0.04	0.71	-0.07	0.51	-0.12	0.28

between a healthy mouth and overall general health. The mental health of children with hearing impairment (HI) is of concern as their social-emotional development may be negatively impacted by difficulties in communication.⁶ Thus, communication could be a reason for neglect by dental health providers. This study is unique in that oral health education was given to the children and adolescents with hearing impairment and its impact on their oral hygiene and OHRQoL was assessed.

In the present study, awareness and interest were created in the young minds through lectures and video presentations on oral hygiene and dental health. Providing preventive and restorative dental treatment at the beginning instilled a positive attitude and gained the confidence of both parents and their children.

The dental problems of hearing-impaired children can be affected by age, hearing loss severity, and living conditions. Such children should not recognize or take responsibility for cooperating with recommendations or procedures for preventive dental health. For oral hygiene, these children typically depend on parents, siblings or caregivers. Many caregivers are not educated or have no knowledge of oral hygiene for children with disabilities, as well as adequate nutrition for these children. They may go to unhealthy eating habits and thus lead to poor oral hygiene.

Maintenance of good oral hygiene in individuals with hearing impairment can be challenging. Therefore, in addition to teaching and demonstrating of tooth brushing and flossing, the monthly motivational sessions were found to be beneficial. The participation of teachers in motivation during the intervening period was invaluable. A significant reduction in plaque and improvement in their gingival health was seen in 6 months. Repetition and reinforcement have been reported to have a positive effect on health education programs.²²

Educating children who have difficulties in communication and comprehension requires patience and the assistance of trained teachers for the effective transfer of information. It may be time-consuming for dental practitioners to make these individuals comprehend the proper tooth brushing technique and the importance of good oral hygiene practices. However, they must be encouraged as components of oral health influence their standard of welfare.²³⁻²⁵

It was observed that the children with hearing impairment significantly improved their oral hygiene over 6-12 months, which greatly influenced their OHRQoL. It was reflected in their significantly better responses to the COHIP-SF.

The oral hygiene of the participants improved significantly and seemed to influence their responses given in the questionnaire on COHIP. A marked difference was seen in their perception regarding oral hygiene and overall well-being. Providing dental treatment and dental education with regular motivation by both the investigator and school teachers could have influenced their understanding of OHRQoL.

Quality of life measures are an evaluation of healthcare delivery systems. It determines the health services provided in a community. However, response to these tools is subjective and can differ among populations due to cultural and social variations.²⁴ Further studies with appropriate restructured questionnaires at the conceptual level are needed in order to make it more suitable for children with sensory deficits and also children having different kinds of disabilities.

Dental education with continuous motivation is crucial for promoting good practices in underserved young individuals with special health care needs so as to improve their quality of life.

CONCLUSION

OHRQoL of children and adolescents with hearing impairment significantly improved during the study period. Educating and motivating children had a large influence on their general welfare.

CLINICAL SIGNIFICANCE

Children with sensory deficits have compromised oral health thus their quality of life is also affected. Hence educating and motivating children with hearing impairment can improve their quality of life.

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