

Effect of Different Educational Methods on Oral Hygiene Status of 7-13-Year-Old Hearing-Impaired Children in Tehran

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ABSTRACT

Background and Aim: Hearing impairment is a leading challenge in the education of deaf children. Compared to normal children, hearing-impaired (HI) children have poor oral health due to a lack of communication skills and effective health educations. This leads us to search for a proper method to educate these children. The present study aimed to assess the effect of different educational methods on the oral health of 7-13-year-old HI children in Tehran.

Materials and Methods: In this clinical trial, 76 HI children, aged 7 to 13 years, were selected from elementary schools of deaf children in Tehran according to the entry criteria. They were examined, and the baseline plaque and gingival scores were recorded using the Silness and Loe plaque index (PI) and the Loe and Silness gingival index (GI). The children were randomly divided into two groups; one group was educated using a dental model, and the other group watched a guided training video. Oral health education was reinforced two weeks later. Reexamination was carried out 4 months later. Data were statistically analyzed using t-test with SPSS version 20.0.

Result: There was a significant reduction in plaque and gingival scores in both groups after health education ($P < 0.05$). The highest reduction in plaque and gingival scores was seen in the dental model group.

Conclusion: In a comparison between the two educational methods (dental model and video), training using a dental model is more efficacious in improving the oral health of HI children. Continuous school-based oral health education programs for HI children need to be considered.

Keywords: Health Education, Oral and Dental Health, Hearing Impairment, Children

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Introduction:

Oral health is a major determinant and an intrinsic part of general health. Children with poor oral hygiene are prone to oral health problems. Due to their systemic illness, children with hearing impairment face difficulty in good oral hygiene maintenance. Due to their inaccessibility to dental care because of communication barriers and lack of adequate oral health awareness, they have poor oral health status compared to normal children.⁽¹⁾ Plaque and gingival indices (PI and GI) in disa-

bled children are significantly different from those of non-disabled children after mechanical plaque control.⁽²⁾ One study in 2003 showed that, in a population of 12-15-year-old hearing-impaired (HI) children in Tehran, only 37.5% have healthy gingiva, and based on healthcare needs, 92% of the population required dental treatment.⁽³⁾ Another study on the oral and dental health status of 192 deaf students in Tehran, aged 12-16 years, showed a higher number of missing teeth in this group.⁽⁴⁾

Overall data show that the decay rate and treatment needs of HI children are higher than that of other children of the same age group. ^(5,6) Due to a disability in learning standard healthcare, this population needs more attention from dentists with preventive and therapeutic programs. ⁽⁶⁾ Different studies claim that education, whether direct or indirect, is effective for normal children, whereas, in HI children, a particular method is required for health education. Several researchers have investigated the effect of educational tools, such as personal instruction, self-educational manuals, and audio-visual aids. ⁽⁷⁻¹²⁾ Training with video clips and dental models has been approved to be effective in improving the oral health of HI children. ^(1,7,8,10) However, the efficiency of different methods has not been compared. Moreover, limited information in this regard in Iran and the importance of educating HI children compelled us to evaluate the effect of different educational methods on the oral hygiene status of 7-13-year-old HI children in Tehran.

Materials and Methods:

In this clinical trial, based on the inclusion criteria, 76 HI students, aged 7-13 years, were selected from four primary schools that provide education services for HI children in Tehran. The sample size was considered a minimum of 31 in each group according to PASS 11 two-sample t-test power analysis. The study protocol has been approved by the respective ethics committee (IR. IAU.DENTAL.REC.1398.026).

After explaining the subjective and the procedure of this study, written consent was obtained from the parents. Moreover, a questionnaire was filled regarding the diet of the children. According to the inclusion and exclusion criteria, children with other mental and physical disabilities, with a history of systemic diseases, with a history of antibiotic or steroid consumption in the past month, and those under orthodontic treatment were excluded from the study at baseline visit. ⁽⁸⁾

Next, the children were randomly divided into two groups; each group included one school for males and one for females. The students were trained on oral health using a dental model in one group and video in the other group. At each school, a trained examiner conducted the oral examination in a room under natural light using a

dental mirror; probing and all healthcare measures were also taken into consideration. ⁽¹⁾

The baseline gingival and plaque status was recorded using the Silness and Loe PI and the Loe and Silness GI. ^(13,14) Following the initial examination, packages of toothbrush (Panberes, Bushehr Polymer Industrial Group, Iran), toothpaste (1000 parts per million (ppm), Pooneh and Nasim, Goltash Co., Iran), and dental floss (Orkid, Tehran, Iran) were distributed among children to motivate them towards active participation in the program. On the same day, children were educated regarding the importance of good oral hygiene maintenance, and instructions were given on correct flossing and tooth brushing.

In the dental model group, the roll-on toothbrushing technique and flossing were demonstrated using a toothbrush and floss on a dental model. ⁽¹⁵⁾ A trained teacher explained all the instructions in sign language.

In the video training group, a five-minute muted video on the roll-on toothbrushing technique and flossing was shown on screen for children. This session was guided by a trained dentist with the help of a teacher who explained the content by sign language.

Two weeks later, all the instructions were repeated for both groups. Children in both groups were asked to brush and floss their teeth regularly for the next 4 months based on the instructions given. After four months, the same dentist reexamined them, and GI and PI were recorded.

The repeated measures analysis of variance (ANOVA) was used to determine the variation of indices in each group during the study period. The difference between the baseline value and that after the education was analyzed using a t-test according to the GI and PI of each group. The data were analyzed using SPSS 20 (SPSS Inc., Chicago, IL, USA).

Results:

Our samples included 76 students that met all the inclusion criteria of the study. Oral health education was given to 39 students using a dental model and to 37 students using a video clip. The distribution of gender and age was matched between the two groups (Table 1). The result of the diet status shows no significant difference in the time and frequency of food consumption between

Table 1. Demographic characteristics of children according to the two training methods

Groups	Gender		Age (year)
	Male	Female	
Dental model	16 (%41%)	23 (%59)	11±1.7
Training video	19 (%51)	18 (%48)	10.7±1.9
P-Value	0.367		0.448

the groups ($P=0.05$). The result of periodontal variables at the baseline and after 4 months indicates a significant reduction in plaque and gingival scores in the dental model group after health education ($P=0.002$).

There was a significant reduction in both indices in the video training group after 4 months ($P=0.002$).

The highest reduction of plaque and gingival scores was observed in the dental model group after 4 months ($P=0.51$) compared to the video training group ($P=0.25$) as shown by unpaired t-test (Tables 2 to 4).

Table 2. Mean and standard deviation (SD) for plaque index (PI) at baseline and 4 months after education

Groups	PI		Plaque score difference	SE	P-Value
	Baseline	4 months			
Dental model	0.94±0.29	0.47±0.23	0.47±0.25	0.04	0.002
Training video	0.64±0.32	0.37±0.28	0.27±0.27	0.02	0.002

SE=Standard Error

Table 3. Mean and standard deviation (SD) for gingival index (GI) at baseline and 4 months after education

Groups	GI		Gingival score difference	SE	P-Value
	Baseline	4 months			
Dental model	0.49±0.36	0.15±0.18	0.34±0.26	0.04	0.000
Training video	0.19±0.17	0.09±0.14	0.09±0.12	0.02	0.000

Table 4. Comparison between the two groups at the baseline and after 4 months.

Groups	Plaque index		Gingival index	
	Baseline	4 months	Baseline	4 months
Dental model	0.94±0.29	0.47±0.23	0.49±0.36	0.15±0.18
Training video	0.64±0.32	0.32±0.28	0.18±0.17	0.09±0.14
P-Value	0.47	0.51	0.00	0.25

Discussion:

The prime purpose of the present study was to evaluate the impact of two educational methods on the oral health status of HI children in Tehran. The findings have shown that education using a dental model and video under supervision leads to a reduction of plaque and gingival scores after 4 months. With both PI and GI, a higher reduction was seen in the dental model group, which indicates the importance of communication skills in education. This result agrees with a study performed by Alse et al, which showed a significant reduction of the decayed, missing, filled, surfaces (dmfs/DMFS) index in HI children under dental model instruction.⁽⁸⁾ Despite the difference in the study design and indices, the result approved the effectiveness of dental model education for these children.

Pouradeli et al used the O'Leary PI with similar methods as our study and showed a higher reduction in the PI of the video training group after one month.⁽¹⁰⁾ However, after 3 months, the two methods showed similar effects in improving oral health status.⁽¹⁰⁾ Sandeep et al revealed a significant reduction of PI and GI after 12 weeks of training with video compared to the control group.⁽¹⁾ In a study conducted by Arunakul et al on the effectiveness of oral hygiene instruction media on periodontal health among HI children, the samples were divided into three interventional groups, including training with video, illustrated books, and both.⁽⁹⁾

The results showed a significant reduction in the mean GI, bleeding index (BI), and PI after 3 months in all groups. Although there was a significant reduction from the baseline value in all

significant reduction from the baseline value in all groups, there was no significant difference among the groups.⁽⁹⁾

Oral health is a fundamental part of general health and well-being. People with special healthcare needs may be at an increased risk for oral diseases throughout their lifetime.⁽¹⁵⁾ In HI children, disability in communication and abnormal condition of the mouth and jaw structure lead to unfavorable oral hygiene. Education is one of the main factors contributing to behavioral change in a child; oral hygiene instruction is important to prevent gingival disease and decay and to promote a healthy lifestyle in children. To deliver high-quality health education, various approaches can be planned to have better communication as this is a key factor in conveying dental health education to HI children.⁽¹⁶⁾

Since sight is the most dominant sense of HI children, it is very important to determine dental health education methods that are visually intended for children with hearing impairment.⁽¹⁶⁾ Using animations can improve their thinking ability and motivate HI children to study. Yanti et al studied the effect of dental health education using cartoons on knowledge and oral hygiene of HI children aged 10-15 years.⁽¹⁷⁾ Training with cartoons and sign language was performed every day for a week. The results showed a significant reduction in the simplified oral hygiene index (OHIS) after a week.⁽¹⁷⁾ Even though the index used in the cited study is different from those used here, the authors reported significant improvement in oral hygiene after video training. Several studies have proven the positive effect of video training on deaf children's education. Accordingly, Ahmadi et al designed software for hygiene education of HI children in Tehran.⁽⁷⁾

Based on these findings, we selected animations, as one of the effective educational methods, which ranked second after dental models. This result agrees with the results of a study conducted by Shaalan et al.⁽¹⁸⁾ The reason for the improvement in oral hygiene status was that children were given personal attention in the form of an educational program.⁽¹⁸⁾ It was observed that children of the dental model group showed a keen interest

to learn during the demonstration. Additional attention and training were given to younger children until they coped. These indicate the effectiveness of communication skills and the importance of tactile sense experience in HI children.⁽¹⁸⁾

Dental floss can contribute to oral hygiene improvement.^(19,21) In this study, we introduced the correct way of dental flossing in our interventions. However, former similar studies did not consider this tool. Further studies with an emphasis on the use of dental floss by HI children are recommended.

Finally, it is hoped that the result of this study could provide an effective approach to improve healthy behaviors in HI children in Iran.

Conclusion:

There is a significant difference between the baseline PI and GI and those after 4 months in both groups. The reduction of indices was more significant in the dental model group, which indicates the importance of effective communication skills for HI children.

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