

Original Article

Parental Knowledge and Attitudes Towards Dental Health Behaviour: A Comparative Study of Oral Hygiene and Nutritional Practices in Children with Heart Conditions Vs. Healthy Children

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Abstract

Background: Parents of children with heart disease often fail to recognize the critical importance of maintaining optimal oral health. The attitudes of these parents significantly influence their children's oral care. Their lack of emphasis on proper oral hygiene and a nutritious diet may pose risks for odontogenic bacteremia and infective endocarditis. This study aimed to assess parents' knowledge of these diseases and their dental knowledge through a questionnaire.

Methods: This descriptive-analytical epidemiological study was carried out with parents of children aged 3 to 16 years, including both normal (n = 69) and heart disease (n = 69) groups, in Ahvaz, Iran, during the August 2022 and June 2023. A researcher-developed questionnaire was employed for data collection. To explore the relationship between knowledge and attitudes, Pearson's correlation coefficient and regression analysis were applied. The data were analyzed using SPSS software version 24, with a significance threshold set at P<0.05.

Results: The results of the present study showed that the average score of parents' knowledges in the control group was 78.27 and in the group of parents of patients with heart disease it was 62.31 and it is at a weak level. The level of attitude among parents of children in both groups is higher than average and the average score of parents' performance in the control group was 40 and in the group of parents of patients with heart disease it was 37.45, which is at the average level.

Conclusion: The results indicated that parents had limited knowledge about their children's oral health. However, their attitudes towards health and oral hygiene were positive. These findings highlight the necessity of enhancing parental knowledge about effective measures to improve dental health from the early stage of life.

Keywords: Dental Care; Heart Disease; Oral Health; Parental Awareness

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Introduction

The occurrence of congenital heart diseases (CHD) is estimated to be around 8-10 cases for every 1,000 live births. Complex anomalies represent nearly one-third of all children diagnosed with CHD (1). Children with heart defects are at a higher risk for oral diseases (2), including poor oral hygiene and increased cavities, which are more prevalent than in healthy children (3). Research indicates that this decline in oral health can lead to serious systemic issues, such as increased bacteremia, in one-third of these children (4). A systematic review revealed that children with CHD have a higher prevalence of dental caries than healthy children. Their increased susceptibility to caries and poor oral health is linked to frequent dietary intake, medications, and enamel defects (5). Additionally, the significant burden of CHD may contribute to neglect in oral health care, resulting in inadequate family oral health practices. Around 15% of infective endocarditis (IE) cases were linked to oral bacteria and followed recent dental procedures (6). Maintaining good dental health and hygiene is particularly vital for this patient group (7). For instance, many children with CHD face nutritional challenges in their early years. Young patients typically seek dental treatment only when their caries disease is advanced, often requiring restorations to be performed under general anesthesia (GA) (8). Studies indicate that 83% of these procedures are done under GA, which poses added risks for high-risk children due to the potential complications associated with anesthesia in the presence of other health conditions (9). Therefore, it is essential to prevent untreated cavities to mitigate the risks of dental sepsis and endocarditis.

Early intervention can improve the oral health of children at risk for infective endocarditis, but many parents are unaware of this issue (10). While they understand their children's heart conditions and medications, they often underestimate the risk of endocarditis (11). In contrast, Balmer *et al.* found that some parents were well-informed about oral health and endocarditis, yet their children's dental health was still lacking (10). Parents of children with heart diseases should be informed about the importance of primary oral and dental care during treatment to help prevent or minimize long-term complications (12).

Neglect of oral health in children with heart disease is primarily due to the disease's impact on their daily lives, making it challenging to maintain age-appropriate oral hygiene and diet (13). Additionally, hospitalization disrupts regular dental check-ups, and there is a lack of experienced pediatric dentists to treat these high-risk patients (6). The aim of oral health promotion is to enhance knowledge in the area and encourage individuals to adopt positive oral health behaviors that lead to better long-term oral health outcomes (5).

An observational controlled study by Suvarna *et al.* found that children aged 5 to 16 with CHD had poorer oral health due to a lack of knowledge about hygiene, though improvements were seen after preventive treatments (14). Another study evaluated a standardized preventive oral hygiene program for surgically treated CHD children, revealing that tooth brushing instructions and motivation helped reduce plaque and gingival inflammation (15). Additionally, early participation in an oral health program led to better hygiene, less gingival bleeding, and fewer untreated dentine caries compared to controls, although it did not show benefits for preventing dental erosion or caries (3). Children with CHD require specialized care due to their unique physiological characteristics, and their oral health needs significant attention and regular dental visits. Research indicates that these children often experience poorer oral health compared to healthy peers, largely due to guardians' lack of understanding about oral hygiene and the connection between oral infections and infective endocarditis (IE), along with associated health risks (16, 17). Preliminary research reveals that families with children who have CHD lack adequate disease knowledge and dental knowledge, performing worse than families without CHD (18). Studies show that only 79% of these children have seen a dentist, 29% received oral health guidance, and 13% were advised on fluoride use. Additionally, only 64% of parents understand the importance of oral health in CHD (10). Overall, fewer than 30% of children with CHD received preventive dental care advice, indicating a significant gap in parental knowledge that needs to be addressed to improve future oral health outcomes (19, 20).

The aim of the current study was to investigate

oral health behavior of parents of CHD children compared to healthy children. The research focused on two main questions: "What are parents' knowledge and performance related to the oral health of children with CDH?" and "What suggestions do parents have for improving the oral health to enhance its feasibility and applicability?"

Materials and Methods

The prospective study was approved by the local ethics committee of Ahvaz Jundishapur University of Medical Sciences. The study was designed according to the guidelines of the Declaration of Helsinki. All parents and legal guardians of the participating children provided written informed consent. The study was conducted between August 2022 and June 2023.

Study Participants

The study involved parents of pediatric patients (aged 3-16) with heart disease (case group) and a healthy control group. These patients were either hospitalized in the pediatric ward or ICU, or they sought outpatient treatment at the hospital's dental clinic. Additionally, 69 parents of healthy children (control group) were randomly selected from individuals visiting the pediatric clinics in Ahvaz.

Data Collection and Analysis

This study used a researcher-developed questionnaire based on Gupta *et al.* (21) to measure various aspects of oral and dental hygiene. Parents then completed a questionnaire addressing their child's general health, oral hygiene practices, preventive dental care, and food consumption. The questionnaire's content validity was confirmed by experts, and its reliability was established with a test-retest agreement coefficient of 0.72. It included three sections: demographic information (age, gender, residence, and parents' education), knowledge questions (ten items scored from 0 to 10), and performance questions (eight binary "yes" or "no" items). Results from the performance section were reported as percentages.

Statistical analysis was performed using SPSS® for Windows (version 25.0, IBM Corporation, Armonk, New York, NY, USA). Frequencies and percentages were computed for descriptive characteristics. Normally distributed quantitative data

were represented by the mean and standard deviation (SD), while non-normally distributed data were summarized using the median and range. Differences between the heart disease group and controls were evaluated using Chi-squared tests, T-tests for normally distributed data, and Mann-Whitney U-tests for non-normally distributed data. Statistical significance was defined as $\alpha = 0.05$.

Results

The study involved 69 children with CHD and 69 healthy children. The CHD group comprised 33 boys and 66 girls, while the control group included 36 boys and 33 girls. The average age was 4.11 ± 8 years for the CHD group and 4 ± 9 years for the healthy group (**Table 1**), with no significant age difference between the groups ($p > 0.05$).

The attitudes section showed that parents of children with CHD had an average score of 68.26, while parents of healthy children scored 66.66. Although parents of children with CHD demonstrated slightly higher attitudes toward oral and dental health, the differences between the two groups were not significant ($p = 0.368$) (**Table 2**).

The findings from the knowledge section indicated that the average knowledge score for parents of healthy children was 8 (out of 100), while for parents of children with CHD, it was 15.19 (out of 100). Parents of children with CHD demonstrated a greater knowledge of oral and dental health; however, no significant differences were found between the two groups regarding their knowledge levels ($p = 0.106$) (**Table 3**). Given the findings and the high incidence of interdental caries in children, it is essential to provide parents of children with CHD with proper training on the correct and regular use of dental floss to help prevent these caries.

The findings regarding parents' practices revealed that the average practice score for parents of children with CHD was 45.37 (out of 100), while for parents of healthy children, it was 40 (out of 100) (**Table 4**). Parents of children with CHD demonstrated better performance in terms of oral and dental health compared to those of healthy children, and this difference was significant ($p < 0.029$). It is crucial to focus on educating the parents of these children about oral and dental health. This includes understanding dental

Table 1. Descriptive Information on Age Distribution in the Healthy and CHD Groups

Groups	No.	Mean $\pm$ SD	p-value
Healthy Children	69	4 $\pm$ 9	0.068
Children with CHD	69	4.11 $\pm$ 8	

Table 2. Comparison of Parents' Attitudes in the Control Group and the CHD Group Regarding the Oral Health Status of Their Children

Groups	No.	Mean $\pm$ SD	p-value
Parents of Healthy Children	69	66.66 $\pm$ 11.50	0.368
Parents of Children with CHD	69	68.26 $\pm$ 9.11	

Table 3. Descriptive Information on the knowledge Score of Oral and Dental Health in Two Groups of Parents of Healthy and CHD Children

Groups	No.	Mean $\pm$ SD	p-value
Parents of Healthy Children	69	8 $\pm$ 20	0.106
Parents of Children with CHD	69	15.19 $\pm$ 3	

Table 4. Practice Scores of Two Groups: Parents of Healthy Children and Parents of Children with CHD in Observance of Oral and Dental Health

Groups	No.	Mean $\pm$ SD	p-value
Parents of Healthy Children	69	40 $\pm$ 15.53	0.029
Parents of Children with CHD	69	45.37 $\pm$ 12.91	

and gum issues related to CHD, the effects of the disease and medications on their oral health, and the significance of maintaining good oral hygiene.

Table 5 displays the sociodemographic characteristics of parents and their oral health knowledge and attitudes, showing no statistically significant differences in urban or rural residence concerning their oral health knowledge and attitudes between the CHD and comparison groups. Parents' jobs and the number of children were not associated with oral health knowledge and attitudes among the CHD and healthy groups. The results showed that maternal education level was significant in relation to oral health knowledge and at-

titudes; mothers with university education had a higher knowledge and better attitudes regarding their children's dental hygiene than mothers with secondary education and diplomas.

On average, the CHD group consumed more ice cream compared to the control group (**Table 6**), and this difference was statistically significant (Chi-square, $p < 0.05$). The intake of fruit, biscuits, chips, puffs, cake, and cookies was nearly the same in both groups. However, no significant difference was observed between the two groups in other food items ($p > 0.05$).

In addition, the survey of parents showed that the average age at which children with CHD start brushing their teeth is 4.10 years, while for healthy children in the control group, it is 4.60 years.

Discussion

Patients with systemic issues have different dental considerations and needs compared to healthy individuals, and knowledge of this is essential for the dentist, the patient, and their family. Among these conditions are heart problems, particularly in children with congenital heart disease, rheumatic heart disease, and valvular diseases, which should be taken into account (22). Patients with these conditions are susceptible to bacteremia and the development of infective endocarditis due to oral health issues and dental treatments (23). While infective endocarditis affecting heart valves is uncommon in children, it can result in serious and potentially fatal complications (24). The primary pathogenic bacteria involved in this situation are *Streptococcus viridans*, a normal component of oral flora. Thus, it is crucial to prevent its occurrence with antibiotics, particularly prior to dental procedures (20).

This study utilizes a questionnaire directed at parents of children with CHD in comparison to those of healthy controls. The results showed that the level of knowledge among parents of children in both groups has been low. A comparison of the level of knowledge of parents in the control group and the study group regarding the oral health of their children showed that the average knowledge score for parents in the control group was 27.78, while for parents of children with heart diseases it was 31.62, both of which fall within a low range. The results also indicated no significant difference between the average knowledge levels in the two

Table 5. Parents' Sociodemographic Characteristics and Oral Health knowledge and Attitudes among the CHD and Healthy Groups

Variable	Mean $\pm$ SD n = 138	
	knowledge	Attitudes
Residence		
urban	29.58 $\pm$ 13.92	67.46 $\pm$ 9.88
rural	31.33 $\pm$ 14.92	67.44 $\pm$ 16.69
p-value	0.718	0.995
Father's Job		
Employee	29.77 $\pm$ 13.42	68.58 $\pm$ 10/40
self-employment	29.30 $\pm$ 14.35	67.11 $\pm$ 10.01
other	30.68 $\pm$ 14/75	65.77 $\pm$ 11.43
p-value	0.923	0.511
Mother's Job		
employee	32.76 $\pm$ 13.83	67.30 $\pm$ 8.96
home keeper	28.98 $\pm$ 14.03	67.70 $\pm$ 10.72
other	27.84 $\pm$ 13.48	66.07 $\pm$ 11.38
p-value	0.384	0.866
Paternal Education		
secondary education	29.64 $\pm$ 10.15	67.96 $\pm$ 10.94
diploma education	32.36 $\pm$ 17.34	68.68 $\pm$ 8.76
university education	28.37 $\pm$ 13.06	66.68 $\pm$ 10.97
p-value	0.358	0.606
Maternal Education		
secondary education	26.48 $\pm$ 11.28	71 $\pm$ 9.19
diploma education	26.67 $\pm$ 12.59	65.02 $\pm$ 10.76
university education	32.72 $\pm$ 14.97	67.18 $\pm$ 10.36
p-value	0.034	0.057
Number of Children		
one child	29.21 $\pm$ 14.06	69.23 $\pm$ 10.52
two child	28.23 $\pm$ 12.89	66.49 $\pm$ 10.18
three child	33.06 $\pm$ 13.10	67.65 $\pm$ 10.80
More than three	28.76 $\pm$ 19.14	65.07 $\pm$ 9.72
p-value		

groups ($p > 0.05$), although the level was higher in the group of parents with children suffering from heart diseases. These results are consistent with other studies such as Dariushii (22), Sajadi (23), Schulz (20), Fallahinejad (25) and Noorollahian (26). Suvarna *et al.* in 2011 found that parents' knowledge regarding oral health was satisfactory, which is inconsistent with the results of our study. This difference is likely due to better education in the community they studied (17).

According to the study results, the majority of children brushed their teeth, but the average age for starting tooth brushing was 4.6 years for healthy children and 4.1 years for children with

heart disease, which is higher; however, in both groups, this age is significantly above the standard age for children to start brushing. Tooth brushing by parents was observed in only 17.4% of children with heart disease and 14.5% of healthy children, which is very low. A study indicated comparable tooth brushing habits between children with CHD and those who are healthy (27).

Children with heart conditions tend to have worse oral health than their healthy peers (7, 26). This can be attributed to several factors, including the ongoing use of medications with sweeteners, a rise in developmental enamel defects, and a lack of focus on oral hygiene due to heightened con-

Table 6. Nutritional Behaviour of Children in the Control Group and the Study Group Regarding the Oral Health Status of Children

Groups		children with CHD (percentage)	healthy children (percentage)	p-value
Nutrition Style				
Cake and Cookies	>3/Day	14.5	13	0.963
	1/Day	20.3	23.2	
	Every Few Days	26.1	29	
	Rarely	23.2	18.8	
	Never	15.9	15.9	
Fruits	>3/Day	20.3	17.4	0.777
	1/Day	15.9	24.6	
	Every Few Days	37.3	31.9	
	Rarely	20.3	20.3	
	Never	5.8	5.8	
Ice Cream	>3/Day	1.4	13	0.009
	1/Day	23.2	23.2	
	Every Few Days	33.3	24.6	
	Rarely	17.4	29	
	Never	24.6	10.1	
Chocolate	>3/Day	8.7	5.8	0.177
	1/Day	26.1	17.4	
	Every Few Days	21.7	40.6	
	Rarely	31.9	29	
	Never	11.6	7.2	
Cocoa Milk or Sweet Milk	>3/Day	11.6	5.8	0.141
	1/Day	18.8	31.9	
	Every Few Days	33.3	29	
	Rarely	21.7	27.5	
	Never	14.5	5.8	
Chips and Puffs	>3/Day	10.1	14.5	0.808
	1/Day	27.5	29	
	Every Few Days	39.1	31.9	
	Rarely	18.8	17.4	
	Never	4.3	7.2	
Soft Drink	>3/Day	8.7	5.8	0.764
	1/Day	15.9	26.4	
	Every Few Days	23.2	21.7	
	Rarely	33.3	30.4	
	Never	18.8	17.4	
Walnuts and Almonds	>3/Day	5.8	10.1	0.019
	1/Day	15.9	15.9	
	Every Few Days	27.5	42	
	Rarely	33.3	10.1	
	Never	17.4	21.7	
Biscuit	>3/Day	26.1	27.5	0.836
	1/Day	26.4	21.7	
	Every Few Days	18.8	26.1	
	Rarely	20.3	17.4	
	Never	10.1	7.2	
Milk	>3/Day	4.3	11.6	0.072
	1/Day	29	27.5	
	Every Few Days	20.3	26.1	
	Rarely	37.7	18.8	
	Never	8.7	15.9	

cern for the child's heart issues. In some cases, children with complex heart problems may experience anorexia, nausea, and vomiting, which can impact enamel health. Additionally, these children often eat more frequently at night, further compromising their oral health (28). Moreover, those taking ASA (acetylsalicylic acid) face a greater risk of gum bleeding (29). Our study indicates a poor knowledge among parents regarding these issues and a low level of attention to the oral health of their children. Regarding the frequency of toothbrush replacement, the majority of individuals replaced their toothbrushes every 4 to 6 months, which is an acceptable statistic. When it comes to visiting the dentist in case of bleeding during brushing, many parents of children with heart disease sought dental care, which significantly differed from parents of healthy children, who were more likely to overlook the bleeding.

Another objective of this research was to determine the attitudes of parents in both the control group and the study group regarding the oral health of their children. The results indicate that the attitude levels among parents in both groups were above average. Specifically, in the group of children with heart diseases, 71% had a good attitude. In contrast, among parents of children in the control group, 56.5% had a good attitude. Furthermore, the comparison of parental attitudes between the control group and the study group revealed no significant difference in the average attitude levels between the two groups ($p < 0.05$). In the study by Daryoushi *et al.* in 2021, the mean and standard deviation of the attitudes of parents of children with congenital diseases was 25.67 (22). In the study by Falahinejad, the attitude scores of parents of both sick and healthy children were not statistically significant, which aligns with our findings (25), which is consistent with our study. Contrary to our findings, one study reported that the attitudes of parents of children regarding oral health have not been favorable (17).

The World Health Organization (WHO) recommends keeping free sugar intake below 10 percent of total energy consumption at all life stages to reduce the risk of tooth decay. For an average adult, this means a maximum of 50 grams, or about 10 teaspoons, of sugar per day (30). Regular consumption of sugary foods raises the risk of

dental caries. Our study found only a difference in ice cream consumption between the two groups, while no significant relationship was observed for other foods. In addition, in both groups, the consumption of sweet snacks and decay-causing substances was high. Given the higher risk for heart patients, there is a need for increased knowledge for these children, specifically through outreach by cardiologists and dentists. A German study also showed that CHD children had a higher intake of cariogenic foods and beverages, which contrasts with our findings (20).

low knowledge about the importance of regular dental visits is significant among parents, who often do not realize the need for routine check-ups for their children. This lack of knowledge leads to missed opportunities for important oral health information from dentists. Therefore, community education for parents is crucial to help them encourage their children and promote good oral hygiene.

Conclusion

The findings indicate that the knowledge of parents in both groups is poor, while their attitudes are relatively favorable. There is no significant difference between the knowledge and attitudes of the two groups; however, a significant difference in performance has been observed. Given the parents' weak awareness, this positive attitude cannot lead to the establishment of proper health behaviors. It is evident that while most children do brush their teeth, the initiation of brushing is often delayed, which may stem from parents' lack of knowledge regarding the importance of early brushing. The results indicate that parents closely supervise their children's brushing, but without the necessary awareness, this supervision holds little value. There is a need for better nutritional habits and education on dental caries prevention, including brushing, fluoride use, and regular check-ups. A structured dental care schedule in collaboration with parents is essential. Additionally, fostering cooperation among pediatricians, pediatric dentists, and cardiologists is important to improve understanding of the relationship between dental health and cardiac conditions, as well as to prevent dental bacteremia and infective endocarditis.

Data accessibility

This article does not contain any additional data.

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Conflict of Interest

All authors declare that they have no competing interests in this article.

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