



The Comparison of dental status and oral health related quality of life among children 3-6 years old suffering from Congenital Heart diseases and healthy children

Foroogh Amirabad ^{*1}, Noor Mohammad Noor², Reza Rahmanian³

¹Assistant Professor, Oral and Dental Disease Research Center, Department of Pediatric Dentistry, School of Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran

²Department of Pediatric Cardiology, Children and Adolescent Health Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

³Associate Professor, Children and Adolescents Health Research Center, Oral and Dental Disease Research Center, Department of Pediatric Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran

⁴Dentist, Iran

ABSTRACT

There are a wide range of oral problems in children which interfere with natural function, sense of health, and child's life quality in general. Congenital heart diseases are also considered as one of the most prevalent developmental defects in children. The aim of this research is to make a comparison between dental status and oral health related quality of life in children 3-6 years old suffering from congenital heart diseases and healthy children. The participants of this case-control study were 44 children suffering from congenital heart diseases and 44 healthy children aged between 3-6 years old. The data of children's oral health related quality of life and dental quality were examined by ECOHIS questionnaire and dmft index, respectively. The obtained data from comparing the two groups in SPSS20 software were analyzed by Mann Whitney test ($P < 0/05$). The average of dmft in control group (6/45) was significantly more than health group (3/77) ($p > 0/05$). The average of oral health related quality of life (OHRQoL) in control group (11/86) was also significantly more than health group (7/41) ($p > 0/05$), and there was not any significant difference between dmft average and OHRQoL average among boys and girls ($p > 0/05$). According to the current study, the average of dmft and oral health related quality of life (OHRQoL) in 3-6-year-old children suffering from congenital heart disorder is significantly more than healthy children.

Keywords: Congenital heart diseases, dmft, oral health related quality of life (OHRQoL)

INTRODUCTION

Human heart is formed between the 8-12th embryonic week. Any kind of anomaly during this process leads to congenital heart disease (CHD). CHD is one of the most prevalent congenital diseases which include 8 to 10 cases per 1000 birth[1]. This disease can be alone or with other genetic diseases such as Down's syndrome, Turner, and Trisomy 18[2,3]. The common symptoms are cyanosis and heart failure[4,5]. Although new surgery methods have treated and saved many children suffering from CHD, it is not possible to completely treat children with more complicated heart problems by surgery and thus this disease exists during individual life[6,7]. Dental treatments in children suffering from CHD need special considerations because these patients have high infective endocarditis related to dental invasive procedures. On the other side, due to some reasons including, Enamel developmental defects[8], nutritional problems which lead to nausea and vomiting in patients[9], using drugs containing sweeteners and nutrition supplements[10], using drugs which cause xerostomia, hypertrophy gums in patients receiving heart transplant[11], and low priority CHD children's health among their parents, children with heart diseases have less dental and oral health[12,13].

The American heart association states that simple dental caries can be serious threats for CHD patients, thus simple dental examinations and treatments are suggested before surgery treatment[14].

Sheller et al (1997) showed that untreated dental caries lead to lower quality of life in CHD patients. The results of these defect treatments including pain, infection, swelling, and lack of amelioration increases medical costs, referring to emergency centers, and hospitalization which lead to less daily activity of the patients[15].

In their study, Rai et al (2009) showed that children with congenital heart disease have low oral health, 41/8% plaque, 35/3% calculus, and 42/4% caries. Also parental awareness of keeping good oral health, preventive dentistry, and dental caries and their systematic effects have been really low[16].

In Fonseca et al (2009) study, no significant difference in caries index was reported between these patients and healthy individuals. Although, this study stated that decreasing dental health related to the quality of patients' life is due to family stress and mental pressures. The parents of these congenital heart patients were less aware of their children's oral health and dentistry treatments and yet were concerned of dentistry treatments because they thought that their children will be more upset after these kinds of treatments[17].

In Pimental et al (2013) study, children with congenital heart diseases had more prevalence of dental caries and cyanosis, ill behavior, daily consumption of drugs, and illiterate parents affected the amount of caries[18].

According to the contradictory results of the studies already done and the limited number of researches regarding deciduous teeth of the children suffering from CHD and also restricted studies on their quality of life, the aim of this study was to examine dental status and its relationship with quality of life related to dental health in children with congenital heart diseases and healthy children.

MATERIALS AND METHODS

The participants of this case-control research were 3-6-year-old children who had medical records in heart subspecialty clinics, their congenital heart defects were diagnosed, and they had no other systematic diseases. As the population size under study was indefinite, for identifying the statistical sample size duration of 3 month period was used. Thus all of the 3-6-year-old children who had gone to the heart subspecialty clinic in Ali Asghar hospital in Zahedan city during 3 month (Shahrivar to Aban, 1394) were selected as statistical sample in examination group. At first the required information about the methods and objectives of the study were given to children's parents or attendants and they signed informed consent form in the terms of agreement. The participants were asked to bring one of their friends next session. This was done in order to choose control group from children who had the same sex and approximately the same social and economic situation. They were in the same age too. Children's dental examinations were done by pediatric dentist in clinic on the dental unit with dentistry mirror and disposable explorer. The obtained data about dmft according to WHO index as well as patients' demographic data were recorded. After examinations if there were any caries or special problem, the necessary recommendations had been given to the parents in order to remove them. The data of life quality related to children's oral health (ECOHis questionnaire) were also completed on that session by the parents. Validity and stability of the Persian version of ECOHis questionnaire were confirmed by Jabarifar et al (1390)[19]. This questionnaire includes 13 questions and it is mainly based on the impact on child and on family. The part which includes impact on child has 4 components: disease symptoms (one question), child performance (4 questions), mental and psychological (2 questions), and child self-confidence and social interactions (2 questions). The part which includes impact on family comprises parental concerns and worries (2 questions) and family performance (2 questions). Answer options were measured according to Likert scale: never =0, rarely=1, sometimes=2, often=3, very often=4, don't know=5. Question scores were added to determine the total score of the part. According to the idea of the questionnaire designer the participants, who answered "don't know" to more than one question, were put away from the study and replaced with someone else. The total scores were between 0 to 36 in impact on child part and 0 to 16 in impact on family part. The higher score means more impact, more dental health problems, and worse life quality related to dental health.

Then the obtained data were used for statistical analyses. Man Whitney test was used to compare the average of life quality and dmft according to control and case group (healthy and patient children) or according to gender. The significant level of $p < 0/05$ was considered.

RESULTS

88 children were studied in this research, 44 children suffering from congenital heart diseases and 44 healthy children. Examining the frequency of boys and girls in both groups showed that both patient and healthy groups involved 56/8% (25 children) boys and 43/2% (19 children) girls.

The most prevalent heart disease among examined children was VSD with 61/36% of frequency. The frequency of boys and girls was equal in both groups, 56/8% were boys and 43/2% girls. Also 84% of boys and 57/9% of girls in case group had different kinds of heart surgical operations.

Table 1: comparing the average of dmft index in CHD and healthy children.

	Group	Number	Average	Standard Deviation	Mann-Whitney U	
					Z	P value
d	CHD	44	5.204	3.651	-2.659	0.008
	Healthy	44	3.182	3.082		
m	CHD	44	1.182	1.833	-2.105	0.035
	Healthy	44	0.4773	0.7621		
f	CHD	44	0.0682	0.334	-0.557	0.577
	Healthy	44	0.1136	0.754		
dmft	CHD	44	6.4545	4.156	-2.998	0.003
	Healthy	44	3.7727	3.409		

According to table 1, dmft index in children suffering from congenital heart failure is significantly more than healthy children ($p < 0/05$).

Table 2: comparing the average of dmft index among boys and girls in both patient and healthy groups.

Group	Gender	Number	Average	Standard Deviation	Mann-Whitney U	
					Z	P value
CHD	Boy	25	6.840	3.944	-0.749	0.454
	Girl	19	5.947	4.478		
Healthy	Boy	25	3.680	3.132	-0.060	0.952
	Girl	19	3.895	3.828		

The results of table 2 shows that in children with congenital heart failure, the average of dmft indices in boys and girls are 6/84 and 5/94, respectively. Although the dmft average among boys is high, Man-Withney test doesn't show significant statistical difference between boys and girls ($p > 0/05$). In healthy children the average of dmft indices among boys and girls are 3/68 and 3/89, respectively. Man-Withney test doesn't show significant difference between dmft rate among boys and girls.

Table 3: comparing the context average (family, child) of life quality related to oral health in CHD and healthy children

		Group	Number	Average	Standard Deviation	Mann-Whitney U	
						Z	P value
Areas of Impact on Family	Family Performance	CHD	44	1.273	1.648	-1.651	0.099
		Healthy	44	0.773	1.292		
	Worry and Concern of Parents	CHD	44	3.341	2.605	-2.314	0.021
		Healthy	44	2.091	2.270		
Impact on Family		CHD	44	4.614	3.966	-2.217	0.027
		Healthy	44	2.846	3.366		
Areas of Impact on Child	Child's Confidence and Social Interactions	CHD	44	0.651	0.783	-1.844	0.065
		Healthy	44	0.386	0.722		
	Mental and Spiritual	CHD	44	1.932	1.981	-1.525	0.127
		Healthy	44	1.432	1.910		
	Child Performance	CHD	44	2.955	2.693	-1.709	0.087
		Healthy	44	2.000	2.293		
	Symptoms	CHD	44	1.727	1.370	-1.54	0.124
		Healthy	44	1.273	1.208		
Impact on Child		CHD	44	7.250	6.463	-1.79	0.048
		Healthy	44	4.977	5.496		

According to the findings of table 3, the average of family performance in patient and healthy children were 1/27 and 0/77, respectively; and there is no significant difference between them ($P \geq 0/05$).

- The average of worries and concerns in patient and healthy children were 3/34 and 2/09, respectively. According to Man-Withney test, worries and concerns of patient children's family were significantly more than healthy children's family ($p < 0/05$).
 - Generally the average of life quality related to oral health in the context of impacting family in patient children with the average of 4/6 is significantly more than healthy children with the average of 2/86 ($p < 0/05$).
- Analyzing life quality related to oral health in the context of impacting children shows that:

- The average of child self-confidence and social interactions in patient and healthy children was 0/65 and 0/38, respectively; and there is no significant difference between them ($P \geq 0/05$).
- The average of child performance in patient and healthy children are 2/95 and 2, respectively; and there is no significant difference between them ($P \geq 0/05$).
- The average of disease symptoms in patient and healthy children are 1/72 and 1/27, respectively; and there is no significant difference between them ($P \geq 0/05$).
- Generally the average of life quality related to oral health in the context of impacting child in patient children with the average of 7/25 is significantly more than healthy children with the average of 4/97 ($p < 0/05$).

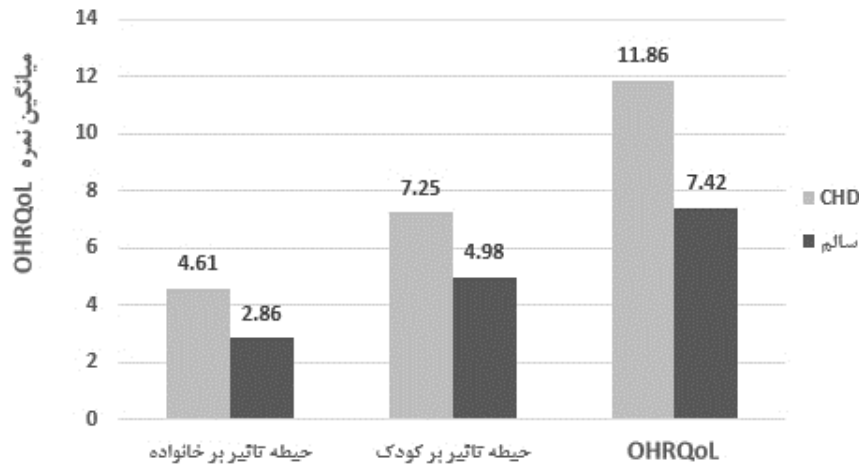


figure1: comparing oral health related quality of life in healthy and CHD children

According to figure 1, oral health related quality of life (OHRQoL) in patient and healthy children is 11/86 and 7/41 respectively. According to Man-withney test, patient's oral health related quality of life score (OHRQoL) is significantly more than healthy children ($p < 0/05$).

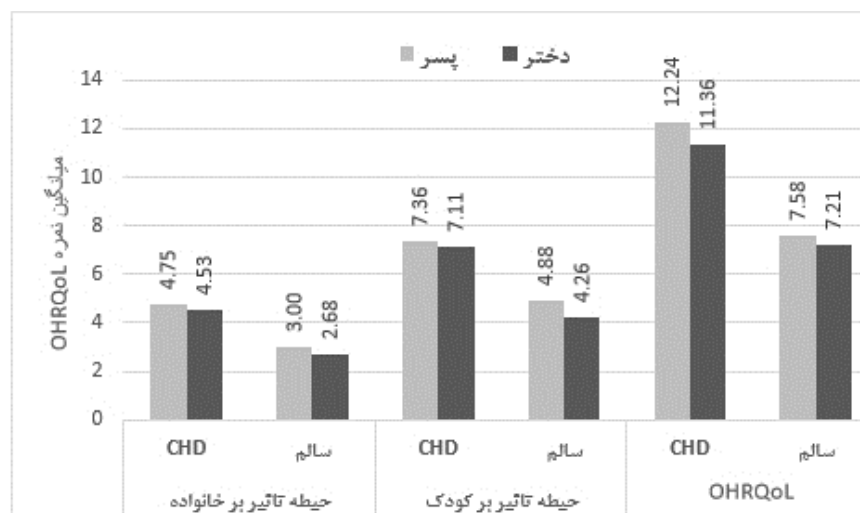


Figure 2: comparing oral health related quality of life among boys and girls in both healthy and patient groups
According to figure 2, in both healthy and patient groups according to Man-Withney test, there is no significant difference between OHRQoL among boys and girls ($P \geq 0/05$).

DISCUSSION

Congenital heart disease is one of the most prevalent developmental failures in children. This disease is the most dominant factor which predisposes children to infective endocarditis. Although infective endocarditis is a rare situation in the society, it can cause serious problems in patients with predisposing heart conditions[5].

The children's parents suffering from congenital heart disease ignore other aspects of their children's health because they are completely involved in their medical conditions. Most of the time children go to the dentist because they have dental emergencies, but the situation will be out of control as the result of having heart disease and dental problem both[20].

This study was done in order to analyze dental status and its relationship with oral health related quality of life in 3-6-year-old children suffering from congenital heart disorder and healthy children. To achieve this goal, 44 children suffering from heart failure and 44 healthy children were analyzed.

The findings of the current study showed that dmft index in patient children with the average of 6/45 is significantly more than healthy children with the average of 3/77. Also there is no significant difference between boys and girls regarding dmft index in patient and healthy groups, both.

Sajadi *et al* (2013) indicated that plaque, gum, and DMFT/dmft indices in congenital heart disease group is significantly more than control group[21]. Rai *et al* (2009) study showed low oral health and high dental caries in children suffering from congenital heart disease[16]. In Pimental *et al* (2013) research, there was more dental caries among children suffering from congenital heart disorder[18]. The same results were reported in the studies done by Steckslen-Blicks *et al*(2004) in Sweden and Da Silva *et al* (2002) in Brazil[11,22].

But there are still contradictory findings related to other studies. Da Fonseca *et al* (2009) did not report obvious difference in dmft index among children suffering from congenital heart disorder and healthy children[17]. There was no significant difference in the average of DMFT/dmft among healthy and patient children, according to Talebi *et al* (2007) study in Mashhad and Balmer *et al* (2003) research in England[23,24]. Sample size and participants' age (deciduous teeth system against permanent teeth system) are the reasons which differentiate the findings of this study from the other studies.

The DMFT/dmft index in patient children is high because they are under medical treatments and have surgical operations from their early ages and children's parents do not pay attention to their dental conditions. Parents are mainly not aware of the relationship between oral, dental and heart health.

On the other side, these children are confronted with other problems such as nausea and vomiting, consumption of drugs containing sucrose, and consumption of diuretic in their early ages; they have more likely nutrition diseases and dental defects which lead to more dental caries and less oral health[8,25]. In Steckslen-Blicks *et al* (2004) study there was a significant relationship between digoxin and dental caries[11].

In this study, the average of oral health related quality of life in all three contexts, family, child, and OHRQoL total score, among patient children was significantly more than healthy children. The higher scores of life quality shows more impact or more oral health problems and worse oral health related quality of life[19].

Dan Fonseca *et al* studied the impact of oral health on 1-6-year-old children quality of life suffering from congenital heart diseases and healthy children. The findings of their study indicated that the life quality of experimental group was significantly more than control group while the average of dmft index did not show significant statistical difference between both groups[18].

According to the findings of this study, the higher dmft index among children suffering from heart failure can affect their quality of life.

The presence of caries and untreated teeth causes pain, infection, and swelling in this group of children and can prevent children from learning and playing and prevent their parents from going to work and on the other side increases emergency and hospitalization costs which leads to more stress generally.

Dental caries and extracted teeth can lead to eating problems and deteriorate mental and physical growth of the child.

In this study, the average of OHRQoL did not have significant difference among boys (12/24) and girls (11/36). The study of Golkari *et al* (2013) was in agreement with this study. They revealed that there was no significant difference in OHRQoL score between boys and girls[26].

MacGrath and Bedi (2000) indicated that in comparing males and females, oral and dental health has greater impact on quality of life which is in disagreement with this research[27]. The reason of this disagreement is age difference

between the participants of both groups. Cohen-Carneiro et al (2011) showed that oral health related quality of life is in relationship with some social factors such as gender[28].

One of the limitations of this study is the lack of radiography practice which can affect dmft index in case of interdental caries and. The other limitation can be providing incorrect information by the parents in the questionnaire. In this kind of study individuals tend to remember the accidents happened to them recently and thus the existence of biased information is inevitable. The other limitation is that this study is related to a specific period of time.

Acknowledgments

I really appreciate the assistance of vice-chancellor of academic affairs of Zahedan medical sciences university. It is worth nothing that this research article was extracted from general PHD thesis with 1512 number in dental college library of Zahedan medical sciences.

Authors Contribution: All authors had equal role in design, work, statistical analysis and manuscript writing.

REFERENCES

- [1] Hoffman JIE, Kaplan S. The incidence of congenital heart disease. *J Am CollCardiol* 2002; 39: 1890-900.
- [2] Vis JC, Duffels MG, Winter MM, Weijerman ME, Cobben JM, Huisman SA, et al. Down syndrome: a cardiovascular perspective. *J Intellect Disabil Res* 2009; 53: 419-25.
- [3] Vander B. Noonan syndrome. *Orphanet J Rare Dis* 2007; 2: 4.
- [4] Sunnegårdh J. *Barnkardiologi - en översikt*. 1st ed. Lund: Studentlitteratur; 2000. P 321-7.
- [5] Allen HD, Driscoll DJ, Shaddy RE, Feltes TF. *Moss and Adams' heart disease in infants, children, and adolescents*. 1st ed. Philadelphia: Lippincott Williams & Wilkins; 2008. P 673-90.
- [6] Bhat AH, Sahn DJ. Congenital heart disease never goes away, even when it has been 'treated': the adult with congenital heart disease. *Curr Opin Pediatr* 2004; 16: 500-7.
- [7] Reybrouck T, Vangesselen S, Gewillig M. Impaired chronotropic response to exercise in children with repaired cyanotic congenital heart disease. *Acta Cardiol* 2009; 64: 723-7.
- [8] Hallett KB, Radford DJ, Seow WK. Oral health of children with congenital cardiac diseases: a controlled study. *Pediatr Dent* 1992; 14(4): 224-30.
- [9] Steksen-Blicks C, Rydberg A, Nyman L, Asplund S, Svaberg C. Dental caries experience in children with congenital heart disease: a case-control study. *Int J pediatr Dent* 2004; 14: 94-100.
- [10] Bigeard L. The role of medication and sugars in pediatric dental patients. *Dent Clin North Am* 2000; 44: 443-56.
- [11] Al-Sarheed M, Angeletou A, Ashley PF, Lucas VS, Whitehead B, Roberts GJ. An investigation of the oral status and reported oral care of children with heart and heart-lung transplants. *Int J Paediatr Dent* 2000; 10: 298-305.
- [12] Grann K, Wikstrom S, Nyman L, Rydberg A. Attitudes about dental care among parents whose children suffer from severe congenital heart disease: a case control study. *Int J pediatr Dent* 2006; 16(4): 231-8.
- [13] Saunders CP, Roberts GJ. Dental attitudes, knowledge and health practices of parents of children with congenital heart disease. *Arch Dis Child* 1997; 76(6): 539-40.
- [14] Wilson W, Taubert KA, Gewitz M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association. *Circ* 2007; 116(15): 736-54.
- [15] Sheller B, Williams BJ, Lombardi SM. Diagnosis and treatment of dental caries-related emergencies in a children's hospital. *Pediatr Dent* 1997; 19: 470-5.
- [16] Rai K, Supriya S, Hegde AM. Oral health status of children with congenital heart disease and awareness, attitude and knowledge of their parents. *J Clin Pediatr Dent* 2009; 33(4): 315-18.
- [17] Da Fonseca MA, Evans M, Teske D, Thikkurissy S, Amini H. The impact of oral health on the quality of life of young patients with congenital cardiac disease. *Cardiol Young* 2009; 19: 252-6
- [18] Pimentel EL, Azevedo VM, Castro RA, Reis LC, De Lorenzo A. Caries experience in young children with congenital heart disease in developing country. *Braz Oral Res* 2013; 27(2): 103-8.
- [19] Jabarifar SE, Golkari A, Ijadi MH, Jafarzadeh M, Khadem P. Validation of a Farsi version of the Early Childhood Oral Health Impact Scale (F-ECOHIS). *BMC Oral Health* 2010; 10: 4.
- [20] Zeinaloo AA, Pishva N, Razavi S, Edalat M. Investigating the molars and periodontium health in 7-11 years old children with congenital heart disease in Qazvin. *JQUMS* 2009; 13(3): 41-6.
- [21] Sajadi F, Torabinejad M, Torabinejad F. Oral and dental health and related factors in children with congenital heart disease: a preliminary study. *J Isfahan Dent Sch* 2013; 9(5): 411-22.
- [22] Da Silva D, Souza I, Cunha M. Knowledge, attitudes and status of oral health in children at risk for infective endocarditis. *Int J Paediatr Dent* 2002; 12(2): 124-31.
- [23] Talebi M, Khordi Mood M, Mahmoudi M, Alidad S. A study on oral health of children with cardiac diseases in Mashhad, Iran in 2004. *J Dent Res Dent Clin Dent Prospects* 2007; 1(3): 114-8.
- [24] Balmer R, Bu'Lock FA. The experiences with oral health and dental prevention of children with congenital heart disease. *Cardiol Young* 2003; 13: 439-43.
- [25] Kliegman RM, Stanson B, Geme J, Schor N, Richard E. *Nelson textbook of pediatrics*. 19th ed. Philadelphia: Saunders Elsevier; 2011. P 302.
- [26] Golkari A, Moeini A, Jabbarifar SE. Relationship of socioeconomic status with quality of life related to oral and dental health of 2-5-year-olds in Shiraz. *J Isfahan Dent Sch* 2013; 9(6): 534-41.
- [27] McGrath C, Bedi R. Gender variations in the social impact of oral health. *J Ir Dent Assoc* 2000; 46: 87-91.
- [28] Cohen-Carneiro F, Souza-Santanos R, Rebelo MA. Quality of life related to oral health: contribution from social factors. *CienSaude Colet* 2011; 16(1): 1007-15.