

## Association Of Children's Dental Health Status with Their Parents' Oral Health Literacy and Family Characteristics

### ABSTRACT

**Background and Objective:** Oral health literacy (OHL) is a type of health literacy that specifically focuses on people's literacy and knowledge about oral health. It has been shown that oral health literacy can be a powerful predictor of people's health, health-related behaviors, and medical outcomes. As parents play a crucial role in their child's health, in this study we aimed to assess the oral health literacy of the adults and its relation with their children's dental status.

**Materials and Methods:** Four hundred parents with their children participated in this cross-sectional study. Two hundred OHL questionnaires were distributed to parents of 3–6-year-old patients referred to pediatric hospitals for any reason. The OHL was assessed in three domains: reading comprehension, numeracy and appropriate decision-making. The score were categorized as inadequate, 0-7; marginal, 8-9, and adequate, 10-15. Then a dentist did the dental examination of their children, and the DMFT (decay-missing-filled teeth) index was calculated. Chi-square, independent sample t-test, Mann-Whitney, and Kruskal-Wallis tests were used for comparative analysis.

**Results:** 69.2%, 21.2% and 9.6% of the parents had inadequate, marginal and adequate OHL, respectively. The mean DMFT was  $4.5 \pm 4.47$  (median:3) with minimum of 0 and maximum of 17. The mean age of parents and children did not differ between 3 groups of OHL, but DMFT was significantly higher in participant with inadequate OHL ( $p=0.03$ ). The mean DMFT was also higher in families with greater than four family members ( $p=0.002$ ). It is shown that the frequency of inadequate OHL was higher among parents with lower education ( $p=0.002$ ), while the DMFT did not differ in 3 groups of education ( $p=0.84$ ).

**Conclusion:** Parents with inadequate OHL was associated with high children's dental caries. So, conducting oral health education for parents is essential. Holding training classes in health centers can improve the parent's oral health literacy, and hopefully motivate them to look after their child's dental health.

**Paper Type:** Research Article

**Keywords:** oral health, health literacy, child

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## Introduction

Oral health is an important aspect of overall health that can affect both physical and mental well-being. The International Dental Federation (FDI) recently re-defined oral health as a multi-faceted condition that includes the ability to confidently speak, smile, smell, taste, touch, chew, swallow, and express a range of emotions through facial expressions without pain, discomfort, or disease of the craniofacial complex (1). Oral health literacy is the degree to which people have the capacity to obtain, process, and understand basic oral and craniofacial health information, and services needed to make appropriate health decisions (2). Like health literacy (3-9), oral health literacy has also proved to be critical in reducing oral health disturbances and in promoting oral health (10). In a 2020 study on a practical strategy to improve oral health status among the adult population stated that the significant correlation observed between OHL and oral health status introduces oral health literacy as a factor affecting the oral health of each individual (11). Recent data from the European Health Literacy Survey showed that 12% of participants from eight representative European union nations had "inadequate" general health literacy and 35% had "problematic" general health literacy (12, 13). It is recognized that socioeconomic conditions are determinants of oral health, and in turn, oral health is an impartible part of general health and quality of life (14). Lower oral health literacy has been associated with less dental knowledge (15-18), poor self-reported oral health (19, 20), irregular follow-up dental visits (19), less seeking of health information (21), and less access to dental care (21).

Parents and especially mothers have key role in establishing and changing their children's health behavior (22). Some studies have pointed to the relation of caregiver literacy and child

oral health status (18, 23). In the study of Vann WF et al on the impact of parents' OHL on oral health outcomes in early childhood, it is evident that caregiver oral health literacy has a multidimensional impact on reported oral health outcomes in infants and young children and it has been found that deleterious oral health behaviors, including nighttime bottle use and no daily brushing/cleaning is associated with lower caregiver literacy (18).

It is reported that socio-economic status of the family is related to the DMFT index (24). They indicated that economic situation of a family (living in urban vs. rural areas, having permanent job) could influence dental status of the children, and it also (Gini index, income inequality measures) could affect dental status of the children (25, 26).

Since, there is a significant association among oral health literacy, oral health status, and improvement of the decayed, missing, and filled teeth, we can use the DMFT index to determine the oral health status at the society level. This index is a cumulative caries measure to examine the total number of decayed, extracted, and filled teeth (27). The decayed, missing and filled teeth (DMFT) index has been used for more than 70 years and is well-established as the key measure of caries experienced in dental epidemiology (28).

The aim of this study is to evaluate the association between children's dental health status and their parents' oral health literacy and family characteristics.

## Methods

### Study design and population

This cross-sectional study was done in Pediatric Hospital from 2018 to 2019. Two hundred and five caregiver-child dyads were selected by

convenience sampling from old children (3-6 years) who were referred to a pediatric hospital. A trained interviewer designed the project and a demographic checklist. Oral health literacy (OHL) questionnaires were distributed to those caregivers/parents who want to participate in this project. Only literate parents could enter this study. Those who did not agree to participate were not included in this study. A dentist using DMFT index also examined children's dental status.

Clinical data was measured only for primary dentition as d (dental caries of deciduous teeth), m (missing deciduous teeth due to dental caries), and f (filling of deciduous teeth due to dental caries).

### Sample size

Assuming 47% of parents with insufficient oral health literacy, based on the study of Khodadadi et al (29), using the precision (d) of 0.07 and 95% CI, the sample size was calculated 196. So, at least 196 caregiver/child dyads must enter in this research and 198 of parents fulfilled the needed items of the questionnaires. The response rate was 96%.

### Tools/Measurements

The checklist included some questions about the age, educational level of the caregiver, the family size, career, and the main source to obtain the health information. The main questionnaire used in this study was Oral Health Literacy for Adults Questionnaire (OHL-AQ) that was validated by Naghibi et al. in 2013 (30). This questionnaire assesses oral health literacy in 17 items including reading comprehension (6 items), numeracy (4 items), listening (2 items), and decision-making (5 items). For each item the score 1 is given if the answer is true; and 0 is given if the answer is false/not known. The final score is calculated by summing the score of all items. For ease of work and parental cooperation with this research,

we omitted the listening part and asked the parents to complete the main 3 domains. The final scores were classified as inadequate (0-7), marginal (8-9), and adequate (10-15) oral health literacy.

### Statistical Analysis

The statistical analyses were performed using SPSS software version 22. Quantitative data presented as mean  $\pm$  standard deviation (SD) or median (range) according to the normality distribution or type of variable. Normality distribution was checked by Kolmogorov-Smirnov test, Chi-square, independent sample t-test, Mann-Whitney, and Kruskal-Wallis tests were used for comparative analysis. The level of significance in all analyses considered as less than 0.05.

### Ethics

The ethics committee of Mashhad University of Medical Sciences approved this study (961115). Participants were also informed about the research project.

### Results

The caregivers in 23% (45 children) of cases were fathers, while other children came with their mothers. The mean age of parents and their children was  $33.47 \pm 5.75$  and  $4.61 \pm 1.19$ , respectively. The youngest parent was 18 and the oldest one was 52 years old.

The mean score of OHL was  $8.25 \pm 2.63$ , ranged 2 to 15. Among parents, 69.2% had inadequate, 21.2% had marginal and 9.6% had adequate OHL. By dividing the participants' answers to correct and incorrect, we found out that only 32.3%, 34.3% and 22.2% of participants answered questions correctly in reading comprehension, numeracy and decision-making areas, respectively.

The mean OHL was significantly different between various educational levels and family size. By improving the educational level, the mean score of OHL became higher ( $p < 0.001$ ),

and this difference was highlighted among the upper diploma and two other categories (diploma and lower than diploma). The correlation test also indicates the positive correlation between total score of OHL and the years of education ( $r=0.64$ ,  $p=0.047$ ). This positive correlation was more significant and stronger between the years of education and decision-making dimension ( $r=0.67$ ,  $p=0.033$ ).

The mean score of OHL is greater in families with less than four family members (compared with living with more than four people in a family) ( $p=0.008$ ). There is no difference in the mean OHL between employees and unemployed persons ( $p=0.463$ ). Table 1 shows the distribution of oral health literacy levels among parents' characteristics.

The mean DMFT was  $4.5 \pm 4.47$  (median: 3).

**Table 1. OHL levels and mean dental caries, missing, and filling according to parents' characteristics**

		Inadequate N (%)	Oral Health Literacy N (%)			Dental status Mean (SD) ; Median (range)								
			marginal	adequate	p-value	dmft	p-value	d	p-value	m	p-value	f	p-value	
Family size	≤3	50 (27)	29 (58)	12 (24)	9 (18)	0.047*	3.06(3.95); 1.5(0-14)	0.002**	2.8(3.62); 1.5(0-14)	0.002**	0.1(0.58); 0(0-4)	0.273**	0.16(1.13); 0(0-8)	0.457**
	>4	135 (73)	98 (72.6)	28 (20.7)	9 (6.7)		5.21(4.61); 4(0-17)		4.9(4.45); 4(0-16)		0.18(0.63); 0(0-3)		0.13(0.65); 0(0-4)	
Education	Lower than diploma	61 (33)	50 (82)	10 (16.4)	1 (1.6)	0.002*	4.68(4.38); 4(0-16)	0.84#	4.49(4.18); 4(0-16)	0.594#	0.19(0.7); 0(0-3)	0.931#	0(0); 0(0)	0.08#
	Diploma	91 (49.2)	60 (65.9)	19 (20.9)	12 (13.2)		4.61(4.44); 3(0-17)		4.35(4.31); 3(0-16)		0.13(0.52); 0(0-3)		0.13(0.67); 0(0-4)	
	Upper than diploma	33 (17.8)	14 (42.4)	13 (39.4)	6 (18.2)		4.54(5.15); 2(0-15)		3.97(4.7); 2(0-15)		0.15(0.71); 0(0-4)		0.42(1.54); 0(0-8)	
Occupation	Unemployed/ housewife	139 (73.5)	97 (69.8)	25 (18)	17 (12.2)	0.054*	4.6(4.4); 3(0-16)	0.971**	4.34(4.26); 3(0-16)	0.904**	0.13(0.54); 0(0-3)	0.497**	0.13(0.83); 0(0-8)	0.329**
	Employee/ self- employed	50 (26.5)	35 (70)	14 (28)	1 (2)		4.72(4.72); 3.5(0-17)		4.32(4.36); 3.5(0-16)		0.24(0.79); 0(0-4)		0.16(0.71); 0(0-4)	
Parent's age	≤29	47 (25)	30 (63.8)	10 (21.3)	7 (14.9)	0.326*	4.3(4.75); 2(0-15)	0.216#	3.98(4.51); 2(0-15)	0.229#	0.08(0.46); 0(0-3)	0.279#	0.23(1.23); 0(0-8)	0.971#
	30-39	113 (60.1)	79 (69.9)	23 (20.4)	11 (9.7)		4.6(4.46); 3(0-17)		4.36(4.34); 3(0-16)		0.14(0.58); 0(0-4)		0.09(0.55); 0(0-4)	
	≥40	28 (14.9)	21 (75)	7 (25)	0 (0)		5.7(4.38); 5.5(0-14)		5.25(3.98); 5.5(0-13)		0.36(0.91); 0(0-3)		0.14(0.75); 0(0-4)	

\*Chi-square test

\*\*Mann-Whitney U test

# Kruskal-Wallis test

The mean age of parents and children did not differ between 3 groups of OHL. The DMFT did not differ in 3 groups of education ( $p=0.84$ ) (table 1). The mean $\pm$ SD (median) of DMFT in inadequate OHL was  $5.1 \pm 4.56$  (4), and in participants with marginal and adequate OHL were  $3.19 \pm 3.57$

(2) and  $3.78 \pm 5.05$  (2), respectively. Average of DMFT in children was higher among parents with lower OHL level ( $p=0.03$ ).

Parents were also asked about the sources of obtaining the health information. Their answers listed in table 2.

**Table 2. Parents' main source of health information (n=198)**

Source of Health information	Frequency (%)	Rank
Media (TV, radio)	130 (71.8)	1
Dentists	40 (49.4)	2
Internet	64 (35.3)	3
Family	27 (14.9)	4
Books	19 (10.5)	5
Friends, Colleagues	6 (3.3)	6
Newspaper	4 (2.2)	7

## Discussion

The current study aimed to determine the relationship between children's dental health status and their parents' oral health literacy and other socioeconomic characteristics. According to the findings, inadequate parental OHL was associated with a higher risk of dental decay in children. Our findings are in line with the results of study that was conducted by Sérigne Dieng et al., in 2020. They confirmed that mothers' OHL levels are significantly associated with the rate of tooth decay in their children. They concluded that improving maternal OHL may help strengthen their capacity to promote oral health as well as improve dental health in children (31). In addition, we found that children who lived in a house with more family members had a higher risk of dental caries because their parents have low level of education and OHL.

The findings of this study are in line with the findings of another study conducted by Batista et al. in Brazil (32). In both studies, great majority of parents had inadequate oral health literacy (about 70%). While in other studies, the number of people with inadequate health literacy were lower, for example 56.5% in the study of Dieng

and his colleagues (31), 47% in the study of Khodadadi et al. (29), and 37% in the study of Sandhu and his colleagues (33). This can be explained by the fact that the participants in our study were selected from patients who were referred to a public university hospital (not a private hospital). Therefore, it can be concluded that these individuals probably had a moderate to low socioeconomic status.

The findings of the present study indicated that there was an association between parents' OHL and children's DMFT score, which is equal to more decay, missing and filled teeth. This finding is consistent with other results from the clinical literatures which found a relationship between caregivers' health literacy and children's oral health status (29, 34). Whereas Sanders et al., found no relationship between caregiver's health literacy and oral outcomes or knowledge (35). It should be noted that Sanders assessed the general health literacy and they did not used the specific questionnaire for oral health literacy.

This study showed that higher parents' age was associated with worse children's dental condition. In addition, this study revealed that lower parents' educational level was associated with low level of caregiver's oral health literacy. This finding is consistent with some other studies (36, 37). Haghdoost et.al., in a nationwide population-based survey in Iran found that education level, age, female sex, living in rural areas, and having permanent job were associated with higher level of health literacy (36). However, Matsuyama believed that providing information needs is less dependent on literacy consideration. He noted that this is more related to the issues that divide across different levels of educational attainment (38).

In the current study there was no statistically significant relationship between parental educational level and children's DMFT score,

although it is shown that the DMFT index is lower in those with higher education. Keep in mind that the higher DMFT index could reflect both more intention to treat and using higher health services and poor oral health status. As the median dental caries is more in people with lower education, it seems that in the current study the second aspect is more likely to be correct.

This study indicated that the frequency of dental caries is significantly higher among families with more than 4 people. Other studies also mentioned as the family size exerts a notable influence on the economics and nutrition of the family, it could affect on dental status of the children (39, 40).

In our study, oral health literacy was not associated with parents' age and employment status. However, many studies on oral health literacy and health knowledge demonstrate a significant association of parents' OHL with their age and income (23, 41). The young age parents, participating in our study (mean age of 33 years) may explain this difference in findings. Additionally, in this study only educated parents who were employed attend. In fact, parents with the highest education with high income were excluded. This could be the limitation of the current research. Furthermore, in the study, we assessed oral health literacy in three main criteria of reading comprehension, numeracy, and decision-making. Therefore, the results should interpret carefully as we did not evaluate the listening part of OHL.

On the other hand, in this study we investigated the various sources that caregivers used to obtain their medical information. The findings show that the media plays a key role in educating the family on health topics. Matsuyama study also noted that educational attainment, rather than health literacy, could predict information needs (38).

As this research area emerges, it appears that the pathways between caregiver literacy and child health may be complex, and a more thorough assessment of oral health behaviors may be needed to understand the link between caregiver literacy and child health outcomes.

Holding training classes in health centers is suggested to improve the parent's oral health literacy, and hopefully motivate them to look after their child's dental health.

**Conclusion:** In conclusion, low level of parents' OHL and living in a house with more family members was associated with higher children's dental caries. It is also found that parents' education was positively associated with level of oral health literacy. As the media plays a key role in educating the family on health topics and empowering them in decision-making, promoting community health by strengthening the media in health care topics, including oral health education through TV, and radio is desired. Furthermore, more studies need to be done to improve global awareness about oral health and OHL.

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