

A Study on the Oral Health Literacy and Related Factors of Mother's in Some Areas: A 25% Comparison Study of the Upper and Lower Grades

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Background: This study compares and analyzes the degree of oral health information literacy by 25% for upper and lower grades to assess how differences in mothers' oral health information literacy affect infants' oral health behavior.

Methods: The study surveyed 201 mothers with infants and children using a 36 question survey tool. Cross-analysis was conducted to determine the difference in oral health information literacy between the upper and the lower 25%.

Results: Comparing 25% of the upper and lower grades of verbal oral health information literacy scores, the word with the most significant difference in the correct answer was resin. An item asking about the time to eat after fluoride varnish application showed the most significant difference in the correct answer on the functional oral health information literacy scale. Mothers' oral and functional oral health information literacy scores showed that verbal literacy was statistically significant for brushing guidance after children's meals, brushing guidance before children's bedtime, food intake restrictions before bedtime, and restrictions on consumption of cavity-inducing foods ($p < 0.05$). Functional literacy was statistically significant in the post-brushing test of children and the correct brushing method map items ($p < 0.05$).

Conclusion: As a result of comparing and analyzing the upper and lower 25% of the mother's oral health information literacy, it was found that the mother's oral health information literacy affected the infant's oral health behavior. Therefore, systematic education is needed to raise literacy by grasping the level of oral health information literacy of mothers, and oral health education by level according to oral health information literacy should be developed.

Key Words: Dental health education, Health behavior, Health literacy, Oral health, Preschool child

Introduction

The infancy period refers to the period from birth to the age of six, during which physical growth and changes occur. In particular, oral health management during this period affects the life-long quality of oral health^{1,2)}. In addition to mastication, pronunciation, and aesthetic functions, deciduous teeth are responsible for various functions such as succession of jawbone development and induction of eruption of permanent teeth. Oral health in infancy is very important because early childhood caries is a common oral

health problem, and various problems can occur in oral function and physical development due to oral disease that may arise from incorrect oral health management during infancy³⁾.

Voluntary oral care is difficult during the early childhood period, and the mother's responsible interest and attitude for oral care are very important⁴⁾. According to previous studies, it has been reported that the oral health knowledge and attitude of the mother have a great influence on oral health management of infants and young children. It has also been reported that mothers with excellent oral health

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have higher oral health knowledge and better oral health behaviors. In order to create a healthy oral environment for infants and toddlers, oral care should be provided by the mothers appropriate to their growth stages⁵⁾.

Health literacy is a concept that encompasses the abilities required to solve health-related problems in daily life⁶⁾ and has various effects on health-related behaviors such as health checkups and vaccinations, as well as an individual's understanding of health and health conditions⁷⁾. Due to these differences in literacy, the cause of health inequality among individuals is increasing⁸⁾. The lower the health literacy, the more difficult it is to access medical services, and the poorer is the health status. Oral health literacy refers to the ability to understand the processing to actually set in motion the appropriate health behaviors necessary for oral health care⁹⁾. According to previous studies, the lower the oral health literacy, the lower is the quality of life, and the lower are the oral health and knowledge^{10,11)}. For oral health, the higher the literacy level, the better is the oral condition, and the oral health behavior and attitude are also positive¹²⁾. As such, oral health literacy has a great influence in promoting oral health and prevention.

Studies on oral health literacy have mainly focused on health and oral literacy in adults, but studies on oral health literacy of mothers related to children are lacking. Oral health of infants and young children can be expected by adopting the right attitude and habits for oral health through mothers, the main caregivers. Therefore, in this study, oral health information literacy scores were divided into the top and bottom 25%, respectively, and comparative analysis was conducted to investigate the effect of differences in mother's oral health information literacy on oral health behaviors of infants and toddlers. The purpose of this study is to provide basic data for the development of oral health education programs for infants and young children according to differences in literacy and to improve the mothers' oral health information literacy.

Materials and Methods

1. Study subjects

This study was conducted for mothers with infants and

toddlers with the cooperation of daycare centers and kindergartens in the J region selected by the convenience sampling method from September 1 to 14, 2020. The number of subjects was selected using the G*POWER 3.1 program. The minimum sample size was 204 subjects (significance level 0.05, effect size 0.15, power 0.95). After explaining the purpose and contents of the study to the study subjects, if they agreed, they were asked to respond to an individual self-filling questionnaire distributed online. The final analysis target were 201 subjects who responded to the questionnaire.

2. Study tools

Among the survey items, there were 10 items on the mother's children oral health management behavior and 17 items on oral health information literacy (10 items on verbal oral health information literacy, 7 items on functional oral health information literacy), with 27 items in total.

We used the Rapid Estimate of Adult Literacy in Dentistry (REALD) as a linguistic oral health information literacy measurement tool, which was modified and supplemented by Lee¹³⁾ and Ju et al.¹⁴⁾. This was re-refined with terms mainly used in children's dental treatment according to the subjects of this study. Cronbach's α value of verbal oral health information literacy used in this study was 0.926. The response scale was assigned as 1 point for 'I know it exactly' and 0 points for both 'I have heard of it, but I do not know the meaning', and 'I do not know exactly'.

For functional oral health information literacy, the Test of Functional Health Literacy in Dentistry (TOFHLiD) modified and supplemented by Kang and Cho¹⁵⁾ was used. There was a total of 7 questions: 2 questions about scaling (Cronbach's $\alpha=0.674$), 3 questions about dental fillings (Cronbach's $\alpha=0.711$), and 2 questions about precautions for fluoride varnish (Cronbach's $\alpha=0.710$). If the answer was correct, 1 point was given, and if it was wrong, 0 points were given. The higher the score, the higher is the oral health information literacy.

3. Data analysis

After classifying the top and bottom 25%, respectively,

based on the oral health information literacy score, the degree of oral health information literacy discrimination was measured. A cross-analysis was conducted to investigate the difference in oral health information literacy according to the oral health management behaviors of the mothers scoring the top 25% and bottom 25% of oral health information literacy. The collected data were analyzed using SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA), and the statistical significance level (α) was 0.05.

Results

1. Discriminatory degree of verbal oral health information literacy scale for the top 25% and bottom 25%

Table 1 shows the results of comparing the scores of the top 25% and bottom 25% to find out the discriminant degree of the verbal oral health information literacy scale. All 10 words showed a significant difference, and the question with the largest difference in correct answers was resin (90.2%).

Table 1. Discrimination on the Verbal Oral Health Information Literacy Scale (25% Correct Answer Rate Comparison for Upper and Lower)

Item	Correct answers	Correct answers		Correct answer rate comparison for upper and lower (%)	p-value
		Upper 25%	Lower 25%		
Total	201 (100.0)	43 (100.0)	39 (100.0)		
Dental plaque	37 (18.4)	23 (53.5)	0 (0.0)	53.5	< 0.001
Tooth sealant	86 (42.8)	38 (88.4)	1 (2.6)	85.8	< 0.001
Dental calculus	117 (58.2)	43 (100.0)	6 (15.4)	84.6	< 0.001
Fluoride	98 (48.8)	43 (100.0)	5 (12.8)	87.2	< 0.001
Eruption of teeth	35 (17.4)	17 (39.5)	1 (2.6)	36.9	< 0.001
Milk tooth	113 (56.2)	43 (100.0)	10 (25.6)	74.4	< 0.001
Permanent tooth	118 (58.7)	43 (100.0)	12 (30.8)	69.2	< 0.001
Tooth extraction	117 (58.2)	43 (100.0)	8 (20.5)	79.5	< 0.001
G.I	26 (12.9)	20 (46.5)	1 (2.6)	43.9	< 0.001
Dental resin	84 (41.8)	41 (95.3)	2 (5.1)	90.2	< 0.001

Values are presented as number (%).

G.I: glass ionomer.

Table 2. Discrimination of Functional Oral Health Information Literacy Scale (25% Correct Answer Rate Comparison for Upper and Lower)

Item	Correct answers	Correct answers		Correct answer rate comparison for upper and lower (%)	p-value
		Upper 25%	Lower 25%		
Total	201 (100.0)	50 (100.0)	31 (100.0)		
Correct behavior after scaling	164 (81.6)	50 (100.0)	18 (58.1)	41.9	0.001
Knowledge related to scaling	129 (64.2)	48 (96.0)	11 (35.5)	60.5	< 0.001
Purpose of tooth sealant	174 (86.6)	50 (100.0)	30 (96.8)	3.2	0.177
Treatment area of tooth sealant	138 (68.7)	50 (100.0)	11 (35.5)	64.5	< 0.001
Period of periodical examination for tooth sealant	171 (85.1)	50 (100.0)	22 (71.0)	29	0.022
Time to eat after fluoride varnish	132 (65.7)	46 (92.0)	3 (9.7)	82.3	< 0.001
Time for water intake to maximize effect of fluoride varnish	138 (68.7)	49 (98.0)	7 (22.6)	75.4	< 0.001

Values are presented as number (%).

2. Discriminatory degree of functional oral health information literacy scale for the top 25% and bottom 25%

Table 2 shows the results of comparing the scores of the top 25% and bottom 25% to determine the degree of discrimination of the functional oral health information

literacy scale. There was a significant difference in 6 items except for the purpose of tooth sealant, and the item with the largest difference in the correct answer was the item asking about the time to eat after applying fluoride varnish (82.3%).

Table 3. Level of Verbal and Functional Oral Health Information Literacy according to the Mother's Oral Health Care Behavior

Item		Verbal oral health literacy		Functional oral health literacy	
		Upper 25%	Lower 25%	Upper 25%	Lower 25%
Brush your child's teeth after snack	Not	5 (11.6)	10 (25.6)	11 (22.0)	5 (16.1)
	Usually	15 (34.9)	8 (20.5)	10 (20.0)	14 (45.2)
	Yes	23 (53.5)	21 (53.8)	29 (58.0)	12 (38.7)
	p-value	0.070		0.054	
Brush your child's teeth after a meal	Not	3 (7.0)	5 (12.8)	4 (8.0)	3 (9.7)
	Usually	12 (27.9)	19 (48.7)	10 (20.0)	10 (32.3)
	Yes	28 (65.1)	15 (38.5)	36 (72.0)	18 (58.1)
	p-value	0.023		0.410	
Brush your child's teeth before bedtime	Not	0 (0.0)	5 (12.8)	3 (6.0)	1 (3.2)
	Usually	8 (18.6)	3 (7.7)	5 (10.0)	8 (25.8)
	Yes	35 (81.4)	31 (79.5)	42 (84.0)	22 (71.0)
	p-value	0.026		0.158	
Restriction on intake of sugar-added foods	Not	5 (11.6)	11 (28.2)	4 (8.0)	7 (22.6)
	Usually	24 (55.8)	12 (30.8)	22 (44.0)	12 (38.7)
	Yes	14 (32.6)	16 (41.0)	24 (48.0)	12 (38.7)
	p-value	0.045		0.174	
Food intake restriction before bed	Not	2 (4.7)	6 (15.4)	6 (12.0)	6 (19.4)
	Usually	18 (41.9)	13 (33.3)	12 (24.0)	11 (35.5)
	Yes	23 (53.5)	20 (51.3)	32 (64.0)	14 (45.2)
	p-value	0.030		0.249	
Restriction on consumption of cavity-inducing foods	Not	4 (9.3)	17 (43.6)	6 (12.0)	10 (32.3)
	Usually	25 (58.1)	7 (17.9)	19 (38.0)	11 (35.5)
	Yes	14 (32.6)	15 (38.5)	25 (50.0)	10 (32.3)
	p-value	<0.001		0.067	
Check after brushing your child's teeth	Not	5 (11.6)	10 (25.6)	5 (10.0)	6 (19.4)
	Usually	16 (37.2)	12 (30.8)	17 (34.0)	13 (41.9)
	Yes	22 (51.2)	17 (43.6)	28 (56.0)	12 (38.7)
	p-value	0.260		0.045	
Teach the right way to brush teeth	Not	1 (2.3)	4 (10.3)	4 (8.0)	3 (9.7)
	Usually	14 (32.6)	10 (25.6)	17 (34.0)	12 (38.7)
	Yes	28 (65.1)	25 (64.1)	29 (58.0)	16 (51.6)
	p-value	0.195		0.021	
Use fluoride toothpaste	Not	5 (11.6)	8 (20.5)	8 (16.0)	6 (19.4)
	Usually	19 (44.2)	13 (33.3)	20 (40.0)	17 (54.8)
	Yes	19 (44.2)	18 (46.2)	22 (44.0)	8 (25.8)
	p-value	0.070		0.252	
Tongue brushing	Not	0 (0.0)	2 (5.1)	2 (4.0)	2 (6.5)
	Usually	11 (25.6)	7 (17.9)	17 (34.0)	9 (29.0)
	Yes	32 (74.4)	30 (76.9)	31 (62.0)	20 (64.5)
	p-value	0.251		0.819	

Values are presented as number (%).

3. Verbal and functional oral health information literacy according to oral health management behavior of the top 25% and bottom 25% scorers

Table 3 shows the results of comparing the top and bottom 25%, respectively, of the verbal and functional oral health information literacy scores according to the oral health management behavior of mothers.

Verbal oral health information literacy was statistically significant ($p < 0.05$) in the following items: instructing children to brush their teeth after meals, instructing their children to brush their teeth before bedtime, limiting sugar-added food intake, limiting food intake before bedtime, and limiting intake of caries-inducing foods ($p < 0.05$).

Functional oral health information literacy was statistically significant ($p < 0.05$) in the children's post-brushing test and correct brushing method guidance items.

Discussion

In this study, the effect of differences in mothers' oral health information literacy by comparing and analyzing those in the top 25% and bottom 25% literacy levels of oral health information was analyzed to improve the oral health management ability of infants and young children, and to provide basic data to help develop oral health programs according to the difference in literacy.

As a result of comparing the top and bottom 25% scores of oral health information literacy in the discriminant degree of the verbal oral health information literacy scale, there was a significant difference in all 10 words, and in the top 25%, tartar, fluoride, deciduous teeth, permanent teeth, and tooth extraction showed a high percentage of correct answers, followed by in the order of resin, dental filling, plaque, glass ionomer (G.I) and teeth eruption. In the bottom 25% scorers, the percentage of correct answers were in the order of permanent teeth, deciduous teeth, and extractions, followed by tartar, fluoride, resin, G.I dental filling, and plaque. Among them, the word with the largest difference in correct answers was resin. These results are similar to those of Kim et al.¹²⁾ and Ju et al.¹⁴⁾. As resin was a non-payment treatment item until before 2019, and

therefore costly to patients, it is thought that its awareness would have been lower than that of G.I which was a payment item. In the bottom 25%, the correct answer rate for plaque, which is important for dental caries, was 0%, indicating that verbal literacy about oral health information was insufficient. Among the items of linguistic literacy, dental sealants and resins showed a low percentage of correct answers in the bottom 25%, despite the fact that dental sealants were added to health insurance coverage in 2009 and light-curing composite resin filling permanent teeth in children under the age of 12 in 2019. In particular, as a result of comparing the top and bottom 25% scorers, resin showed a large difference in correct answers. This may be due to the low awareness of mothers of infants and toddlers and low awareness of health insurance benefits, and there is a need to raise awareness. When comparing the correct answer rate for the functional oral information literacy scale of the top and bottom 25% scorers, the bottom 25% scorers showed a low rate of correct answers except for the purpose of dental filling and regular checkup periods, showing similar results to that of Kim et al.¹²⁾. Among them, the questions about the time to eat after fluoride varnish and the time to consume water for maximum effect when applying fluoride varnish showed a low percentage of correct answers. According to a study by Yoon and Chae¹⁶⁾, people with oral health education experience had a higher awareness of fluoride. In order to increase awareness of the concept of fluoride and the purpose of its use, it is necessary to increase the frequency of oral health education suitable for literacy.

In the top 25% scorers of the verbal and functional oral health information literacy level according to the oral health management behavior of mothers, verbal oral health information literacy was shown to be high for instructing children to brush their teeth after meals, instructing their children to brush their teeth before bedtime, limiting intake of sugar-added foods, limiting food intake before going to bed, and limiting caries-inducing food intake. For functional oral health information literacy, children's post-brushing test and correct brushing method guidance items were shown to be high. It was found that the mother's oral information literacy had a nutritional effect on the child's oral health management

behavior. When mothers brushed their children's teeth, the rate of dental caries was low¹⁷⁾, and it has been reported that mothers' supervision is necessary until infants and young children form correct teeth brushing habits¹⁸⁾. It has also been reported that parents' confidence in their oral health behavior and knowledge leads to healthy behavior in their children¹⁹⁾. Therefore, it is considered that more education and multi-faceted research are needed on how to manage children's oral health according to the mother's oral information literacy level.

As a limitation of this study, first, by bias extraction, the top 25% and bottom 25% were divided based on oral health information literacy scores for mothers in region J and divided into upper and lower groups. Consequently, it is difficult to generalize the results to all mothers of infants and toddlers in Korea due to the insufficient number of subjects and the inability of the age group to standardize the results. Second, in the oral health literacy measurement tool, except for 6 out of 17 items, the discriminative power was low, so it would be necessary to change and develop the items in the follow-up study.

In respect to this study, it was found that linguistic and functional understanding of literacy is essential to improve oral health information literacy of mothers of infants and toddlers, and that mothers' literacy influences their children's oral health behavior. Therefore, systematic education should be conducted to raise the level of literacy according to the mother's level of understanding of oral health information literacy. In addition, it is necessary to consider the use of various media to provide information suitable for the characteristics of the oral period of infants and toddlers. It is also crucial an integral program that can promote oral health of infants and young children and increase the mothers' literacy level is developed through provision of oral health education during oral examinations at dental hospitals and dental clinics.

Notes

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Ethical approval

This study was approved by the Institutional Review Board of Wonkwang University (IRB No. WKIRBIRB-202008-SB-045).

Author contributions

Conceptualization: Mi-Jeong Kim. Data acquisition: Cha-Young Lim. Formal analysis: Cha-Young Lim. Funding: Mi-Jeong Kim. Supervision: Mi-Jeong Kim. Writing-original draft: Ju-Lee Son. Writing-review & editing: Ju-Lee Son.

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