Original Article

Oral Health Literacy and Oral Health Behavior among Adolescents in Babol 2019

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Abstract

***Background*:** The process of obtaining oral health information, evaluating its concepts and using appropriate prevention and treatment processes in the field of Oral health literacy (OHL) is within the scope of health literacy and is the link between culture and society, health system, education system, and oral health consequences. The purpose of the current study was to investigate OHL in first grade high school students in Babol.

***Materials and Methods*:** The present study was a cross-sectional study on 383 high school students in Babol 2019 using multi-stage cluster sampling method in the first stage of school selection and in the second stage of class selection. The data were collected using demographic, oral health behaviors assessment and Oral Health Literacy Questionnaire. OHL questionnaire have 17 questions in four sections of reading comprehension, numeracy, listening and decision making. Regression analysis, Anova, T-test, and chi square test were used for data analysis (SPSS 23).

***Findings*:** The mean score of students' OHL was 8.33 ± 2.004, and 11.7%, 26.1%, and 61.9% of the students were with adequate, borderline, and inadequate levels of OHL, respectively. According to the analysis, OHL had a significant relationship with income, father's education, tooth brushing, and use of beverage foods.

***Conclusion*:** The results showed that OHL was insufficient among students, and more efforts and interventions were required to improve oral health and increase oral health literacy among students.

***Key Words*:** Adolescents; Oral Health Literacy; Behavior; Oral Health
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1. *Introduction*

Oral health literacy (OHL) includes a complicated set of knowledge and skills, which is independentincom of public teaching, and we consider it as a major determinant of abilities of individuals to decide in wide spectrum of behaviors related to oral and activity health. Therefore, oral health literacy can correct patterns of low use of health services, avoidance of dental care, and preventive behavior in oral health. OHL has gained prominence in the dental literature in the last decade. Similar to health literacy, OHL has also proved to be critical in reducing oral health disparities and in promoting oral health (1). Individuals with limited OHL were reported to be at higher risk for oral diseases and the problems related to those diseases (2). Lower literacy has been linked to problems with the use of preventive services, delayed diagnoses of medical conditions, poor adherence to medical instructions, poor self-management skills, increased mortality risks, poor health outcomes, and higher healthcare costs (3). Baskaradoss found that people with poor oral health literacy are more likely to have missed dental appointments(4). Non-adherence to Dental recommendations has been reported to cause higher caries experiences and poor periodontal status (5, 6). Several Published studies have highlighted the important role played by OHL in influencing health behaviors and health outcomes (7-10). In a large cross-sectional survey conducted at two university-based dental clinics in the United States, Multi-site Oral Health Literacy Research Study (MOHLRS), reported that about one-fifth (18%) of the participants had “low” conceptual knowledge (11).

Adolescence is a period of considerable transformations in which individuals often reject predetermined norms and create their own behaviors (12). It can be a vulnerable period in terms of health due to inadequate behavior, the underuse of preventive services, and greater independence from one’s parents (13). With regard to oral health, the most recent Brazilian epidemiological survey found that 13.6% of the adolescents aged 15 to 19 years had never visited a dentist (12). The prevalence of caries for 12 and 13-year-old adolescents in the world is about 36%, but in Iran this prevalence is 79.7% (14).

Diseases related to mouth and tooth can not only cause infection and tooth loss, but also cause disabling pains and problems in eating and talking. Another important issue is that chronic oral infections are related to cardio-pulmonary diseases, diabetes and stroke, which, in addition to other oral diseases, and many other non-communicable and chronic diseases, could be prevented by increasing the level of OHL (15).

Any increase in OHL in students has many benefits including that children are probably diagnosed with oral diseases at early stages and necessarily need repairing cares. In contrast, as we said, the lack of access to oral healthcare in children can lead to delay in diagnosis and common tooth decay (16).

Such investigations showed that an unfavorable economic status is reflected in a lower brushing frequency, inadequate sanitary installations, and the consumption of more cariogenic foods and beverages. This fact makes socioeconomic status an important determinant for the greater prevalence of dental caries (12, 17, 18).

Information on oral health literacy can help dental clinicians and researchers to better evaluate how well their patients understand the oral health-related information given to them. The insufficient information on oral health literacy makes urgent the need for more research on this important topic.

Few studies have been conducted regarding the impact of oral health literacy on oral health behaviors among adolescents.(2, 19, 20) One report has indicated that oral health literacy is associated with self-reported oral health (20). In Iran, some studies have examined oral health literacy in adult (8, 21). Thus, the objective of this cross-sectional study was to investigate how oral health literacy was related to oral health behaviors in Babol

2. *Material and Method*

The current study was a cross-sectional study in which 383 students (13-16 years) in Babol were selected as participants for the study through multistage cluster sampling in the time range of October to December, 2019. In the first stage, schools and in the next stage, classes were selected. By referring to education office of the city, the list of all schools of first grade middle school, location, socio-economic status, and number of them were determined, and then from seven schools (4 girls' and 3 boys' schools), based on population ratio, 383 students of first grade of middle school were selected for the study.

Sample size was estimated at 400 individuals by considering population of students of middle school in Babol (5753), standard deviation of 0.5, and estimation error of 0.05, and 17 individuals were excluded due to not responding the questionnaire thoroughly.

The inclusion criteria were literate male and female adolescents aged 12 to 16 years. Adolescents with learning problems due to medical conditions, disease that affect learning abilities, and hearing impairment (information obtained from parents and teachers) were excluded in the study.

Data gathering tool included three-part questionnaire (demographic, oral health literacy, and oral health behaviors assessment questions). In demographic section, questions included age, gender, educational level, father's education, mother's education, father's age, mother's age, father's job, mother's job, family income, and number of family members. We used Oral Health Literacy Adults Questionnaire (OHL-AQ). Their validity and reliability were confirmed by Naghibi et al. (22). The internal consistency for this questionnaire was also tested (Cronbach's alpha=0.72).

The OHL-AQ includes four sections of reading comprehension, numeracy, listening and decision making. Section of reading comprehension includes 6 questions which evaluates awareness of oral diseases to assess the skill of reading and health knowledge of students.

Next section (numeracy) is related to the skill of writing, understanding numbers, and the skill of reading which consists of two two-question sections. At first section, one version is located by the use of antibiotic and at second section, guideline related to the use of sodium fluoride 0.2% mouthwash due to which the questions are answered. In listening skill section, one guideline on points which should be adhered after pulling tooth is read by the researcher for students to select the answer to the questions related to it or write it. By considering the answers, skill of listening, numeracy, reading and writing are assessed, and at the final section, questions on dealing with oral problems and phrases

on form of dentistry examination are presented to students to assess their skills of reading comprehension and decision making.

Each question related to OHL consists of one correct answer, one or more wrong answers and one answer of "I don't know", and in scoring, every correct answer achieves score of 1, and wrong answer or "I don't know" answers were scored zero, and due to the number of questions, the questionnaire score is in the range of 0-17, and is placed in three groups of insufficiency (0-9), borderline (10-11), and sufficient (12-17).

Then, questions on oral health behavioral habits which consist of frequency of brushing, using toothpaste while brushing, use of dental floss and use of sweet snacks were asked.

Afterward, questions on the resource of oral health information and self-assessment of oral behaviors, and oral behavioral habits are asked. According to these questions, students are assessed on their behavioral function regarding mouth and tooth.

Inclusion criteria was students of first grade of middle school which filled the questionnaire thoroughly and were satisfied on participating in the study.

The data of the questionnaire was analyzed after gathering by SPSS Software, version 23, through descriptive-analytical statistics (mean and frequency percentage), regression, ANOVA, T-test and chi square tests (to show any potential association among demographic characteristics, mean score of OHL of students, association between oral health behavior and oral health literacy).

The research was approved by the Human Research Ethic Committee of Mazandaran University of Medical Sciences, No (IR.MAZUMS.REC.1397.402)

3. Results

The number of participants was 400 individuals from students of first grade of middle school 233 (60.8%) of whom were girls and 150 (39.2%) were boys. 32.6% of the students brushed their teeth two to three times a week and 34.2% brushed their teeth twice a day or more. In addition, 91.6% of the students always and mostly used toothpaste while brushing their teeth, 71.5% of them used dental floss two-three times a week, and 27.9% of them used dental floss twice or more a day. Amongst the students participated in the study, 11.7% had sufficient, 26.1% had borderline, and 61.9% had insufficient oral health literacy. The mean score of OHL of the students was 8.33±3. The demographic characteristics of students are shown in Table 1.

Table 1. Demographic characteristics of participants (N=383)

Variables		Value
Mother's age		39.50±20.81
Father's age		44.60±29.58
Father' job	Unemployment	40(10.4%)
	Employed	225(58.7%)
	Worker	118(30.8%)
Mother's job	Housewife	266(69.5%)
	Employed	60(15.7%)
	Etc.	57(14.9)
Mother's education	Diploma and lower	264(72.3%)
	Academic	101(27.7%)
Father's education	Diploma and lower	278(74.3%)
	Academic	96(25.7%)
OHL	Insufficient(0-9)	237(61.9%)
	Borderline(10-11)	100(26.1%)
	Sufficient(12-17)	46(12%)
Total OHL(0-17)		8.32±3
Frequency of brushing	Two or three times a day	121(31.6%)
	Once a day	131(34.2%)
	Twice or more a day	131(34.2%)
using dental floss	Two to three times a week	277(72.3%)
	Twice a day or more	106(27.7%)
Use of sugary foods	Three times a day or more	99(25.8%)
	Once a day	65(17%)
	Rarely	219(57.2%)

Students had the most correct answers to the comprehension reading section (54.16) and the lowest answers to the listening section (42.7) (Figure1).

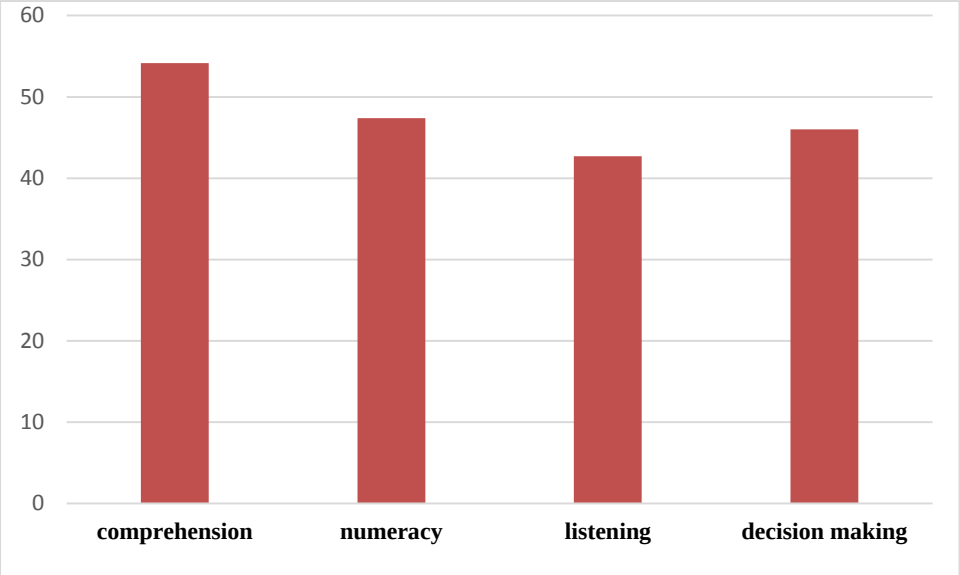

Figure1. Distribution of correct answer to Oral Health Literacy among students

According to the findings, linear regression analysis was used, and demographic variables and oral health behaviors were found to be related to OHL in students. The results showed that there was a significant relationship between income, father's education, tooth brushing, and the use of beverage foods and OHL. Also, regression analysis showed that income, father's education, tooth brushing and beverage foods explained 10.7 of OHL variance (Table 2).

Table 2. Regression analysis predicting OHL

Variables	B	SE	p-value	R^2
Income	0.161	0.23	0.02	
Mother's education	0.031	0.311	0.59	0.107
Father's education	0.123	0.38	0.037	
Tooth brushing	0.204	0.409	<0.001	
Dental floss	-0.027	0.277	0.611	
Use of sugary foods	0.11	0.177	0.034	

Tooth brushing was twice or more a day in girls, and in boys, it was twice to three times a week, and girls significantly tooth brushed and used dental floss more than boys (P=0.01). As is shown in Table 2, the use of sugary foods in girls was less than boys (p<0.02). Also, oral health assessment in girl students was better than boys. Hence, the individuals who behaved better in brushing and using sugary foods had higher health literacy (P<0.05) (Table 3).

Table 3. Distribution of oral health variables divided by gender

Variables		Gender		p-value*
		Boy	Girl	
Frequency of brushing	Two or three times a day	66	55	<0.001
	Once a day	47	84	
	Twice or more a day	37	94	
using dental floss	Two to three times a week	113	164	<0.001
	Twice a day or more	37	69	
Use of sugary foods	Three times a day or more	53	46	0.002
	Once a day	22	43	
	Rarely	75	144	
Oral health assessment	Good	123	141	<0.001
	Moderate	18	75	
	Bad	9	17	
Oral health literacy	Sufficient	22	24	0.274
	Borderline	34	66	
	Insufficient	22	24	

***p<0.05 chi square test**

In addition, the priority of oral health information resource was the Internet, (35.2%), dentists (34.7%), and family (13.6%), and the lowest resource was obtaining information from friends (1.8%).

Based on oral health assessment, 68.9% of the students reported sufficient oral health, and only 6.8% of them reported insufficient level of oral health.

Regression analysis showed a significant association between OHL and oral health assessment (p=0.02). Results of the post-hoc test indicated that OHL in students who experienced bad oral health assessment was lower than those with good and average evaluation.

The relationship between the dimensions of OHL with demographic variables is shown in Table 4.

In this study sex and income had a significant relationship with all dimensions of OHL. Girls were better than boys in comprehension and decision-making dimensions, and boys had higher means in terms of numeracy and listening dimensions.

With an increase in income level, all aspects of health literacy have increased significantly (p<0.05).

There was found a significant relationship between age and dimensions of listening and decision-making. As students get older, the dimension of listening and decision-making increases. Ninth grade students had higher health literacy scores in terms of numeracy and decision making. Oral health assessment also had a significant relationship with listening and decision making (Table 4).

Table 4. Relationship between OHL dimension and variables

OHL	Sex (p-value)[1]	Class (p-value)[2]	Income (p-value)[2]	Age (p-value)[2]	Oral health assessment (p-value)[2]
Comprehension	<0.001	0.433	0.015	0.306	0.726
Numeracy	<0.001	0.02	0.002	0.073	0.286
Listening	<0.001	0.303	<0.001	0.017	0.004
Decision making	<0.001	0.015	0.006	0.04	0.001

1:t-test 2: ANOVA

4. Discussion

The current study aimed to assess the oral health literacy and oral health behavior in students of first grade middle school. The results indicated that 61.9% of the students had insufficient OHL. The study of Laio da Costa et al. showed consistent results with the findings of the present study in that 33.1% of the adolescents aged 15-19 years had insufficient health literacy, and 37.5% had borderline health literacy, while 29.4% of them had sufficient health literacy which indicated a lower level of oral health in adolescents (12).

The results of a study conducted by Moalemi in Isfahan showed that OHL in adult was sufficient, which can be related to the target group (adults over 18 years), while in the present study, the target group was in the range of 13-16 years old (21).

In the current study, one of the factors affecting oral health literacy was found to be father's educational level, but mother's educational level did not significantly affect OHL. This finding was in line with some other studies (23, 24).

The study by Bhavna stated that children with low educational level showed poor oral health, especially in parents with educational level lower than diploma (25).

Health behavior is formed based on knowledge, attitude and performance. Habits and knowledge of mother and father on oral health affects oral health status of children (26).

In a study on Brazilian immigrants, 80% of the respondents with a high level of OHL had academic education. This finding was consistent with other studies, as it is mentioned that education is a strong predictor (24, 27)

Therefore, by considering the relationship between habits and degree of education in parents in dealing with their children, lower educational level can cause lower income, unemployment, and inappropriate occupational status, which, then, may affect healthy behaviors and oral health status (16).

A significant outcome of this study was that oral health literacy and all dimensions of OHL had significant relationship with the income level, which showed OHL will be increased by improvement of income. This finding was in line with a study conducted in China and Brazil(17), (28).

In another study by Paola Calvasina et al., the average family income was found to be associated with barriers to dental use (dentistry), and students with insufficient median income were four times more likely to not having a visit to a dentist in the last year (27).

Other studies have shown that adequate income had an impact on health, and people in high-income countries generally have better health conditions (27, 29). In a study conducted in the children of higher-income families, they were observed to have better oral health and oral health literacy (27).

Controversially, the results of the study by Goudarzi et al. showed no significant association between income level with parent's knowledge, attitude and performance on oral health (30).

The results of a study conducted by Golkari et al. showed that the quality of life related to oral health in children aged 2-5 years living in Shiraz was directly associated with their socio-economic level and birth order. The life quality level related to oral health declined with increasing income level, the number of children, and birth order (29).

The results of a study on adolescents aged 15-19 years in Brazil showed that low economic status was associated with insufficient health facilities and use of unhealthy foods and drinks, which was a result of insufficient oral health literacy. People in low socioeconomic status often had less access to health information, healthy foods, oral health services, and healthy product; therefore, they had lower levels of health literacy and, consequently, more caries experience, while individuals with higher socio-economic status had sufficient level of OHL. Thus, socio-economic status was found to be an important determinant for insufficient health literacy, oral health behavior, and consequent onset of dental caries (12).

In the present study, tooth brushing was twice or more during a day in girls and twice to three times a week in boys. Dental flossing and tooth brushing was more significantly used by girls than boys. Also regarding oral health behavior, use of dental floss, tooth brushing, and use of beverage, gender showed a positive significant relationship, and oral health behavior of girls was found to be more than boys, the results which were in line with the study findings of Basir and Sofia (24, 31).

The results of the current study further showed that there was not any significant relationship between OHL and gender which was in line with the study of Dutra and Salah (12, 15). Studies in America, Canada and India have shown that gender differences had no effect on OHL (21).

In this study, comprehension and decision making were found to be higher in girls than boys, whereas in numeracy and listening, boys had better OHL than girls, the result which can be related to the psychological learning differences in girls and boys. In some studies, health literacy in females was documented to be higher than males (32), but in the study of Javadzade, no significant relationship was seen between male and

female (33). Given the fact that girls have more attention to health, they can obtain health information from different sources, which can finally result in higher OHL.

The findings of the current study also indicated that the most important source of information on oral health literacy in the students was found to be the Internet (it can be related to students' curiosity and information gained through virtual networks). This result was in line with the findings of the study of Amirchaghmaghi (34). The reason for this can be related to the economic situation of students who had a higher percentage in middle-income and upper-income families, or the fact that in recent years, the application of the Internet via tablets and smartphones has become more common. In a study by Sheikh et al., it was shown that the least source of information was the Internet (35).

In this study, dentists, television, and teachers were the frequent sources for students after the Internet, which was in line with other studies (21, 22, 34, 35). The study conducted on adolescent (8-12years) showed that 98.3% of students were informed on oral health knowledge, and this information in 60% of the cases was presented by parents (home, school). This rate in our study was 13.6% for this information resource (23), while in the study of Goudarzi, 50% of the students stated that the most important information resource was health teacher (30). Considering that most people are more affected by dentists and the mass media education, it seems that increasing the awareness of students in this field can be an effective strategy in promoting oral health literacy in the community.

Another important point in this study was oral health self-assessment in students, which indicated a significant relationship between oral health literacy and oral health self-assessment. Also, there was found a significant relationship between oral health self-assessment and listening and decision making. Oral assessment in girls was also observed to be better than boy students. The reason for this result could be attributed to that, individuals with higher health literacy (People who listen well and analyze the data, they have a better self-assessment of oral health) had higher assessment ability on oral health conditions. This result was in line with the previous studies which showed that health literacy and self-efficacy had important role in oral health (21, 22, 36).

The current status of eating behaviors and drinking sugary foods in this study, in addition to destroying effect on oral health probably increases load of chronic diseases (cardiovascular diseases, diabetes, hyperlipidemia, hypertension, and other related chronic diseases). These results can help planners and policy-makers in designing health programs. Due to insufficient oral health literacy, there is a necessity to do needs assessment, designing and performing education programs for students, their parents, teachers, and managers. Schools have an educational role, which is the establishment of cooperation and communication among students, teachers, health centers and parents. The result obtained from this study and similar studies can produce a clear and appropriate program to promote oral health of students, and it is important to try to design programs which

enable students with low-income families to assess health facilities.

5. Conclusion

This study represented that oral health literacy in middle school students was insufficient. It is important to consider educational interventions and education plans for students, their parents, and teachers to improve OHL in adolescents.

Limitation

In this study, the importance of the health educator in relation to the information received about the oral health was not assessed, and it is hoped that such studies to be performed in future. Additionally, our study was conducted in a small society (middle school students), therefor it is suggested to evaluate OHL in a larger level (provincial) with dental indicators, such as DMFT and periodontal indices in future studies.

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