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Health Literacy, Dental Service Utilization, and Oral Health Status among High School Students in Hamedan and Saveh, Iran: A Cross-Sectional Study

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Abstract

Background

The utilization of dental services is influenced by various demographic and individual factors, including health literacy, which is defined as the ability to comprehend, analyze, and utilize health-related information. Therefore, the aim of this study was to investigate the relationship between health literacy and the utilization of dental services as well as oral health status among high school students in Hamedan and Saveh cities.

Methods

The present study is a descriptive-analytical, cross-sectional study. The study population consisted of high school students in the cities of Hamedan and Saveh. To assess health literacy and the utilization of dental services, a health literacy and dental service utilization questionnaire was used. The oral and dental health status of the study participants was evaluated based on dental caries (DMFT index), gingival health (CPI index), and oral hygiene (SOHI index).

Results

Based on the study findings, health literacy has no significant relationship with the dental caries index (DMFT with a mean of 2.36) ($P > 0.05$), but it has an inverse relationship with gingival health index (CPI with a mean of 1.77) ($P < 0.001$) and oral hygiene index (SOHI with a mean of 1.32) ($P = 0.003$). On the other hand, health literacy showed a direct and significant relationship with the rate of utilization of dental services ($P < 0.001$). However, increased utilization of services was only associated with an increase in DMFT ($P < 0.001$) and had no significant effect on improving CPI and SOHI.

Conclusions

Designing targeted educational programs for self-care and prevention of gingival diseases, as well as integrating health literacy into the public education system and school health, can help improve the oral and dental health status of high school students.

Background

Oral and dental diseases are referred to as a silent epidemic. Oral diseases affect more than half of the world's population. Data from surveys conducted over the past two decades show a significant reduction in Decayed, Missing, and Filled Teeth (DMFT) index from 5.1 to 4 among 12-year-old children. However, the overall oral and dental health status, especially among children, is still not satisfactory. The percentage of caries-free children (primary and permanent teeth) among 6-year-old and 9-year-old children is 13.8 and 11.5, respectively, and more than 50% of 12-year-old children have experienced dental caries (1).

According to the last national oral and dental health survey in Iran in 2012, the number of DMFT among children aged 5 to 6 years was 5.16. Furthermore, another national report showed that the DMFT of Iranian high school students is twice the global standard (2).

The rate of utilization of dental services has a significant effect on the oral and dental health status of individuals. By definition, utilization of health services is among the main functions of the health sector, which results from the interaction between the behavior of users and the professionals who guide them within this system. Utilization of dental services refers to the actual visits of community members to oral health care centers to receive these services. According to studies, individuals with a low socioeconomic status are more susceptible to oral diseases such as dental caries, periodontal diseases, and oral cancers due to their lower level of access and utilization of dental services (3).

According to data from the Iranian Medical Council, in 2017, among adolescents, 27% had not utilized dental health-care services at all, 28% had utilized these services only once, and 45% had utilized these services more than once (4).

There are many factors that influence the utilization of oral health care, which can be classified into demographic and individual factors. One of the individual factors affecting the utilization of health care is health literacy (5). Health literacy is the skill of obtaining, understanding, and appropriately using health-related information (6). In 2010, Healthy People for the first time defined oral health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic oral and dental health information and services needed to make appropriate health decisions," a definition that is consistent with general health literacy (7).

Investigating health literacy and its relationship with oral and dental health status in high school students can provide the groundwork for implementing measures aimed at improving oral and dental health status through the promotion of health literacy. Therefore, the aim of this study was to determine the relationship between health literacy and the utilization of dental services as well as oral and dental health status among high school students in the cities of Hamedan and Saveh.

Methods

The present study employed a descriptive-analytical, correlational, cross-sectional design. The study population consisted of high school students from the cities of Hamedan and Saveh. Data were collected from schools in these two cities during the fall of 2024. Hamedan and Saveh are located in the provinces of Hamedan and Markazi, respectively. Hamedan Province is situated in western Iran, while Markazi Province is located in central Iran.

Data Collection

To collect the study data, a number of students were selected from the selected schools. The Health Literacy and Dental Service Utilization Questionnaire was then completed by the selected students. Subsequently, the oral and dental health status of the students was assessed and recorded using a researcher-developed checklist.

Oral and Dental Health Indicators

To assess oral and dental health status, the following indicators were evaluated:

1. DMF Index

The World Health Organization (WHO) definition was used to diagnose dental caries and determine the DMFT index. The DMFT index is the most common and important epidemiological scale for measuring dental caries. In this index, the number of permanent teeth (T = Teeth) that are decayed (D = Decay), missing due to caries (M = Missing), or filled due to caries (F = Filling) was evaluated. This index serves as an important measure for indicating oral and dental health status and plays a key role in health-related decision-making (8).

2. CPI Index

The CPI (Community Periodontal Index) was assessed using a Williams probe. This index reflects the periodontal disease status of a population and indicates the progression of periodontal diseases among community members. It is classified into four scores as follows:

- **Score 0**: Healthy gingiva
- **Score 1**: Gingival bleeding observed following probing
- **Score 2**: Presence of dental calculus
- **Score 3**: Presence of a periodontal pocket of 4–5 mm
- **Score 4**: Presence of a periodontal pocket of 6 mm or more (9).

3. SOHI Index

The amount of dental calculus and debris was assessed using the Simplified Oral Hygiene Index (SOHI). The scoring method for calculating the debris and calculus indices is as follows:

- **Score 0**: No debris or stain present – No calculus present
- **Score 1**: Debris covering up to one-third (≤ 1/3) of the tooth surface, or stain present on the tooth surface – Calculus covering up to one-third (≤ 1/3) of the tooth surface
- **Score 2**: Debris covering between one-third and two-thirds (1/3–2/3) of the tooth surface – Calculus covering between one-third and two-thirds (1/3–2/3) of the tooth surface, or slight subgingival calculus present
- **Score 3**: Debris covering more than two-thirds (> 2/3) of the tooth surface – Calculus covering more than two-thirds (> 2/3) of the tooth surface, or abundant subgingival calculus present

The sum of the scores is divided by the number of surfaces assessed to obtain the score for each index. An individual's SOHI is derived from the sum of the debris and calculus indices (10).

Dental examinations were performed using a dental mirror, dental explorer, Williams probe, disposable tray, disposable gloves, and cotton rolls. The results were then recorded on the relevant form.

Health Literacy

In this study, health literacy was assessed using the Adolescent Health Literacy Measurement Tool. This questionnaire consists of 44 items across 8 domains, including Access (5 items), Reading (5 items), Comprehension (10 items), Evaluation (5 items), Application (4 items), Communication (8 items), Self-Efficacy (4 items), and Calculation (3 items). The instrument was developed and psychometrically validated by Ghanbari and colleagues in 2016 (1395 Persian calendar). According to the study results, the reliability of the questionnaire was confirmed with a Cronbach's alpha coefficient of 93% (11).

Utilization

To assess the participants' utilization of dental services, the number of times each individual had used these services over the past year was examined.

Sampling

A multi-stage cluster sampling method was employed. After obtaining the necessary permissions from the relevant authorities, the list of high schools in the cities of Hamedan and Saveh was first obtained. Subsequently, each city was divided into two districts. From each district, two schools were selected using cluster random sampling, and the sample size for each district was determined proportionally to the student population of each grade level within that district. To achieve this, upon visiting each school, one class from each grade was selected through simple random sampling from the list of classes.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for the study were as follows:

• Inclusion criteria:

- Enrolled in upper secondary school (high school);
- Willingness and ability to participate in the study;

• Exclusion criteria:

- Presence of systemic diseases (based on the student's health record available at the school);
- Undergoing orthodontic treatment.

Data Analysis Method

To analyze the data, descriptive statistics were first used to summarize the data, including means and standard deviations for quantitative variables, as well as frequencies and percentages for categorical variables. Subsequently, Pearson's correlation coefficient was employed to determine the correlations between health literacy and the utilization of dental services, as well as oral and dental health status. The means of oral and dental health status variables across levels of demographic variables were compared using independent t-tests and one-way analysis of variance (ANOVA). All statistical analyses were performed using SPSS software.

Results

Descriptive Statistics of Demographic and Background Variables

Based on the reported findings, the majority of respondents in the present study were male (62.2%) and were enrolled in the ninth grade (65.8%). Regarding parental education, most respondents' mothers and fathers held a

high school diploma (38.5% and 35.5%, respectively). The majority of respondents' mothers were housewives (82.9%), while their fathers were employed (89.0%) (Table 1).

Table 1
Description of Qualitative Demographic and Background Variables

Variable	Levels	Frequency	Percentage
Student gender	Female	148	37.8
	Male	244	62.2
Academic year	Year 8	15	3.8
	Year 9	258	65.8
	Year 10	90	23.0
	Year 12	29	7.4
Mother's education level	Illiterate	4	1.0
	Able to read and write	37	9.4
	Middle school	52	13.3
	High school (lower secondary)	52	13.3
	Diploma	151	38.5
	University	96	24.5
Mother's employment status	Housewife	325	82.9
	Employed	67	17.1
Father's education level	Illiterate	7	1.8
	Able to read and write	33	8.4
	Middle school	67	17.1
	High school (lower secondary)	43	11.0
	Diploma	139	35.5
	University	103	26.3
Father's employment status	Employed	349	89.0
	Unemployed	4	1.0
	Retired	39	9.9

Descriptive Statistics of the Main Study Variables

According to the reported findings, the mean and standard deviation of health literacy among the study participants were 3.52 and 0.625, respectively. Furthermore, it was found that the comprehension domain had the highest mean score, while the application domain had the lowest mean score. Based on the skewness and

kurtosis indices reported in the table above, all of these indices fell within the range of -2 to + 2; therefore, the distribution of these variables followed a normal distribution (Table 2).

Table 2
Description of Health Literacy Among Study Participants

Variable	Domains	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis
Health Literacy	Self-Efficacy	392	1.00	5.00	3.3393	0.81761	-0.248	-0.252
	Access	392	1.00	5.00	3.5612	0.93717	-0.553	-0.524
	Reading	392	1.00	5.00	3.6765	1.07559	-0.629	-0.588
	Comprehension	392	1.60	5.00	3.9194	0.77214	-0.847	0.332
	Evaluation	392	1.00	5.00	3.4153	0.90758	-0.329	-0.619
	Application	392	1.00	5.00	3.3386	1.13349	-0.386	-1.013
	Communication	392	1.00	5.00	3.4493	0.91900	-0.453	-0.534
	Total Health Literacy	392	1.76	4.99	3.5285	0.65274	-0.219	-0.493

The findings showed that the mean and standard deviation of utilization of dental services (based on the total number of times various services were utilized) were 4.568 and 6.645, respectively (Table 3).

Table 3
Description of Utilization of Dental Services Among Study Participants

Variable	Frequency of Service Use	N	Minimum	Maximum	Mean	Standard Deviation
Utilization	Dental examinations	392	0.00	18.00	1.7857	2.98504
	Fillings	392	0.00	21.00	0.9898	2.02917
	Scaling	392	0.00	10.00	0.2474	0.93113
	Pit and fissure sealants	392	0.00	13.00	0.5102	1.22835
	Root canal treatment	392	0.00	9.00	0.2577	0.84469
	Crowns	392	0.00	6.00	0.1505	0.61963
	Jaw surgery	392	0.00	0.00	0.0000	0.00000
	Extractions	392	0.00	10.00	0.5944	1.25772
	Orthodontics	392	0.00	1.00	0.0102	0.10063
	Fissure sealants	392	0.00	2.00	0.0128	0.13319
	Other	392	0.00	4.00	0.0102	0.20203
	Total Utilization	392	0.00	39.00	4.5689	6.64522

Based on the descriptive results of oral and dental health status among study participants, assessed using the three indices of DMFT, CPI, and SOHI, the mean and standard deviation of the three indices were 2.359 ± 2.431,

1.778 ± 0.484, and 1.322 ± 0.672, respectively (Table 4).

Table 4
Description of Oral and Dental Health Status Among Study Participants

Variables	N	Minimum	Maximum	Mean	Standard Deviation
Decayed	392	0.00	13.00	1.6709	1.94722
Missing	392	0.00	4.00	0.0663	0.35138
Filled	392	0.00	11.00	0.6224	1.52400
DMFT	392	0.00	13.00	2.3597	2.43182
CPI	392	0.00	2.00	1.7781	0.48426
SOHI	392	0.00	3.16	1.3222	0.67235

Inferential Statistics

Relationship Between Health Literacy and Utilization of Dental Services

Based on the study results, there was a direct and significant relationship between health literacy and utilization of dental services ($r = + 0.293$, $P < 0.001$). Specifically, as health literacy increased among the studied students, their rate of utilization of dental services also increased, and vice versa. All components of health literacy, including self-efficacy, access, reading, comprehension, evaluation, and communication, also showed a positive and significant correlation with utilization of dental services ($P < 0.001$). The self-efficacy component had the strongest correlation (0.279), while the application component had the weakest correlation (0.147) (Table 5).

Table 5
Relationship Between Health Literacy and Its Components with Utilization of Dental Services

Variables		Utilization of Dental Services
Self-Efficacy	Correlation coefficient	0.279**
	P-value	< 0.001
Access	Correlation coefficient	0.177**
	P-value	< 0.001
Reading	Correlation coefficient	0.190**
	P-value	< 0.001
Comprehension	Correlation coefficient	0.233**
	P-value	< 0.001
Evaluation	Correlation coefficient	0.198**
	P-value	< 0.001
Application	Correlation coefficient	0.147**
	P-value	0.004
Communication	Correlation coefficient	0.233**
	P-value	< 0.001
Health Literacy	Correlation coefficient	0.293**
	P-value	< 0.001

Relationship Between Health Literacy and Oral and Dental Health Status

The study findings indicated that neither health literacy nor any of its components had a significant relationship with the DMFT index.

However, there was a significant inverse relationship between health literacy and the CPI index ($r = -0.620$, $P < 0.001$). The negative sign of the correlation coefficient indicated an inverse relationship between the two variables, meaning that as health literacy increased, the CPI index value decreased, and vice versa. Furthermore, other correlation analyses revealed that all components of health literacy also had a significant inverse relationship with the CPI index. Among these components, the evaluation component had the strongest correlation (0.511), while the application component had the weakest correlation (0.288).

Finally, based on the study findings, there was a significant inverse relationship between health literacy and the SOHI index ($r = -0.152$, $P = 0.003$). The direction of the relationship was inverse, as indicated by the negative sign of the obtained correlation coefficient, demonstrating that as health literacy increased among students, the SOHI index value decreased, and vice versa. Furthermore, other correlation analyses revealed that the components of self-efficacy, access, reading, comprehension, and evaluation also had a significant inverse relationship with the

CPI index. Among these components, the self-efficacy component had the strongest correlation (0.181), while the reading component had the weakest correlation (0.109) (Table 6).

Table 6
Relationship Between Health Literacy and Oral and Dental Health Indices

Variables		DMFT	CPI	SOHI
Self-Efficacy	Correlation coefficient	-0.028	-0.491**	-0.181**
	P-value	0.584	< 0.001	< 0.001
Access	Correlation coefficient	-0.026	-0.437**	-0.176**
	P-value	0.615	< 0.001	< 0.001
Reading	Correlation coefficient	0.031	-0.424**	-0.109*
	P-value	0.547	< 0.001	0.030
Comprehension	Correlation coefficient	-0.020	-0.450**	-0.115*
	P-value	0.694	< 0.001	0.022
Evaluation	Correlation coefficient	0.032	-0.511**	-0.116*
	P-value	0.524	< 0.001	0.022
Application	Correlation coefficient	0.009	-0.288**	0.004
	P-value	0.862	< 0.001	0.933
Communication	Correlation coefficient	0.088	-0.467**	-0.081
	P-value	0.080	< 0.001	0.108
Health Literacy	Correlation coefficient	0.020	-0.620**	-0.152**
	P-value	0.693	< 0.001	0.003

Relationship Between Utilization of Dental Services and Oral and Dental Health Status

Based on the study results, there was a direct and significant relationship between utilization of dental services and the DMFT index ($r = +0.304$, $P < 0.001$). This means that as the utilization of dental services increased among the studied students, the DMFT index value also increased, and vice versa.

The results of the Pearson correlation test for the two variables of utilization of dental services and the CPI index revealed a significant inverse relationship between these two variables ($r = -0.434$, $P < 0.001$). Based on this finding, as the utilization of dental services increased among the students, the CPI index value decreased, and vice versa.

Finally, given that the p-value for the correlation coefficient between the two variables of utilization of dental services and the SOHI index was greater than 0.05, it was determined that these two variables did not have a statistically significant relationship with each other (Table 7).

Table 7
Relationship Between Utilization of Dental Services and Oral and Dental Health Indices

Variables		DMFT	CPI	SOHI
Utilization of Dental Services	Correlation coefficient	0.304**	-0.434**	-0.048
	P-value	< 0.001	< 0.001	0.346

Discussion

Oral and Dental Health Status

The results obtained from the present study showed that the mean values of the three indices, namely DMFT, CPI, and SOHI, were 2.359, 1.77, and 1.322, respectively. Nekoui and colleagues (2022) conducted a study on 5,657 adults in Kerman and reported mean DMFT and CPI values of 10.7 and 0.76, respectively (12). The mean CPI in the present study was slightly higher than that reported by Nekoui and colleagues. This difference may be attributed to the difference in the study population, as the participants in the present study were adolescents. At this age, periodontal conditions may be influenced by hormonal factors, growth, or dietary changes, which could lead to poorer outcomes.

Relationship Between Health Literacy and Utilization

Based on the study results, a significant direct relationship was observed between health literacy and the rate of utilization of oral and dental health services. That is, as health literacy increased, the rate of utilization of dental services also increased. Junkes and colleagues (2015) reported a significant direct relationship between general literacy and the use of dental service (13). On the other hand, Chisombat and colleagues (2023) reported that oral and dental health literacy scores had a significant negative correlation with the use of dental services (14). Given the evidence of a significant direct relationship in the studied population, improving oral and dental health literacy should be considered a key strategy in health planning. This requires the integration of oral health education into school curricula, the design of awareness campaigns tailored to the socio-cultural needs of adolescents, and the empowerment of teachers and school staff through educational workshops. This approach not only increases the utilization rate but also, by influencing preventive behaviors, reduces the burden of oral and dental diseases and future treatment costs.

Relationship Between Health Literacy and Oral and Dental Health Status

Based on the findings obtained from the present study, no significant relationship was observed between health literacy and DMFT. Consistent with the results of the present study, Bashirian and colleagues (2023) reported that even after adjusting for the effect of potential confounding factors, no significant relationship was found between oral and dental health literacy and DMFT among pregnant women (15). The results of Chaisombat and colleagues (2023) were in contrast to the findings of the present study. Their study showed that health literacy was associated with better oral and dental health status (14). The multidimensional nature of the DMFT as a cumulative and time-dependent index may overshadow its relationship with health literacy.

DMFT primarily reflects dental experiences accumulated over a lifetime, whereas health literacy is considered a dynamic variable dependent on the present time. In adolescents, the accumulation of dental caries may have

occurred before the development of independent health literacy, especially if educational interventions are implemented late.

The influence of other variables, such as socioeconomic status, dietary habits, or access to fluoride, which have been heterogeneously controlled across different studies, may confound the apparent relationship between health literacy and DMFT.

Finally, the present findings may indicate the necessity of redefining the role of health literacy within more complex causal models. Rather than expecting a linear relationship, health literacy may function as a facilitating factor alongside structural interventions (e.g., school-based prevention programs or access to fluoride varnish).

In the present study, a significant inverse relationship was observed between health literacy and both SOHI and CPI. That is, increased health literacy was associated with decreased periodontal indices. Kanupuru and colleagues (2015) reported a negative correlation between oral health literacy and measured clinical parameters, meaning that higher oral health literacy was associated with better oral and dental health status (16). Furthermore, Garcia-dominguez and colleagues (2021) conducted a study aimed at determining oral and dental health status and its relationship with oral health literacy levels among Mexican migrant farmworkers and reported an inverse relationship between health literacy and SOHI (17). In contrast to the findings of the present study, Ramlay and colleagues (2020) reported no significant correlation between OHLI-M scores and DMFT index scores (18). These results are justifiable in that health literacy serves as a predictor of health behaviors and clinical outcomes. Students with higher health literacy are likely to have a better understanding of the importance of oral hygiene, timely use of preventive services, and interpretation of professional recommendations, which directly affects plaque accumulation reduction and improvement of clinical SOHI and CPI indices. Furthermore, health literacy is not only an individual variable but is also influenced by contextual factors such as access to health education in schools or the level of parental awareness, which in the cities of Hamedan and Saveh may have acted as reinforcing factors for this relationship.

On the other hand, the apparent inconsistency with some studies that have reported a weaker relationship between health literacy and clinical indices may be attributed to differences in health literacy measurement instruments, study demographics, or region-specific contextual factors. For instance, in our study, the use of standardized CPI and SOHI indices (unlike studies that employed subjective measures such as self-rated oral health) enhanced the clinical validity of the findings.

Relationship Between Utilization of Dental Services and Oral and Dental Health Status

Based on the study findings, utilization of dental services had a direct significant relationship with DMFT. In fact, this direct significant relationship exists between utilization of oral and dental health services and one of the components of the DMFT index, namely restorations (fillings). Tudoroniu and colleagues (2020) conducted a study on adolescents aged 10 to 19 years and reported that adolescents with fewer dental visits showed an increase in DMFT (19).

May at first glance the finding of the present study appears to contradict existing theoretical knowledge, as access to preventive or restorative services is expected to reduce the dental caries index (DMFT). However, this positive relationship can be explained through several mechanisms. First, in communities where dental services

are predominantly based on reactive treatments (e.g., fillings or extractions) rather than prevention, frequent dental visits often indicate a pre-existing compromised oral condition. In such circumstances, the increase in DMFT due to the presence of filled or missing teeth (the F and M components of DMFT) reflects a history of progressive disease rather than necessarily indicating access to primary care.

On the other hand, the study findings showed that there was no significant relationship between the rate of utilization of dental services and the CPI and SOHI indices. Consistent with the results of the present study, Benjamin and colleagues (2024) reported that CPI was not significantly associated with previous dental visits (20). The results of studies in the field of the relationship between utilization of oral and dental health services and CPI and SOHI indices are often influenced by complex factors that may explain the consistency or inconsistency of findings. The CPI index primarily assesses the need for advanced periodontal treatments, while the SOHI index focuses on daily oral hygiene behaviors. Therefore, irregular dental attendance (solely for emergency or restorative services) may have a limited impact on improving these indices, as primary prevention or lifestyle modifications (such as diet or tobacco use) are recognized as stronger determinants of periodontal health and oral hygiene. On the other hand, heterogeneity in the studied populations and contextual differences (such as the level of access to basic services, quality of care delivery, or general health literacy) also influence the results. For example, in communities where oral and dental health services are predominantly treatment-oriented (rather than preventive), even increased attendance does not lead to significant improvement in CPI/SOHI indices. Furthermore, these indices may not be sufficiently sensitive to short-term changes, and the effects of dental interventions may become apparent only after a time lag.

Finally, differences in the methodology of previous studies (e.g., the use of self-reported data versus direct clinical assessments in the present study) and the diversity of health literacy measurement instruments challenge the comparability of findings. The finding of the present study may reflect the need to redefine "effective utilization of services" in the form of educational-preventive interventions integrated with the public health system, rather than merely a quantitative increase.

Strengths and Limitations of the Study

In the present study, due to the lack of access to students' dental records, the rate of utilization of services was measured based on students' self-reports, which may introduce recall bias. On the other hand, since early-stage caries or gingival inflammation in students may be influenced by hormonal factors, growth, or dietary changes independently of dental visits, focusing solely on this age group may lead to statistical distortion of the relationships between study variables. Due to the high cost of oral and dental health services in Iran and the lack of coverage of these services by basic insurance, household income could significantly affect the utilization of oral and dental health services. However, household income was not considered in this study due to students' lack of awareness and the potential for providing inaccurate information. Another limitation of the study is the lack of assessment of the quality of oral and dental health services provided to students, which could influence oral and dental health status. However, since the services received may have been provided a considerable time before the study and because students do not have the knowledge to evaluate the quality of services, it was not possible to assess service quality.

In this study, the use of a multi-stage cluster sampling method by dividing the cities of Hamedan and Saveh into geographical districts and randomly selecting schools and classes reduced sampling biases. Furthermore, the sample size, which was proportionate to grade levels and geographical distribution, enabled valid subgroup analyses. Additionally, the simultaneous use of three global standard indices—DMFT for dental caries, CPI for

gingival health, and SOHI for oral hygiene—following World Health Organization protocols, ensured the validity of the clinical findings. Finally, the integration of objective data (clinical examinations) with subjective data (health literacy and utilization questionnaire) provided a novel approach to assessing the interaction between individual factors and oral health.

Conclusions

The findings of this study demonstrated that health literacy, as a determining factor, plays a differential role in oral and dental health indices. On the other hand, the direct and significant relationship between health literacy and the rate of utilization of dental services supports the hypothesis that greater knowledge and understanding of health concepts encourages individuals to actively utilize preventive and therapeutic services.

Based on the obtained results, this study emphasizes the necessity of redefining educational policies and dental services with a focus on strengthening health literacy as a key tool in improving health behaviors. Designing targeted educational interventions for adolescents, particularly in the areas of self-care and prevention of gingival diseases, can reduce the existing gap between utilization of services and sustainable improvement in oral health. Furthermore, integrating health literacy programs into the public education system and school health services is proposed as a practical strategy to achieve this goal.

Abbreviations

DMFT: Decayed, Missing, and Filled Teeth

WHO: World Health Organization

CPI: Community Periodontal Index

SOHI: Simplified Oral Hygiene Index

Declarations

Ethics approval and consent to participate:

This study was approved by the Ethics Committee of authors' institute (ethical number: IR.UMSHA.REC.1403.372). This study was conducted in accordance with the Declaration of Helsinki. Participants were free to leave the study if they were not satisfied with the process of holding the sessions and how to use the results. Participants were asked to sign the informed consent form of participating in the study.

Consent for publication:

Not applicable

Competing interests:

The authors declare that they have no competing interests.

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Author Contribution

HGH and ZR designed the project and drafted the first version of the manuscript. ZR collected data. SK and AB analyzed the data. HGH and ZR revised the manuscript.

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Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to ethical restrictions and institutional policies, but are available from the corresponding author upon reasonable request.

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