Relationship Between Health Literacy Level and Gingival Health

Sağlık Okuryazarlığı Düzeyi ile Diş Eti Sağlığı Arasındaki İlişki

Gurbet Alev ÖZTAŞ ŞAHİNER[1]
Recep ORBAK[2]

[1]Department of Periodontology, Erzurum Oral and Dental Health Center, Erzurum, Turkey
[2]Department of Periodontology, Atatürk University Faculty of Dentistry, Erzurum, Turkey

ABSTRACT

Objective: Oral and dental health is an inseparable component of general health. In this study, it was aimed to assess the relationship between health literacy level and dental and gum health of individuals.

Methods: This study was conducted with 342 randomly selected participants at 3 institutions with the highest patient density. Initially, dental and gum health of the participants were evaluated. Turkey Health Literacy Scale-32 (TSOY-32) was used to evaluate the health literacy levels of the participants. The data were analyzed using the Statistical Package for the Social Sciences Statistics, version 22.0 software.

Results: The average TSOY-32 score of the participants was determined as 22.85 ± 8, ranging from 2.60 to 41.67. The average scores of the participants selected from the Faculty of Dentistry, the Oral and Dental Health Center, and the Dental Polyclinics of Mareşal Çakmak State Hospital were 25.12 ± 7.8, 21.11 ± 8.1, and 22.31 ± 7.7, respectively. The TSOY-32 mean score was calculated as 25.36 for the participants with 1 and 2 tooth brushing frequencies per day and 17.66 for the individuals who brush their teeth only when they remember ($P < .05$). The gingival and Community Periodontal Index of Treatment Needs index values were lower in participants with high health literacy levels ($P < .05$).

Conclusion: It has been determined that individuals with high health literacy levels pay more attention to oral hygiene habits; therefore, their teeth and gums are healthier.

Keywords: Dental health surveys, gingival index, health literacy, oral hygiene, periodontal index, public health

ÖZ

Amaç: Ağız ve diş sağlığı genel sağlığın ayrılmaz bir bileşenidir. Bu çalışmada bireylerin sağlık okuryazarlığı düzeyi ile diş ve diş eti sağlığı arasındaki ilişkinin değerlendirilmesi amaçlandı.

Yöntemler: Bu çalışma, hasta yoğunluğunun en fazla olduğu üç kurumda rastgele seçilmiş 342 katılımcı ile gerçekleştirildi. Öncelikle katılımcıların diş ve diş eti sağlıkları değerlendirildi. Katılımcıların sağlık okuryazarlığı düzeylerini değerlendirmek amacıyla Türkiye Sağlık Okuryazarlığı Ölçeği-32 (TSOY-32) kullanıldı. Veriler SPSS versiyon 22.0 programı kullanılarak analiz edildi.

Bulgular: Katılımcıların ortalama TSOY-32 puanı 22,85±8 olup 2,60 ile 41,67 arasında değişmektedir. Diş Hekimliği Fakültesi, Ağız ve Diş Sağlığı Merkezi ve Mareşal Çakmak Devlet Hastanesi Diş Polikliniklerinden seçilen katılımcıların ortalama puanları sırasıyla 25,12±7,8, 21,11±8,1 ve 22,31±7,7 olarak gerçekleşti. Günde bir ve iki diş fırçalama sıklığına sahip katılımcıların TSOY-32 puanı ortalaması 25,36, dişlerini yalnızca hatırladığı zaman fırçalayan bireylerin ise 17,66 puan olarak hesaplandı ($P < 0,05$). Sağlık okuryazarlığı düzeyi yüksek olan katılımcılarda diş eti ve CPITN indeks değerleri daha düşüktü ($P < 0,05$).

Sonuç: Sağlık okuryazarlığı düzeyi yüksek bireylerin ağız hijyeni alışkanlıklarına daha fazla dikkat ettikleri, dolayısıyla diş ve diş eti sağlıklarının daha iyi olduğu belirlendi.

Anahtar Kelimeler: Diş sağlığı araştırmaları, diş eti indeksi, sağlık okuryazarlığı, ağız sağlığı, periodontal indeks, halk sağlığı

INTRODUCTION

Periodontium is a complex structure consisting of hard and soft tissues around the tooth. Periodontal health is perceived as the health of all tissues associated with periodontium.

Gingivitis and periodontitis are 2 common diseases affecting the periodontium.[1] There are 3 important factors: a susceptible host, the presence of pathogenic species, and beneficial microorganism deficiency in terms of the occurrence, progression, and severity of periodontal disease. While plaque formation accounts for only 20% of the risk of periodontal tissue inflammation, smoking and the presence of systemic diseases such as diabetes or genetic variations affecting the healing stages of tissue account for the remaining 80%.[2]

The most important thing to do for microbial dental plaque removal and healthy teeth and gums is to practice daily oral hygiene habits. In the examinations, it has been reported that the use of dental floss applied in addition to tooth brushing after plaque removal is effective in controlling bleeding.[3] In another study evaluating the effectiveness of the interproximal brushes, it was stated that the use of the interproximal brush was more effective on the plaque index (PI) than the use of dental floss.[4]

Health Literacy
In order to lead a healthy and a good quality of life, it is essential for individuals to reach, understand, and act in accordance with appropriate health information when necessary. As a result of the efforts to increase this awareness, the concept of "Health Literacy (SOY)" has emerged.[5]

Although health literacy was introduced to the literature with the article "Health Education as Social Policy" written by Scott Simonds in the 1970s, its importance has been better understood in recent years.[6] It has been stated that health-related information should be arranged in a way that is easy to access and simplified so that the society can understand and develop behavior.[7]

Nutbeam and Wise[8] in 1993 and Zarcadoolas et al[9] in 2005 defined health literacy as a whole, including the ability to seek, find, understand, evaluate, and make the right decision-making information and services to help individuals reduce their health risks and lead a better quality of life.

There are many personal and socio-environmental factors that affect the level of health literacy. In this context, the skills of the individual such as seeing, hearing, testing, speaking, and keeping in memory are very important. In addition, race, age, gender, educational status, general literacy level, occupation, and socio-economic conditions are among the influencing socio-environmental factors.[10]

Many scales have been developed to evaluate the health literacy level[11] including the European Health Literacy Survey Questionnaire (HLS-EU-Q) and the Turkey Health Literacy Scale-32 (TSOY-32). The (HLS-EU-Q) is a 47-item scale developed for determining health literacy levels in European countries in the 2009-2012 period. The questionnaire consists of 3 dimensions in health processes (prevention from illness, health service delivery, and health improvement) and 4 processes in information processing (obtaining information, understanding information, evaluating information, and applying information).[12] Turkey Health Literacy Scale-32. As a result of the Turkish Adaptation of the European Health Literacy Scale (ASOY-TR) studies, it was seen that the scale measured health literacy in general, but did not provide sufficient results in some concepts. For this reason, TSOY-32 was created by updating the scale and reducing the number of questions to 32.[5]

The Importance of Health Literacy for Today's Conditions
The coronavirus disease 2019 disease, which has been going on in the world since the beginning of 2020, has been effective in understanding the importance of health literacy. Understanding the source of the disease, ways of transmission and prevention, and treatment options have played an important role in controlling the disease. For this, the importance of individual awareness of the disease, sense of responsibility, and solidarity has increased.[13,14]

Health Literacy in Dentistry
Maintaining and treating oral and dental health, which is an integral part of general health and well-being, is the primary goal of dentistry.[15] For healthy teeth and gums, the awareness of the individual should be increased in terms of lifestyle, diet habits, daily oral hygiene practices, and periodic dental visit.[16]

In this study, it was aimed to assess the relationship between health literacy level and the dental and gingival health of individuals.

MATERIAL AND METHODS

This study was carried out with a total of 342 applicants in 3 institutions with the highest number of patient admissions in Erzurum; Atatürk University Faculty of Dentistry Department of Periodontology, the Erzurum of Health Oral Dental Health Center, and the Dental Polyclinics of Mareşal Çakmak State Hospital, in the period of April-October 2019.

Ethical Approval
Ethical approval regarding the methodology and material used in this study was obtained from the Atatürk University Faculty of Medicine Clinical Research Ethics Committee (Date: 13.03.2019, Number: B.30.2.ATA.0.0/125). In addition, a written permission was obtained from the Erzurum Provincial Health Directorate since part of the study was carried out in the Erzurum of Health Oral Dental Health Center and Dental Polyclinics of the Maraşel Çakmak State Hospital. On the other hand, a private permission for using the TSOY-32 scale was obtained from Prof. Dr. Pınar Okyay via electronic mail. The individuals participating in the study were asked to read and sign the "Informed Volunteer Form."

Inclusion Criteria for the Study
The individuals included in this study were randomly selected among the patients who applied to health institutions and met the following conditions: to be over 15 years old, to be literate, to have no obstacle to fill the form for health reasons, to speak Turkish, not to be trained in the field of health and not to be from the health-care professional group, and to voluntarily accept to participate the survey.

An information form for each participant has been filled out to describe the socio-demographic information and systemic status. In the form, questions regarding age, gender, marital status, general health level, smoking habit, education level, and tooth brushing were asked.

Filling the Turkey Health Literacy Scale-32 Questionnaire
The TSOY-32 scale, of which its reliability and validation have been approved, was used. The survey was evaluated through

one-to-one communication. According to the results of the survey, individuals' health literacy levels were evaluated by scoring "very easy—4," "easy—3," "hard—2," "very hard—1," and "no idea—0." The following formula was used to calculate the index score.

$$index = (mean - 1) \times 50 \div 3$$

The Health Literacy level of each individual was evaluated in the lowest (0) and highest (50) score range according to the TSOY-32 scale. Health Literacy levels were grouped as 0-25 points "inadequate health literacy," 25-33 points "problematic-limited health literacy," 33-42 points "adequate health literacy," and 42-50 points "excellent health literacy."[5]

Evaluating Mouth, Teeth, and Periodontal Tissues Health
Following the completion of the forms, the clinical periodontal examination of the participants was performed. The Decay, Missing, Filling Total (DMFT) index was used in evaluating the number of decay, missing, and filled teeth, and the gingival index (GI) (Löe & Silness, 1963, 1967),[17] plaque index (Silness & Löe, 1964),[18] and CPITN index[19] were used to evaluate oral hygiene and periodontal tissue health. All measurements were recorded on the forms and calculated for each individual.

Statistical Analysis
The data were analyzed using the IBM Statistical Program for Social Sciences Statistics (SPSS) version 22.0 software (IBM Corp.; Armonk, NY, USA). One-way analysis of variance (ANOVA) test was used for evaluating more than 2 categorical data with numerical data, the independent sample t-test for 2 categorical data with numerical data, bivariate correlation test for the correlation between numerical values, and chi-square test for categorical data between groups. In all evaluations, 95% confidence interval at a 5% significance level was considered.[20]

RESULTS

A total of 342 patients, 114 applicants from each of the 3 institutions with the highest patient potential in Erzurum; Atatürk University Faculty of Dentistry Department of Periodontology, the Erzurum of Health Oral Dental Health Center, and the Dental Polyclinics of Mareşal Çakmak State Hospital, were included in this study.

The average age of the participants evaluated within the scope of the study was 36.8 ± 11.3; 60% (n = 205) were women and 40% (n = 137) were men. About 70% (n = 237) of the participants were married. Considering the education levels, 97 participants (28.4%) had primary school degree or no degree, 26 participants (7.6%) had secondary school degree, 108 participants (31.6%) had high school or equivalent degree, and 111 participants (32.5%) had university diploma or graduate degree.

About 40% (n = 138) of the research group were homemakers or unemployed, 17.3% (n = 59) were civil servants, and 13.5% (n = 46) were students. Approximately half of the participants (53.8%, n = 184) declared that their monthly incomes were less than their monthly life expenses.

It was observed that 196 individuals had at least 1 chronic disease; especially, blood pressure, diabetes, and cardiovascular disease were the most commonly reported diseases.

It was also determined that 162 participants were daily systemic drug users, and 163 were smokers.

Table 1. Mean and SD Values of Decay, Missing, Filling Total Value, and Periodontal Parameters of All Participants Participating in the Study

Parameter	Mean ± SD
DMFT value	9.43 ± 5.67
Gingival index	1.65 ± 0.60
Plaque index	1.64 ± 0.66
CPITN value	2.75 ± 0.74

CPITN, Community Periodontal Index of Treatment Needs; DMFT, decay, missing, filling total.

Findings of Clinical Examination Data
Only 119 (34.8%) participants stated that they brush their teeth once a day, and this rate was higher among the participants with a university diploma or graduate degree. However, 103 (30.1%) participants stated that they brush their teeth only when they remember, and this rate was higher among the participants with a primary education degree or had no degree.

No statistically significant differences ($P < .05$) in the DMFT value and periodontal parameters among the institutions were obtained. The mean index values of the participants are given in Table 1.

Negative correlations were obtained between the frequency of tooth brushing and the gingival, plaque, and the CPITN index. In other words, it was determined that an increased number of tooth brushings (once or twice a day, brushing once every 2 days, and brushing when remembered) decreased the gingival plaque and the CPITN index at $P < .05$.

When the relationship between educational status and periodontal parameters was examined, it was found that the evaluated parameters were significantly higher among the participants with a primary school degree or had no degree than those of the participants with a university diploma or graduate degree ($P < .05$).

Turkey Health Literacy Scale-32 Descriptive Findings
The average TSOY-32 score of the participants was determined as 22.85 ± 8, ranging from 2.60 to 41.67. The average TSOY-32 scores of the participants by considering the institutions are given in Table 2.

The health literacy level of the individuals who presented to the Faculty of Dentistry was higher than those of the participants who presented to the other 2 institutions, even though their health literacy level was "problematic and limited health literacy level" category, at $P < .05$. There were no participants whose health literacy level was in the "excellent health literacy" category in all 3 institutions.

No statistically significant differences in the TSOY-32 scores of participants among the age groups were obtained at $P < .05$ significance level. The average TSOY-32 score was found to be 22.69 ± 7.95 for female and 23.08 ± 8.08 for male participants without having a statistically significant difference between the means at $P < .05$. However, there were statistically significant differences ($P < .05$) between the education levels of the participants regarding the average TSOY-32 scores (Table 3).

Table 2. Mean and SD Values of Turkey Health Literacy Scale-32 Scores of the Institutions Included in the Study

Institution	Mean ± SD of TSOY-32 Score
Faculty of Dentistry	25.12 ± 7.8**
Health Oral Dental Health Center	21.11 ± 8.1**
Maraşel Çakmak State Hospital	22.31 ± 7.7**

TSOY-32, Turkey Health Literacy Scale-32.
**$P < .05$.

Table 3. Mean and SD Values of Turkey Health Literacy Scale-32 Scores Regarding to Education Levels

Education Level of the Participants	Mean ± SD of TSOY-32 Score
Primary school degree or no degree	18.04 ± 8.08**
Middle school degree	16.67 ± 7.61**
High school degree	23.51 ± 6.74**
University diploma or graduate degree	27.86 ± 5.32**

TSOY-32, Turkey Health Literacy Scale-32.
**$P <.05$.

When the relationship between the health literacy level of the participants and oral hygiene habits was examined, it was determined that an increase in health literacy index score increased the regular tooth brushing habits of individuals. The average health literacy score was found to be 25.36 for the individuals with 1 and 2 tooth brushing frequencies per day and 17.66 for the individuals who brushed their teeth when they remember ($P < .05$).

Negative correlations were found between the TSOY-32 score index and the DMFT value, CPITN value, gingival, and PI values ($P < .01$) (Table 4).

Descriptive statistics for health literacy are given in Table 5. When the responses of the participants to the health literacy items were examined, under the "treatment and service" category, the highest (55%) response for "very easy" was given to item 14 "finding the location of the unit you are looking for (laboratory, polyclinic, etc.)," and the highest responses for "very hard" (37.1%) and "don't know" (20.2%) answers were given to item 15 "deciding what to do in an emergency (accident, sudden health problem, etc.)." Similarly, the highest (75.4%) response for "easy" answer was given to the item 31 "making suggestions to your family and/or friends

Table 4. The Relationship Between the Participants' Turkey Health Literacy Scale-32 Score Indexes and Periodontal Parameters

Correlations

		Gingival Index Value	TSOY-32 Index
Gingival index value	Pearson Correlation	1	−.282**
	Sig. (2-tailed)		.000
	N	342	342
TSOY-32 index	Pearson correlation	−,282**	1
	Sig. (2-tailed)	.000	
	N	342	342

Correlations

		Plaque Index Value	TSOY-32 Index
Plaque index value	Pearson correlation	1	−.257**
	Sig. (2-tailed)		.000
	N	342	342
TSOY-32 index	Pearson correlation	−.257**	1
	Sig. (2-tailed)	.000	
	N	342	342

Correlations

		CPITN value	TSOY-32 Index
CPITN value	Pearson correlation	1	−.236**
	Sig. (2-tailed)		.000
	N	335	335
TSOY-32 index	Pearson correlation	−.236**	1
	Sig. (2-tailed)	.000	
	N	335	342

Correlations

		DMFT Value	TSOY-32 Index
DMFT value	Pearson Correlation	1	−.324**
	Sig. (2-tailed)		.000
	N	342	342
TSOY-32 index	Pearson correlation	−.324**	1
	Sig. (2-tailed)	.000	
	N	342	342

CPITN, Community Periodontal Index of Treatment Needs; DMFT, decay, missing, filling total; sig., significance; TSOY-32, Turkey Health Literacy Scale-32.
**$P < .01$.

Table 5. Descriptive Statistics of Health Literacy

Health literacy	Mean ± SD	Median	Mimimum–Maximum
Understanding health-related information	24.15 ± 9.01	18.79	0.00-45.83
Accessing health-related information	18.71 ± 10.22	27.08	0.00-41.67
Using/applying health-related information	30.68 ± 7.26	18.75	0.00-37.50
Evaluate health-related information	17.86 ± 8.93	31.25	12.50-43.75

to be healthier," and the highest (25.9%) response for "very difficult" answer for the item 29 "your lifestyle for your health (doing sports, healthy eating, not smoking, etc.)," and the highest (30.4%) response for "don't know "for the item 32 "interpreting health-related policy changes," under the 'protection from diseases and improving health' category.

DISCUSSION

Oral and dental health is an inseparable component of general health. For increasing the health level of society, special attention should be given to increase oral and dental health level as well as general health knowledge, and individual health awareness should be created. Within the health literacy concept, although many studies have been carried out and evaluating scales have been developed in the fields of medicine and nursing, the number of studies in the field of Dentistry is very limited.

This study, aiming to evaluate the relationship between health literacy level and teeth and gums health parameters, is a pilot study in the field of dentistry at the level of specialization thesis.

The study was carried out in 3 health-care institutions with high and different patient potentials, one of which was the Faculty of Dentistry Atatürk University, in Erzurum city center. For the sample size, the minimum number of individuals was determined as 320 by taking into account the suggestions[21] of at least 10 individuals per "item" directed in the survey, but 342 individuals were included in the study.

The DMFT index, PI, and GI developed by Löe & Silness[17,18] were used to evaluate the health of teeth and gums by stating oral hygiene habits. These indexes were preferred for the reasons of ease of application and widespread use. CPITN value gives an idea about periodontal pocket depth and related treatment planning. However, it does not provide information about attachment loss, which is critical in the evaluation of periodontal disease.[19] However, evaluation of attachment loss was not included in the study, since the individuals who applied to the clinics for the purpose of treatment may have experienced discomfort due to the length of the study.

While examining people's understanding of the health system, their participation, their ability and motivation to take responsibility for their own health in the societies, and the literacy levels of individuals and the society should be evaluated first.

In this study, TSOY-32,[5] which has been updated and has a reduced number of questions, was developed based upon the European Health Literacy Project (HLS-E).

The average TSOY-32 score of our study groups was found to be 22.8 over 50 and evaluated as "inadequate." Although there was no published research article on TSOY-32 scores using periodontal parameters in Turkey, several studies in medicine were reported on general health literacy. In a study carried out at University of

Adnan Menderes University Faculty of Medicine Department of Public Health, the health literacy score by the TSOY-32 was found to be 29.5.[5] In another study conducted with 1003 students at the University of Sivas Cumhuriyet University, it was determined that 62.8% of participants had "sufficient and excellent health literacy level" according to the TSOY-32 score.[22]

The health literacy level of the participants selected from the Faculty of Dentistry was higher than those of the participants from the other 2 institutions, even though it was evaluated as "problematic-limited health literacy level." This difference might be due to the fact that the faculty is preferred more by university employees and university students and also because of transferred patients from other institutions for advanced treatments by more experienced academicians.

There was no significant difference in the health literacy general index scores between the age groups, even though the health literacy levels of individuals over 45 years old was lower, similar to the results stated by Özdemir et al.[23] It has been pointed out that this relationship could be linked to reasons such as difficulty of individuals to follow technological changes, their distance from social life, and need of help from family members as they get older.[24]

General literacy is considered to be an individual's literacy, understanding, and interpretation of what person reads and is an important point for health literacy. Many studies indicated that individuals with low literacy levels had difficulties in understanding and interpreting health-related information. Tanrıöver et al[15] and Okyay et al[5] reported that there were positive correlations between the educational levels of individuals and their health literacy levels. In our study, it was obtained that TSOY-32 scores increased significantly with increasing educational level of individuals.

When the relationship between the frequency of teeth brushing and the level of health literacy of individuals was evaluated, it was seen that individuals with high health literacy brush their teeth at more regular intervals. The findings of our study agreed with that of the literature. Acar[25] found that the number of teeth brushing was higher for individuals with at least high school education than those of individuals with a lower educational level than high school.

Although there were no statistically significant differences found in the DMFT value and periodontal parameters of the participants among the institutions, it was observed that the individuals with high health literacy levels in all 3 institutions had lower DMFT values, GI, PI, and CPITN values. It was also figured out that the individuals with higher health literacy levels were more conscious about oral hygiene habits.

Some studies have shown that children, their parents, and adults with high health literacy levels have better oral hygiene habits and a lower DMFT index. The low number of tooth decays and losses and the high number of surviving teeth ensure that people have adequate oral health in terms of physical, functional, phonetic, and aesthetic characteristics.[26-28]

Mamaklıoğlu et al[29] examined the relationship between the TSOY-32 scores and the periodontal parameters of pregnant women and reported that the TSOY-32 level in pregnant women was significantly higher than that of non-pregnant women. However, they have not reported any significant relationship between TSOY-32 level and periodontal parameters. In their another study[30] with the dentistry students of Marmara University, it was obtained that the increase in the level of education positively affected the

SOY level and contributed to the reduction of the findings associated with periodontal inflammation.

In a study investigating the effect of health literacy on benefiting from preventive dentistry practices among Somali refugees in Massachusetts, the Short Test of Functional Health Literacy in Adults scale was used, and it was found that the participants with higher health literacy benefited from preventive practices 2 times more than the others, and the individuals with wider vocabulary were 1.8 times more likely to have preventive practices.[31]

The general and health literacy levels of individuals are undoubtedly of great importance in oral, dental, and gingival health. However, the main issue is to increase the level of oral health literacy.

In a study examining the effect of oral health literacy level on daily oral hygiene habits using the Rapid Estimation of Adult Literacy in Dentistry (REALD-30) scale in Australia, it was found that the individuals with low REALD scores rarely brushed their teeth, did not have a toothbrush, and had insufficient knowledge about oral hygiene habits ($P < .05$). It was also determined that the dental treatment needs of women and the elderly were higher.[32]

Similarly, it was determined that there was a negative correlation between oral health literacy and clinical parameters, and individuals with high oral health awareness had more adequate oral hygiene habits.[33] As a result of these studies, oral health literacy as well as general and health literacy has been shown to be significantly effective on oral hygiene practices and parameters that show oral health.

The responses given to the "items" of the health literacy scale in our study were similar to the results reported by Okyay et al.[5]

In addition to these topics, the relationship between oral health and systemic health has been studied extensively, and the relationship between them has been confirmed. The mouth is the most bacteriologically dense area of the human body after the anus. It is quite normal for the other organs of individuals with poor oral health and advanced periodontal problems to be affected by this condition. Oral health significantly affects the upper respiratory tract, heart health, insulin metabolism, gastrointestinal tract, pregnant women, and infant health. In our study, individuals with high health literacy were determined to have better oral health. Indirectly, it can be predicted that this situation will positively affect systemic health.

It was determined in this study that (1) oral and dental health is directly related to the general and health literacy level; therefore, in order to be systemically healthy, dental and gingival health should be given due importance; (2) individuals with high health literacy level pay more attention to their oral hygiene habits, and their teeth and gums health are better. Their tooth brushing habits and dentist controls are more regular; therefore, the DMFT values, plaque and GI values, and CPITN values are lower; and (3) among the individuals with high health literacy level, there are individuals who have dental and gum problems and insufficient knowledge about what to do, how to do, and which health institution to go. It was concluded that it is extremely necessary to increase oral and dental health literacy besides the general and health literacy.

Study Limitations

In the study, the relationship between the general health literacy level of the patients and their oral health was examined. Oral and

dental health literacy level had not been evaluated (as there is no validated and reliable scale on this subject).

In addition, the addition of clinical attachment level and probing bleeding indices, which are used in the evaluation of periodontal health, could have made the study more powerful.

REFERENCES

1. Newman MG, Takei H, Klokkevold PR. *Carranza's Clinical Periodontology*. 11th ed. St. Louise, MO: Elsevier Health Sciences; 2011.

2. Bartold PM, Van Dyke TE. An appraisal of the role of specific bacteria in the initial pathogenesis of periodontitis. *J Clin Periodontol*. 2019;46(1):6-11. [CrossRef]

3. Silva C, Albuquerque P, de Assis P, et al. Does flossing before or after brushing influence the reduction in the plaque index? A systematic review and meta-analysis. *Int J Dent Hyg*. 2022;20(1):18-25. [CrossRef]

4. Sälzer S, Slot DE, Van der Weijden FA, Dörfer CE. Efficacy of interdental mechanical plaque control in managing gingivitis--a meta-review. *J Clin Periodontol*. 2015;42(suppl 16):S92-S105. [CrossRef]

5. Okyay P, Abacıgil F. Türkiye sağlık okuryazarlığı ölçekleri güvenilirlik ve geçerlilik çalışması. *Avrupa Sağlık Okuryazarlığı Ölçeği Türkçe Uyarlaması (ASOY-TR) Mayıs*. 2016:24-41.

6. Simonds SK. Health education as social policy. *Health Educ Mono*. 1974;2(1_suppl):1-10. [CrossRef]

7. Yılmazel G, Çetinkaya F. The importance of health literacy for community health. *TAF Prev Med Bull*. 2016;15(1):69-74. [CrossRef]

8. Nutbeam D. Health promotion glossary. *Health Promot Int*. 1998;13(4):349-364. [CrossRef]

9. Zarcadoolas C, Pleasant A, Greer DS. Understanding health literacy: an expanded model. *Health Promot Int*. 2005;20(2):195-203. [CrossRef]

10. Sørensen K, Van den Broucke S, Fullam J, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*. 2012;12:80. [CrossRef]

11. Sönmez BF. *Sağlık okuryazarlığına AR-GE Yaklaşımı, Ankara*; 2011. Available at: [CrossRef]

12. Sørensen K, Van den Broucke S, Pelikan JM, et al. Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). *BMC Public Health*. 2013;13:948. [CrossRef]

13. Spring H. Health literacy and COVID-19. *Health Info Libr J*. 2020;37(3):171-172. [CrossRef]

14. Paakkari L, Okan O. COVID-19: health literacy is an underestimated problem. *Lancet Public Health*. 2020;5(5):e249-e250. [CrossRef]

15. Tanrıöver M, Yıldırım HH, Ready ND, Çakır B, Akalın HE, Araştırması SO. *Yenimahalle*. 1st ed. Ankara, Turkey: Sağlık-Sen Yayınları; 2014.

16. Kök AN. *Diş Hekimliği Uygulamalarında Sağlık Okuryazarlığı. Turkiye Klinikleri Endodontics-Special Topics*. 1st ed. Ankara, Turkey: Türkiye Klinikleri; 2018:1-5.

17. Löe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. *Acta Odontol Scand*. 1963;21:533-551. [CrossRef]

18. Silness J, Löe H. Periodontal disease in pregnancy II. Correlation between oral hygiene and periodontal condition. *Acta Odontol Scand*. 1964;22(1):121-135. [CrossRef]

19. Ainamo J, Barmes D, Beagrie G, Cutress T, Martin J, Sardo-Infirri J. Development of the World Health Organization (WHO) community periodontal index of treatment needs (CPITN). *Int Dent J*. 1982;32(3):281-291.

20. Anderson TW, Finn JD. *The New Statistical Analysis of Data*. Berlin: Springer Science & Business Media; 2012.

21. DeVellis RF, Thorpe CT. *Scale Development: Theory and Applications*. Newbury Park, CA: Sage Publications; 2021.

22. Biçer EB, Malatyalı İ. Determination of health literacy levels: the case of Sivas Cumhuriyet University. *Ank Sağlık Hizmetleri Derg*. 2018;17(2):1-15.

23. Ozdemir H, Alper Z, Uncu Y, Bilgel N. Health literacy among adults: a study from Turkey. *Health Educ Res*. 2010;25(3):464-477. [CrossRef]

24. Mut H. *Aile hekimliği polikliniğine başvuran hastalarda sağlık okuryazarlığı düzeyi ve ilişkili faktörlerin değerlendirilmesi, Sağlık Bilimleri Üniversitesi, İzmir Tepecik Eğt. ve Arş*. Hast Aile Hekimliği Anabilim Dalı. 2017.

25. Acar B. *Evaluation of the Relationship between Halitosis and Inflammatory Periodontal Diseases. Master of Science*. Ankara, Turkey: University of Hacettepe; 2016.

26. Ardakani AH, Sharifabad MAM, Rezapour Y, Ardakani AP. Investigation of the relationship of oral health literacy and oral hygiene self-efficacy with DMFT and Gingival index in students of Ardakan University. *Payesh (Health Monit)*. 2015;14(3):351-362.

27. MacDougall AC. *Exploring the Influence of Oral Health Literacy and Oral Health Chronic Disease Knowledge on Older Adults Oral Care Behaviours*. A Thesis Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of Master of Science Human Biology. 2016.

28. Baskaradoss JK. Relationship between oral health literacy and oral health status. *BMC Oral Health*. 2018;18(1):172. [CrossRef]

29. Mamaklıoğlu D, Meşeli SE. Hamilelerin Sağlık Okuryazarlığı Düzeyi ile Periodontal Durumları Arasındaki İlişkinin İncelenmesi. In: *TPD 48th scientific congress 27th scientific symposium*. Antalya, Turkey 2018:11.

30. Doğan B. *Evaluation of Knowledge and Awareness of Medical Students about the Relationship between the Periodontal Diseases and Diabetes Mellitus. Master of Science*. İstanbul, Turkey: Marmara University Institute of Health Sciences; 2018.

31. Geltman PL, Hunter Adams J, Penrose KL, et al. Health literacy, acculturation, and the use of preventive oral health care by Somali refugees living in Massachusetts. *J Immigr Minor Health*. 2014;16(4):622-630. [CrossRef]

32. Parker EJ, Jamieson LM. Associations between Indigenous Australian oral health literacy and self-reported oral health outcomes. *BMC Oral Health*. 2010;10(1):3. [CrossRef]

33. Batista MJ, Lawrence HP, Sousa MDLR. Oral Health literacy and oral health outcomes in an adult population in Brazil. *BMC Public Health*. 2017;18(1):60. [CrossRef]