



Evaluation of Patient Information Texts About Bruxism on the Internet in Terms of Readability and Content

Dogan Ilgaz Kaya¹, Ziya Ozan Cengiz², Sena Tolu³

¹Karamanoğlu Mehmetbey University, Faculty of Dentistry, Department of Oral and Maxillofacial, Karaman, Türkiye

²Selçuk University, Faculty of Dentistry, Department of Oral and Maxillofacial, Konya, Türkiye

³Istanbul Medipol University, Faculty of Medicine, Department of Physical Medicine and Rehabilitation, İstanbul, Türkiye

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Abstract

Aim: Bruxism is a common health problem in our society. The treatment method to be preferred should be determined by the decision of the patient and the physician together. Individuals' knowledge of the course of the disease, symptoms, and treatment options will contribute to the treatment process. There are many websites on the Internet that can guide patients about health and illness. The aim of this study is to evaluate the patient information texts about bruxism on web sites in terms of content and readability.

Material and Method: Websites reached in a search using the keyword "bruxism" on Google were evaluated in terms of readability and content. The readability assessment was classified according to the level of education. Text content accuracy was also evaluated according to information level separately.

Results: Forty-four of the 100 websites examined were included in the study. The average grade level is 11.41 ± 0.82 . The readability level of 79% (n=35) of the 44 texts examined is at a difficult level. It is seen that the definition and etiology of the disease are mentioned in 68% (n=30) of the texts examined in the study.

Conclusion: Although the content of the English texts prepared to inform patients about bruxism on the Internet is sufficient, it has been found that the readability level is low.

Keywords: Bruxism, Access to information, Search engine

INTRODUCTION

Today, the internet has become a tool used by individuals to have detailed information about their diseases and to obtain information about treatment options and diagnostic methods (1). On the Internet, there are a lot of websites that can give patients information about their health and their illness. Regarding oral and dental health, it was found that 53.7% of patients use the internet to find out about their treatment options and how this is carried out (2). However, some patients feel safer in terms of their medical conditions through the information they obtain from the internet (3). In the systematic review study in which information on health issues on the Internet is evaluated, it is seen that 70% of the information is insufficient in terms of quality (4).

Bruxism is a frequent health problem in society. The reported incidence ranges from 8% to 31% in adults (5).

The etiology of bruxism is multifactorial, so a multifactorial perspective is required in treatment. Preventing the harmful effects of bruxism is the main goal of treatment (6,7). In the treatment of bruxism, undesirable effects can be prevented by methods such as botulinum toxin applications, biofeedback, hypnotherapy, cognitive therapy, behavioral therapy, occlusal therapy, and the use of intraoral devices (8). It should be the decision of the patient and the doctor together as to which treatment method is preferred. For this reason, individuals' knowledge of the course of the disease, symptoms, and treatment options will contribute to the treatment process.

Patient information texts on the internet in the field of health have an important place in understanding the disease and accepting the treatment process by the patient (9,10). In addition to the sufficient information contained in these texts, it is also important that they be read by patients. Readability is a mathematical concept. For this

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Corresponding Author: Ziya Ozan Cengiz, Selçuk University, Faculty of Dentistry, Department of Oral and Maxillofacial, Konya, Türkiye

E-mail: ozan.cengiz70@gmail.com

reason, it has a measurable feature. It is recommended that the texts about health be written in accordance with the 6th grade and below in order to be understandable by the patients (11). The texts written above this level will be more difficult for the reader to understand. Studies have been conducted to evaluate the readability of texts written about health problems such as cataracts and voice disorders (12,13). In addition, both readability and content evaluations were made regarding common health problems such as osteoporosis and headache (14,15). However, the literature has not identified a study that examined patient information texts on bruxism. The purpose of this research is to analyze the content and readability of patient information about bruxism on websites.

MATERIAL AND METHOD

Search Strategy

The search using the keyword "bruxism" in November 2023 was carried out by a single researcher (DIK). The searches were made using the Google Search Engine. The first 100 websites that were found as a result of the search were examined. Considering the inclusion and exclusion criteria, the websites to be included in the study were determined.

Inclusion criteria

1. Websites containing patient information texts about bruxism,
2. Websites containing English content.

Exclusion criteria

1. Websites containing academic articles,
2. Websites containing less than 20 sentences of information,
3. Websites aiming to inform patients with video visuals,
4. Websites prepared for healthcare professionals.

The contents of the texts were evaluated in order to distinguish the web sites for healthcare professionals and patient education. Texts containing less than 20 sentences of information were excluded from the study because they were considered insufficient in terms of content.

Data Collection

Patient information texts about bruxism on 44 websites included in the study were transferred separately to Microsoft Word 2013 (Microsoft Corporation, Redmond, Washington, USA) applications. The title, author information, site address, additional links, and images were deleted, preventing the readability measurement from being negatively affected.

Readability Measurement

A free website called The Readability Calculator was used to make readability measurements.(<http://www.online-utility.org>) The text to be analyzed on this website is transferred to the specified box, and readability data can be accessed. This program has been used in some scientific studies before (16,17). The readability data obtained from the program is as follows:

- I. Flesch Reading Ease score
- II. Gunning Fog index
- III. Coleman–Liau index
- IV. Flesch–Kincaid Grade level
- V. Automated Readability Index (ARI)
- VI. Simple Measure of Gobbledygook (SMOG) index

The calculation formulas for these indices are shown in Table 1. Indices II and IV indicate the level of the text at the educational level in the United States. Most formulas take into account the average sentence length and the number of words with more than 3 syllables when determining the readability level. The Flesch Reading Ease scale gives a value between 0 and 100 for the entire text. The higher the value, the higher the readability. The Flesch Reading Ease score and Flesch-KKincaid Grade Level determine the readability value according to word length and sentence length. Gunning Fog index and SMOG index are evaluated by considering the number of polysyllabic words. On the other hand, the Automated Readability Index and the Coleman-Liau Index are based on the number of characters per word rather than the number of syllables per word.

Table 1. Method of calculating readability scores

Index	Formula
Flesch reading ease score	$206.835 - (1.015 \times \text{Average number of words per sentence}) - (84.6 \times \text{Average number of syllables per word})$
Flesch–Kincaid grade level	$(0.39 \times \text{Average number of words per sentence}) + (11.8 \times \text{Average number of syllables per word}) - 15.59$
Gunning Fog index	$0.4 \times (\text{Average sentence length} + \text{Percentage of complex words}^*)$
Coleman–Liau index	$0.0588 \times (\text{Average number of letters per 100 words}) - 0.296 \times (\text{average number of sentences per 100 words}) - 15.8$
Automated readability index	$4.71 \times (\text{Number of letters per word}) + 0.5 \times (\text{Number of words per sentence}) - 21.43$
SMOG index	$3 + \text{Square root of polysyllable}^* \text{ count per 30 sentences}$

*Words with three or more syllables

In order to determine the average education level, the averages of the II and IV indices were determined. In addition, the linguistic statistical data of the texts is also calculated in this readability analysis program. (Number of characters, number of words, number of sentences, average number of characters in a word, average number of syllables in a word, average number of words in a sentence.)

Evaluation of Text Contents

In order to evaluate the content of patient information texts, "Has the disease been defined?" "Has the etiology of the disease been explained?" "Has the preventive medicine practices been mentioned?" "Is the treatment method specified?" "Has alternative treatment options been mentioned?" and "Are the symptoms of the disease specified?" answers were sought. In determining the questions, meta-analysis by Melo et al. was used (18). The

text content was evaluated by an oral and maxillofacial surgeon (D.I.K.) and a physical therapy and rehabilitation specialist (S.T.).

Statistical Analysis

Statistical analyses were performed using the Statistical Package of Social Sciences 23.0 (SPSS Chicago, IL, USA) program. The mean and standard deviation were calculated from normally distributed data according to the Kolmogorov-Smirnov test. The evaluation of the contents was calculated as a percentage according to whether they answered the specified questions or not.

RESULTS

Forty-four of the 100 websites examined were included in the study. The statistical data obtained from the readability analysis website are shown in Table 2.

Table 2. Readability indices

Index	Mean	SD	Median	Minimum	Maximum
Flesch Reading ease score	50.96	9.25	51.40	23.74	67.65
Gunning Fog index	11.99	2.41	11.63	7.61	21.05
Coleman-Liau index	11.15	1.40	11.03	8.45	14.72
Flesch-Kincaid grade level	10.83	2.23	10.48	7.07	20.44
Automated readability index	10.88	2.68	10.24	6.14	22.65
SMOG index	11.71	1.58	11.66	8.58	16.24
Average grade level	11.41	0.82	11.41	10.83	11.99

The average Flesch Reading Ease Score value was determined to be 50.96 ± 9.25 . While the lowest value is 23.74, the highest value is 67.65. The average grade level is 11.41 ± 0.82 . The readability level of 79% (n=35) of the 44 texts examined is at a difficult level. According to all indices, the average reading level is at the "difficult" level. When linguistic statistics are examined, it is seen that there is a wide variation in the number of characters

(4586.5 ± 5774.89), the number of words (935.38 ± 1121.12), and the number of sentences (50.95 ± 54.40) (Table 3).

The definition and etiology of the disease were included in 68% (n=30) of the texts examined in the study. While at least one treatment method is mentioned in 95% of the texts, alternative treatment options are described in only 34% (n=15). Symptoms of the disease were described in 86% (n=38) (Table 4).

Table 3. Linguistic statistics

	Mean	SD	Median	Minimum	Maximum
Number of characters (without spaces)	4586.5	5774.89	3336	1312	39985
Number of words	935.38	1121.12	685.5	265	7764
Number of sentences	50.95	54.40	39	20	369
Average number of characters per word	4.86	0.22	4.85	4.37	5.45
Average number of syllables per word	1.61	0.08	1.61	1.44	1.81
Average number of words per sentences	18.84	4.87	18.73	12.07	42.23

Table 4. Evaluation of the content of patient information texts

Description of the disease	68%	n=30
Etiology of the disease	68%	n=30
Preventive medicine practices	34%	n=15
Treatment method	95%	n=42
Alternative treatment options	34%	n=15
Symptoms of the disease	86%	n=38

DISCUSSION

The Internet is the most frequently used source of information on health problems (1). Most patients use the internet as a guide when making health-related decisions and communicating with the doctor (3). At this stage, the information on the websites must be qualified so that patients do not make the wrong decisions. In this study, 44 websites related to bruxism that can be accessed via Google search engines were evaluated in terms of readability and content. In our literature review, no other study evaluating patient information forms on bruxism was found.

The readability levels of all the texts examined in the study are above the 10th grade level for each index. The average readability education level of the texts was determined to be 11.41. In a study evaluating the readability of texts related to headaches, it was understood that the average readability education level of texts on websites was above 10th grade (14), in the study where the texts about eye diseases were evaluated, the education level was above the 12th grade (19), and the readability level was found to be above the 11th grade in the study in which the texts about breast cancer were evaluated (20). In this respect, our study gave similar results to other studies. According to the criteria of the U.S. Department of Health and Human Services, the readability level of the texts prepared for the 10th grade and above education level is classified as "difficult," and those for the 6th grade and below education level are classified as "easy" (21). It is noteworthy that while the readability level is above 10 in a large part of 44 texts, such as 79%, no text with an education level of less than 6th grade is found. According to Weiss, health texts should be written for 6th grade and below in order to be understandable by patients (11). The fact that most of the texts are above 10th grade will make it difficult to convey information about bruxism. In the editorial process, care should be taken to make such texts suitable for readers in the readers in the 6th grade and below.

According to the recommendations of dental prosthesis specialists, various precautions should be taken to avoid the unwanted effects of bruxism (22). Mention of preventive medicine practices in patient information texts will increase this awareness. Bruxism does not have an established treatment; there are treatment options that

vary according to patient complaints, symptoms, and social status (23). The contents of the examined patient information forms were varied. While the symptoms and treatment options of bruxism are generally mentioned, very few of them have mentioned alternative treatment options and preventive medicine practices. In the texts we examine in our study, a single treatment method is mostly mentioned (Table 4). It has been described by 34% of alternative treatment options. The treatment that is planned to be applied may not give satisfactory results because it is not specific to the person.

For a text in which medical terms are used frequently, sentences created with standard length sentences will be more difficult to understand. According to Flesch, the average number of words per sentence in an English text is 17 for a text of standard difficulty (24). However, this value was found as a result of an analysis made with adult reading materials written in English. In our study, when the linguistic statistics in Table 3 were examined, the average number of words in a sentence was determined to be 18.84, and the average number of syllables was determined to be 1.61. Similar results were obtained in Jayaratne's study on dental implants (25). According to Flesch, this value corresponds to the "difficult" and "rather difficult" ranges (24). This value proves that medical terms are used excessively in the texts examined in our study.

In this study, six different readability formulas were used to determine the level of readability. The formulas with numbers I, II, and IV indicated in Table 1 are the classical readability formulas, and the formulas with numbers III, V, and VI are included in the literature as new readability formulas (26). The fact that we obtained similar results in different formulas in classical and current formulas is one of the strengths of the study. Another strength of the research is that the top 100 websites in the Google search engine have been examined. The websites we have reviewed are inclusive of websites to be listed in a search to be made in another search engine.

This paper has some limitations. In our study, we only examined patient information texts on websites. However, as it becomes easier to access information, the alternatives to the information also increase. People are guided about health on other social platforms (Facebook, Twitter, and Instagram). It will be appropriate to compare patient information texts on different platforms in the future. Another limitation of our study is that only the contents written in English were evaluated. We recommend that studies be conducted to evaluate the readability and content of non-English websites.

If the texts written about bruxism are not understandable by the patients, the intended effect on the reader will not be seen. These should be rearranged by considering readability principles.

CONCLUSION

Although the content of the English texts prepared to inform patients about bruxism on the Internet is sufficient,

it has been found that the readability level is low. The excessive use of medical terms may have reduced the comprehension of the texts. It is very important to have sufficient knowledge about the disease in decisions made on health-related issues. Revision of these texts, which should be more understandable by patients, will increase the level of understandability.

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