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Evaluation of the readability levels of Turkish texts about dental abscesses on the internet

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Purpose: This study aims to evaluate the readability of Turkish texts about dental abscesses available on the internet.

Methods: Using the keyword 'dental abscess', a Google search was conducted. The first 50 websites containing informative and Turkish texts were included in the study. The text sources were categorized as private health institutions, university hospitals, specialist dentists, and general dentists. The readability levels of the obtained patient information texts were determined using the Atesman Readability Index.

Results: Of the 50 websites included in the study, 88% belonged to private health institutions, 6% to university hospitals, 4% to specialist dentists, and 2% to general dentists. The average Atesman Readability Index was found to be 64.23 ± 6.02. Accordingly, 24% of the websites were classified as easy, 74% as medium difficulty, and 2% as difficult.

Conclusion: This study determined that most Turkish websites aiming to provide information about dental abscesses have a medium level of readability. To improve readability, it is recommended to avoid technical jargon as much as possible and to use concise and clear language. Ensuring that health information materials are prepared with easy readability in mind will be beneficial for effective patient use.

Keywords: Abscess; education; endodontics; internet; readability.

Introduction

The advent of the internet has facilitated greater access to information in numerous fields, including healthcare. For a significant proportion of individuals seeking information pertaining to health concerns, the internet has become the principal source of information (1). As indicated by data from the Turkish Statistical Institute, the proportion of individuals aged 14-74 who utilise the internet in Türkiye has increased from 53.8% to 79% between 2016 and 2021 (2). In the present era, the majority of patients utilize the internet to gather information on a range of topics of interest prior to seeking the counsel of a medical professional. As indicated by data from the Turkish Statistical Institute for 2019, one of the most prevalent reasons for internet usage is the pursuit of health-related information, representing 69.8% of total usage (3). In a study conducted by Murray et al. (4), 85% of patients reported undertaking online research into their concerns prior to a scheduled appointment with a medical practitioner. The high prevalence of

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this behaviour underscores the significance of ensuring the accuracy of information disseminated on websites that disseminate health-related content. However, the veracity of this information is not validated, which gives rise to concerns about the reliability and trustworthiness of these sources, regardless of how readily accessible the information may be (5).

Providing health information is one of the primary responsibilities of health education. One of the most significant outcomes of this education is health literacy (6). It is suggested that there is a relationship between health literacy and general literacy skills (7). Clear and comprehensible health information is an indispensable element for enhancing health literacy (8). Readability, a crucial component of the comprehension process, refers to how effectively a text can be read and understood by an individual (9). The ease or difficulty with which a text can be read and understood by the reader defines its readability level (10).

The concept of readability was first introduced in the United States during the nineteenth century (11). Readability can be defined as the ease with which a written text can be understood by the reader (12). As a mathematical concept, readability yields objective results when evaluated (13). A variety of formulas, measurements, and indexes may be employed for the purpose of readability analysis. One of the earliest formulas created for the purpose of measuring readability is the one developed by Vogel and Washburne in 1928. The majority of studies conducted to date have employed three primary variables for the measurement of readability: the number of syllables, the number of words, and the number of sentences (11).

The Atesman Readability Index is a method developed for the purpose of measuring the comprehensibility of texts written in the Turkish language. The index determines the ease with which a text can be read by considering the average word and sentence lengths. The Atesman Readability Index has been devised in accordance with the grammatical rules and vocabulary of the Turkish language, rendering it particularly useful for the evaluation of Turkish texts (14). In accordance with the Atesman Readability Index, texts with a score between 90 and 100 are classified as 'very easy', those between 70 and 89 as 'easy', 50-69 as 'moderately difficult', 30-49 as 'difficult', and 1-29 as 'very difficult' (Table 1) (15). The Flesch Reading Ease classification, on which the Atesman Readability Index is based, provides an indication of the educational level at which a text can be readily comprehended (Table 1) (16).

The acquisition of information from the internet can exert a significant influence on individuals' health-related decisions. In the absence of evidence-based data, the dissemination of such information may prove misleading to patients, potentially leading to delays in the initiation of necessary treatments. It is as crucial to ensure that the text is readily comprehensible as it is to guarantee that the content is accurate and reliable. In emergency situations, such as those involving pain, abscesses, or trauma, it is of the utmost importance to have access to succinct, advertisement-free information from internet sources. A source with a low readability level results in a reduction in the comprehensibility of the information, which ultimately represents a waste of the reader's time. In Goldbort's view, an effective text should progress from the known to the unknown and be characterised by clarity and straightforwardness (17).

Periapical dental abscesses typically develop following dental caries, trauma, or unsuccessful root canal treatments, and can result in a range of clinical manifestations, from localized odontogenic infections to sepsis syndrome (18). Clinically, the formation of an acute abscess typically presents with pain symptoms during biting and percussion. There may be sensitivity to palpation in the periapical area of the affected tooth, and intraoral and extraoral swelling is often observed. In chronic apical abscesses, the tooth may be symptomatic or asymptomatic. If a sinus tract has formed intraorally or extraorally, swelling is usually not seen. Radiographically, bone destruction associated with chronic apical abscesses can be clearly observed (19). Treatment includes draining the abscess, administering antibiotics, managing pain, and removing the source of infection. Hospital admission and intravenous antibiotics may not be necessary for dental abscesses unless the patient exhibits concerning symptoms such as fever, difficulty breathing, or airway obstruction due to swelling. Most dental abscesses can be effectively treated with antibiotics that target gram-negative bacteria, facultative anaerobes, and obligate anaerobes (20). If left untreated, these infections can be not only very painful but also carry a serious risk of spreading into the deep neck spaces or rising to the intracranial sinuses. Diagnosing, treating, and educating patients about a dental abscess will provide symptomatic relief and help prevent potentially dangerous complications (21). Providing patients with accurate and comprehensible information about dental abscesses promotes greater awareness, helps prevent delays in treatment and reduces the risk of potential complications. It also helps to prevent patients from attempting incorrect self-treatment at home.

The internet is often the initial source of information consulted by individuals seeking information about health problems. It is therefore of great importance to evaluate the readability level of the information available online. Since dental abscesses are a source of anxiety among pa-

tients, individuals often seek information about this condition on the internet. The objective of this study is to evaluate the readability of Turkish written texts related to dental abscesses available online. The readability and comprehensibility of online texts regarding dental abscesses enable patients to make accurate and timely decisions about their health, thereby enhancing the overall quality of healthcare services. The study's null hypothesis is based on the assumption that the readability of websites providing information in Turkish about dental abscesses is not optimal. If the texts are of moderate or high difficulty, this may hinder patients' access to necessary information. Utilizing this information, healthcare professionals and public health experts can advocate for the creation of simpler and more comprehensible content. Additionally, the results of such analyses can serve as a foundation for public education and awareness campaigns regarding dental health. Thus, greater awareness of dental abscesses and treatment methods can be achieved.

Materials and Methods

In this study, informational texts about dental abscesses shared on easily accessible websites were evaluated. Therefore, this study does not require approval from an ethics committee.

A search was conducted on Google by the same researcher using the same computer between 28-30 May 2024, using the Turkish phrase "diş apsesi" (dental abscess) as the search term. A total of 50 websites found on the first 10 search result pages were included in the study. Websites excluded from the study included those written for academic purposes, commercial websites, duplicate sites, sites requiring membership, those with mandatory cookie settings, those sharing information exclusively through videos instead of written texts, sites not prepared in Turkish, and those advertising a specific product. Websites providing Turkish information about dental abscesses that do not require membership and are accessible to everyone were included in the study.

The contents of the texts were copied and pasted into a Microsoft Word document. To determine the readability levels, the data were uploaded to a free online readability level calculator (http://okunabilirlikindeksi.com/). The readability calculator used is based on the formula developed by Atesman in 1997. The classification of the Atesman Readability Index is shown in Table 1. The Flesch Reading Ease classification, which is the basis for the Atesman readability formula, assigns a score between 1-100 to indicate the education level at which the texts can be easily understood (Table 1). The obtained data were transferred to a Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA) file.

Statistical Analysis

The data were analysed using the SPSS 23 statistical program (SPSS Inc., Chicago, IL, USA). The normality of the data distribution was evaluated through the implementation of the Kolmogorov-Smirnov test. The mean, minimum, maximum values, and standard deviation were calculated for the data set. The readability index values were categorised in accordance with the Atesman readability classification (Table 1).

Results

The first 50 websites that met the inclusion criteria were examined. When the included texts were analyzed according to their sources, it was found that 88% of the sources belonged to private healthcare institutions, 6% to university hospitals, 4% to specialist dentists, and 2% to general dentists (Table 2). Descriptive statistics related to the linguistic features of the texts are presented in Table 3.

The mean value of the Atesman Readability Index is 64.23 ± 6.02. A graph illustrating the readability levels of the examined websites, based on the Atesman readability classification, is presented in Figure 1. According to the findings, 24% of the websites are categorized as easy, 74% as

Table 1. Atesman readability classification

Atesman readability index range	Atesman readability classification	Flesch readability classification
90-100	Very easy	Grade 4 and below
80-89	Easy	Grade 5-6
70-70	Easy	Grade 7-8
60-69	Moderately difficult	Grade 9-10
50-59	Moderately difficult	Grade 11-12
40-49	Difficult	Grade 13-14
30-39	Difficult	Graduate form undergraduate degree
1-29	Very difficult	Graduate form graduate degree

Table 2. Distribution of websites according to the source of the text

	n	%
Private healthcare institution	44	88
University hospital	3	6
Specialist dentist	2	4
General dentist	1	2

moderately difficult, and 2% as difficult. The readability levels of the texts are as follows: 18% are at the 7th-8th grade level, 66% at the 9th-10th grade level, 14% at the 11th-12th grade level, and 2% at the 13th-14th grade level. The readability levels of the websites according to their sources are detailed in Table 4. According to the results of the Kolmogorov-Smirnov test, all data show a normal distribution (Table 5).

Discussion

Today, individuals have access to a wide range of resources when researching health topics, thanks to rapid technological advancements (22). Studies have shown that internet usage influences health information-seeking behaviors (23). With the widespread use of the internet and the ease of access to information online, it has become easier for patients to obtain information about their health problems. Unsurprisingly, online search engines constitute the second most frequently used source of health information among adults worldwide (24). It is well-known that when people experience health issues, they often search for information online before consulting a doctor (25). The correct understanding and effective use of this information depend on individuals' comprehension abilities. At this point, the clarity and comprehensibility of online information are of great importance.

A study conducted with oncologists in Canada reveals that healthcare professionals view the accessibility of health information on the internet as a positive development (26).

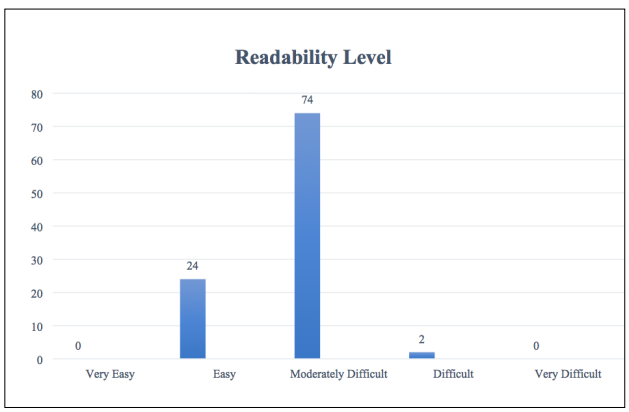

Fig. 1. Readability levels of the websites.

Table 3. Descriptive statistics of the texts in terms of language

	Mean	Standard Deviation	Minimum	Maximum	Average
Word count	648.51	674.63	95	2689	503
Character count	5422.43	4645.73	747	20691	4716
Number of difficult words	645.24	672.24	95	2672	502
Unique words	374.11	124.63	85	781	419
Number of short words	159.25	67.62	12	396	160
Character count without spaces	5112.23	3771.23	646	17933	4997
Sentence count	52.88	27.03	14	184	44
Paragraph count	30.4	12.91	5	83	31
Average word length	2.69	0.10	2.48	2.97	2.68
Average sentence length	9.88	1.53	6.8	17.5	10.2
Atesman Readability Index	64.23	6.02	45.5	76.5	65.3

Table 4. Readability levels of websites according to their sources

	Very easy	Easy	Moderately difficult	Difficult	Very difficult	Total percentage
Private healthcare institution	0.0%	22.8%	75%	2.2%	0.0%	100.0%
University hospital	0.0%	33.3%	66.7%	0.0%	0.0%	100.0%
Specialist dentist	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
General dentist	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%

Table 5. Normality test results

	Kolmogorov-Smirnov		
	static	df	p value
Word count	0.138937	49	0.264
Character count	0.142322	49	0.239
Number of difficult words	0.140895	49	0.250
Unique words	0.155692	49	0.159
Number of short words	0.121268	49	0.421
Character count without spaces	0.141654	49	0.244
Sentence count	0.151867	49	0.180
Paragraph count	0.107171	49	0.577
Average word length	0.112315	49	0.517
Average sentence length	0.107610	49	0.572
Atesman Readability Index	0.088791	49	0.793

$p<0.05$

However, some healthcare professionals may feel uncomfortable when patients compare the information they obtain online with their own medical knowledge, potentially questioning their expertise (27). Therefore, collaboration between healthcare professionals and patients in the process of acquiring and analyzing information is essential. Positive outcomes can be achieved when doctors guide their patients to reliable and comprehensible health information on trustworthy websites.

The concept of readability was first introduced in the United States during the nineteenth century (28). Readability can be defined as the ease with which a text can be followed by the reader. It has been proposed that a text written in English should be composed of short sentences and words with few syllables in order to be easily readable by someone with 6-8 years of education (29). Given that Turkish is an agglutinative language, it can be seen that readability is not solely dependent on sentence length and the number of syllables in words. Consequently, specific coefficients have been incorporated into English readability formulas to ensure their suitability for use with Turkish (15).

There are numerous studies in the literature that investigate the impact of readability on comprehension ability (30,31). According to the findings of these studies, there is a linear relationship between reading level and comprehension level. For instance, a text that is appropriate for the reader's level is better understood by the reader (30). When considering readers who are searching for clear and quick information about dental abscesses, the texts available on the internet must be simple and comprehensible. It is important that texts prepared by healthcare institutions to inform patients meet reliability standards and are written at a readability level that everyone can understand. When creating informational texts for patients, it is recommended to use short sentences, simple language, avoid lengthy lists, and carefully utilize graphics and bullet points (32). To date, no study has conducted a readability analysis of texts related to dental abscesses available on the internet. This study aims to evaluate the readability levels of Turkish texts on dental abscesses found online.

Since Google is the most widely used search engine in Türkiye, it was also chosen for this study (https://gs.statcounter.com). After entering the term 'diş apsesi' (dental abscess) into the search engine, the first 50 websites that met the inclusion criteria were examined. It was decided that examining more than 50 websites would not be necessary for the study. Since 90% of users typically review only the first 30 results in their internet searches (IProspect Search Engine User Behavior Study). Similar studies in the literature have examined a comparable number of websites (12,33,34).

Since this study focused exclusively on Turkish texts, Atesman's readability calculation method was utilized. According to Atesman, the average sentence length in Turkish ranges between 9-10 words, while the average word length is 2.6 syllables (15). Similarly, in this study, the average word length was found to be 2.69, and the average sentence length was 9.88, which aligns with the values reported by Atesman. According to the Atesman Index, 24% of the texts on the websites were classified as easy, 74% as moderately difficult, and 2% as difficult. The findings of this study may raise awareness of the need to simplify the moderately difficult texts found on these websites to enhance their comprehensibility.

A study conducted in 2009 indicated that the readability level of patient education materials should not exceed the 6th to 8th grade level (35). Health professional organizations in the United States recommend that patient education texts be suitable and understandable for individuals at all levels, suggesting a reading level appropriate for 6th grade or below (36,37). The majority of informational texts included in this study were found to have a readability level equivalent to the 9th-10th grade high school reading level, categorized as moderately difficult. These levels are significantly higher than the average education level in our country and the recommended readability levels (36,37). These findings suggest that the texts on the relevant websites may be difficult for a broad audience to understand, do not adequately address the needs of the general public, and therefore, limit the usefulness of the information provided.

According to Google Trends data, the most searched questions related to dental abscesses on the Google search engine in the past year were 'Is Croxilex used for den-

tal abscess?' and 'How to drain a dental abscess?' (www.googletrends.com) (Accessed: 21.06.2024). These results indicate that patients are seeking solutions for dental abscesses at home, on their own. This pursuit of quick home remedies by patients may be attributed to a lack of knowledge regarding antibiotic use, as well as the influence of social media and internet recommendations.

In this study, it was determined that the readability of the texts in the sources was at a moderate level of difficulty; however, the quality of the information in the texts was not evaluated. Assessing the accuracy of the provided information is crucial for benefiting the reader audience. Therefore, further studies are needed to evaluate the quality of writings related to dental abscesses in the online environment.This is a limitation of our study.

Conclusion

It was observed that the readability level of Turkish texts related to dental abscesses available on the internet is moderate. However, this level is higher than the general profile of the Turkish population. Although the content of the texts is sufficient, if they are not understandable by patients, the intended impact on the reader will not be achieved. Public health institutions and professional organizations should review texts about dental abscesses with readability principles in mind.

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Conflict of Interest: None declared.

Ethical Approval: For this study, informational texts about dental abscesses shared on easily accessible websites were evaluated. Therefore, this study does not require approval from an ethics committee.

Informed consent: Written informed consent was obtained from patients who participated in this study.

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