

Original Article

Analysis of Content, Readability, Reliability, and Quality of Turkish Websites on Oral Cancer

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ABSTRACT

Objective: Oral cancer ranks as the sixth most common type of cancer. In this context, patients may seek information and professional opinions regarding their condition from websites. Therefore, the readability, reliability, and quality of the information presented on these websites are of significant importance.

Materials and Methods: This study aims to evaluate the informational content, readability, reliability, and quality of Turkish websites that provide information on oral cancer. In this study, websites appearing on the first 20 pages of Google search results for the keyword “ağız kanseri (oral cancer)” were examined. These sites were categorized into two groups based on their creators: Group 1, consisting of health organizations and specialist physicians, and Group 2, including dental clinics, specialized dentists, and general dentists.

Results: Readability was assessed using the Atesman Readability Index, while reliability and quality evaluations were conducted using the Journal of the American Medical Association (JAMA) score, the Quality Criteria for Consumer Health Information (DISCERN), and the General Quality Score (GQS). The content was systematically evaluated based on various fundamental topics, including the definition, etiology, symptoms, risk factors, and treatment of oral cancer.

Conclusion: Of the 64 websites included in the study, 33 (51.56%) were in Group 1, while 31 (48.44%) were in Group 2. The average Atesman Readability Index of the websites was found to be 63.2 ± 7.13 , indicating a moderate level of difficulty. The DISCERN, JAMA, and GQS values were higher for Group 1.

Keywords: Internet, oral cancer, quality, readability, reliability



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INTRODUCTION

Oral cancer, originating from the multilayered squamous epithelial layer of the lips, tongue, and oral mucosa, is a malignant condition that poses a significant concern for global health due to its high mortality and morbidity rates ^[1]. It represents 2–4% of all cancers and is the sixth most prevalent cancer type. Factors contributing to the advancement of oral cancer include tobacco use, alcohol

drinking habits, dietary habits, viral infections, radiation exposure, genetic predisposition, oral hygiene, dental factors, advanced age, and occupational hazards ^[2]. According to data from the World Health Organization published in 2020, incidence rate of lip and oral cavity cancers in Türkiye is reported as 2.1 per 100,000 population ^[3]. The prevalence of oral cancer varies between countries based on various demographic factors such as gender, age group, and ethnic background ^[1].

The emergence of new technologies and the increasing availability of internet access are continuously reshaping our lifestyles [4]. A significant advantage of technology is its ability to provide access and usability to all segments of society, regardless of factors such as age, gender, ethnic background, and beliefs [5]. According to the 2023 TUIK Household Information Technologies Usage Survey, 95.5% of households have internet access, and 87.1% of individuals use the internet. Both figures have increased compared to 2022, with a rise in searches for health-related information [6]. Online health information is widely accessible, but the lack of verification mechanisms makes it difficult to ensure reliability [7]. The rapid spread of information complicates identifying accurate content [8]. Therefore, it is crucial that health information be both reliable and readable, ensuring it is understandable to the target audience [9,10].

Evaluating the readability of written health information is a common method for assessing patients' understanding, and this approach is globally recommended in health policies [11]. Various tools, such as the Gunning-Fog Index, Flesch-Kincaid, and Fry Readability Graph, can be used to assess readability [9,12]. To analyze website reliability and quality, tools like the DISCERN scale, JAMA score, and Global Quality Score (GQS) are commonly employed [12].

It is important for clinicians concerned with oral health to be aware of internet resources that provide information about oral cancer. The literature includes some studies evaluating the readability and content quality of Turkish websites related to oral cancer [13,14]. However, there is no thorough analysis that concurrently assesses the informational content, readability, reliability, and quality characteristics of Turkish websites providing information on oral cancer. The aim of this study is to improve understanding of oral cancer and to provide standardized, accurate health information accessible to everyone; furthermore, it plans to conduct a thorough evaluation of the content, readability, reliability, and quality features of Turkish websites addressing oral cancer.

MATERIALS AND METHODS

Since this study uses information solely from publicly available websites, ethical committee approval is not required [15-17]. The research was carried out in compliance with the Helsinki Declaration on Human Rights principles. In July 2024, the keywords "ağız kanseri (oral cancer)", "oral kanser (oral cancer)", "ağızda yer alan kanser (cancer in the mouth)", and "ağız içi kanser (cancer inside the mouth)" were investigated using Google Trends with the Türkiye location and Turkish language settings. It was found that the term "ağız kanseri" (oral cancer) was used more frequently. Therefore, "ağız kanseri" was chosen as the primary keyword for the study. To obtain relevant data, the Google search engine (www.google.com.

tr) (Google LLC, Mountain View, California, USA) was used. To ensure that the results were not biased, the personal Google account was logged out, and the browser's cache and cookie settings were cleared. Texts that were not in Turkish, shorter than twenty sentences, academic articles, websites created for health professionals, current news sites (such as newspapers and magazines), chat and forum sites, websites not intended to provide information, commercial and advertising websites, repetitive sites, sites requiring membership, sites that mandate cookie acceptance, sites that only share videos and/or images, social media platforms, and websites that do not provide information about oral cancer were excluded from the analysis. Conversely, the study included Turkish-language websites that provide information about oral cancer, do not require membership, and are accessible to everyone.

The websites were categorized into two groups based on their creators. These groups are defined as follows: Group 1) Healthcare institutions and specialized doctors. Group 2) Dental clinics, specialized dentists and general dentists.

In this study conducted by a single researcher, 64 Turkish-language web-based sites that met the specified criteria were selected from the first 20 pages of search engine results. The data obtained from these sites were transferred to Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA) for analysis.

Evaluation of Information Content

The websites were systematically evaluated for information content, focusing on several key aspects of oral cancer: definition, staging, etiology, risk factors, diagnostic procedures, treatment methods, preventive strategies, the significance of early detection, and recommended specialist consultations. Data on the presence or absence of each of these informational components were recorded as "present=1" or "absent=0" accordingly.

Readability Measurement

The readability level of the content on the websites can be assessed using the Atesman, Bezirci-Yilmaz, and Cetinkaya-Uzun Methods, which are defined for Turkish texts [18-20]. In this study, the Atesman Readability Index, frequently used in studies evaluating readability of Turkish web content, was chosen for analysis. The content of the relevant texts was input into a free online readability calculation tool (<http://okunabilirlikindeksi.com/>). The Atesman Readability Index is a modification of the Flesch Reading Ease Index adapted for Turkish by Atesman in 1997. This method, which utilizes word and sentence length, provides a readability score for a text. The readability levels based on the Atesman method are shown in Table 1.

Table 1. Atesman Readability Level

Atesman Readability Level	
Very easy	90-100
Easy	70-89
Moderate difficulty	50-69
Difficult	30-49
Very difficult	1-29

Content Evaluation

This study utilized the DISCERN Scale, JAMA Score, and GQS to evaluate reliability and quality of information across 64 websites.

The DISCERN Scale was developed by Charnock et al. in 1999^[21] to assess the adequacy and quality of written information on treatment options and was translated into Turkish by Gokdogan in 2003^[22]. The scale consists of 16 questions: 8 questions evaluate reliability and independence, 7 questions assess the adequacy of treatment options, and 1 question measures overall quality. Questions are rated on a scale from 1 to 5 (where 1 indicates “definitely no” and 5 indicates “definitely yes”). Total scores are classified as follows: 63-75 is considered excellent, 51-62 is good, 39-50 is fair, 28-38 is inadequate, and 15-27 is very inadequate.

The JAMA Score is an international metric used to determine the quality, reliability, and usability of medical information available on the internet^[13]. The JAMA criteria assess four fundamental features, with each criterion being scored as either “present=1” or “absent=0”. The total score ranges from 0 to 4; a score of ≥ 3 indicates “high reliability,” while a score of ≤ 2 indicates “low reliability.” The criteria are as follows:

- **Author Information:** Information about the authors, contributors, affiliations, and their fields.
- **Citation:** References and copyright information within the content.
- **Transparency:** Disclosure of site ownership, sponsorship, advertising, and commercial funding.
- **Timeliness:** Dates of content publication and updates.

The GQS, created by Bernand et al. 2007^[23], is used to assess the quality of websites concerning inflammatory bowel diseases. This scale assigns scores ranging from 1 to 5, taking into account overall quality, page flow, and ease of use. The score ranges are as follows: 1-2 indicates low quality, 3 indicates moderate quality, and 4-5 indicates high quality.

To ensure inter-observer reliability, 15 randomly selected websites were re-evaluated for DISCERN, JAMA, and GQS scores 15 days later.

Statistical Analysis

In the study, numerical and categorical descriptive statistics of the data were performed using IBM SPSS Statistics version 24 (Armonk, NY, USA). The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. For normally distributed data, independent sample t-tests were employed. For data that did not follow a normal distribution, the Mann-Whitney U test was used to compare numerical data between independent groups, while the chi-square test was utilized for categorical data comparisons. A significance level of $p < 0.05$ was considered statistically significant. Inter-rater agreement was assessed using the Kappa coefficient.

RESULTS

A total of 200 websites from the first 20 pages of search results for the keyword “ağız kanseri” on Google (Alphabet, California, USA) were examined. After applying the exclusion criteria, 64 websites were included in the study.

The inter-observer reliability values for DISCERN, JAMA, and GQS were 0.77, 0.91, and 0.92, respectively. The distribution pattern of the websites included in the study by their creators is illustrated in Figure 1. Group 1 comprises 21 health organizations and 11 specialist doctors, while Group 2 includes 19 dental clinics, 3 specialist dentists, 6 general dentists, and 4 professional associations.

The average Atesman Readability Index of the websites in the study was 63.2 ± 7.13 (Table 2). This value indicates moderate difficulty.

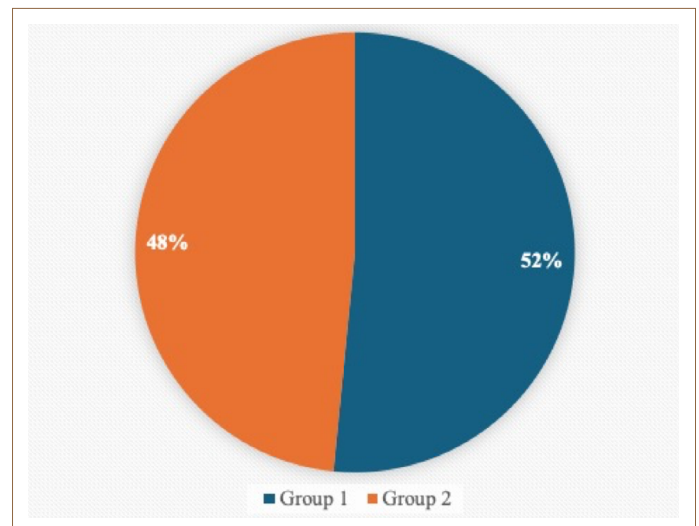


Figure 1. Distribution of websites by groups.

Table 2. Descriptive statistics of texts in terms of language

Ateşman Readability Formula Features	Mean±Standard Deviation (SD)	Minimum (Min)	Maximum (Max)
Word count	579.23±293.924	163	1216
Character count	4403.03±2358.319	649	9472
Number of difficult words	573.80±291.912	163	1201
Unique words	359.02±153.580	115	744
Number of short words (<5 characters)	196.83±877.736	29	7100
Number of characters excluding spaces	3891.25±2021.447	1034	8240
Sentence count	58.75±30.354	20	131
Paragraph count	33.39±16.423	5	70
Average word length	2.72±0.099	2.4	2.97
Average sentence length	10.17±2.208	5.5	16.5
Atesman Readability Index	63.19±7.132	44.9	81.3

The median information content score for Group 1 was 7, the median DISCERN score was 39, the median JAMA score was 1, and the median GQS score was 2. For Group 2, the median information content score was 4, the median DISCERN score was 25, the median JAMA score was 0, and the median GQS score was 1. Statistically significant differences were observed between the groups for information content, DISCERN Scale, JAMA Score, and GQS (p<0.05).

However, no statistically significant difference was found between the Atesman Readability Index according to the groups (Table 3).

Statistical differences between the groups according to DISCERN Score, GKS Score and Atesman Readability Index are shown in Table 4.

DISCUSSION

The objective of this research is to evaluate the content, readability, reliability, and quality of Turkish websites that provide information on oral cancer. Over the past decade, there have been significant technological advancements in the field of information technology. The Internet has become a vast phenomenon expanding and proliferating at a staggering rate [24]. Although there are studies evaluating the content and readability of information on Turkish websites related to oral cancer [13,14], this study is the first to comprehensively and systematically evaluate the information on Turkish websites about oral cancer, thus rendering the findings of significant value. Among the 64 websites examined, 62 (96.8%) were categorized as having low reliability according to the JAMA score. In terms of readability, the websites were found to be of

Table 3. Comparison of information content, DISCERN score, JAMA score, GQS and Atesman Readability Index by groups

	Group 1 (n=33, 52%)		Group 2 (n=31, 48%)		Test value	Significance
	Mean±SD	Median (Min-Max)	Mean±SD	Median (Min-Max)		
Information Content	6.67±1.575	7 (3-10)	5.00±1.713	4 (2-9)	z=3.657	p=0.000*
Atesman Readability Index	63.36±6.446	64 (45-72)	62.84±7.751	63 (46-81)	t=0.295	p=0.769
DISCERN Score	37.39±10.371	39 (16-57)	25.23±6.479	25 (16-39)	t=5.587	p=0.016*
JAMA Score	0.73±0.761	1 (0-3)	0.35±0.661	0 (0-3)	z=-2.334	p=0.020*
GQS	2.36±0.822	2 (1-4)	1.45±0.568	1 (1-3)	z=-4.413	p=0.000*

DISCERN: The Quality Criteria for Consumer Health Information Score; JAMA: The Journal of the American Medical Association Score; GQS: The Global Quality Score. *p<0.05 statistically significant. z: Mann-Whitney U Test. t: Independent Samples t-Test.

Table 4. Comparison of DISCERN score, GQS and Atesman Readability Index by groups

	Group 1		Group 2		Test Value and Significance
	n	%	n	%	
DISCERN Score					
Very poor	6	18.2	19	61.3	X ² =21.032 p=0.000*
Poor	10	30.3	11	35.5	
Fair	14	42.4	1	3.2	
Good	3	9.1	0	0.0	
GQS					
Low quality	20	60.6	30	96.8	X ² =12.313 p=0.002*
Moderate quality	10	30.3	1	3.2	
High quality	3	9.1	0	0.0	
Ateşman Readability Index					
Easy	6	18.2	6	19.4	X ² =0.018 p=0.991
Moderate difficulty	26	78.8	24	77.4	
Difficult	1	3.0	1	3.2	

DISCERN: The Quality Criteria for Consumer Health Information Score; GQS: The Global Quality Score. *p<0.05 statistically significant. X²=Chi-square Test.

moderate difficulty based on the Atesman Readability Index. Evaluation of the content and quality parameters revealed that the websites were inadequate.

The Internet provides individuals with an accessible and flexible resource structure. Easy and practical access to information encourages patients to seek information about their health issues. The long-term and delayed effects of cancer and its treatments may lead those with a cancer history to have specific information requirements. Cancer patients and individuals in recovery have reported that it is easy to communicate with online groups. Online interactions often stem from a search for emotional support. These discussions not only allow patients to express their feelings and share their experiences but also provide emotional validation and a sense of control [25,26].

Online support groups are preferred by patients and individuals in recovery who wish to assist others with their experiences, which facilitates communication during the processes of asking questions and seeking information [25]. A study conducted in the United Kingdom demonstrated that patients suffering from head and neck cancer make use of the internet for purposes such as managing appointments, ordering prescriptions, downloading informational brochures, and viewing images of healthcare facilities [27].

Information on the internet can be presented in audio or video format. YouTube is a widely preferred and easily accessible content platform for individual health-related searches. A study in the literature found that 71.4% of the analyzed videos were categorized as useful [28]. However, studies have shown that most of this information is presented in text format. Tools such as the Atesman Readability Index, Cetinkaya-Uzun Readability Formula, and Bezirci-Yilmaz Formula are used to evaluate the readability of information on Turkish websites [18-20]. According to Atesman, the average sentence length in Turkish is between 9 and 10 words, while the average word length consists of 2.6 syllables. In our study, the Atesman Readability Index was selected to evaluate the readability of Turkish websites related to oral cancer. One study reported an average sentence length of 11.15 words and an average word length of 2.68 syllables [14]. Another study found that the average sentence length was 10.84 words and the average word length was 2.71 syllables [13]. In our study, the average sentence length was determined to be 10.17 words and the average word length was 2.72 syllables. These results indicate that our study is consistent with other studies in the literature and is close to Atesman's average sentence and word lengths. This suggests that the texts are reasonably understandable. Additionally, it was found that the Atesman Readability Index value for Group 1 was higher compared to Group 2. The

readability levels for both groups were assessed as being of moderate difficulty.

Globally, oral cancer is the sixth most frequent type of cancer, characterized by elevated mortality and morbidity rates. Studies evaluating the content of information available online regarding this condition are available. The literature indicates that Turkish websites providing information about oral cancer typically focus on the definition of the disease, its etiology, treatment options, and the importance of early diagnosis [13,14]. In our study, additional aspects such as the stage of the disease, risk factors, diagnostic methods, preventive strategies, and recommended specialist consultations were also evaluated. Additionally, information regarding which department manages oral cancer was found on 18 websites.

The Internet has profoundly transformed our methods of obtaining information and interacting. However, since health information is often reviewed without professional guidance, this can lead to issues concerning reliability and quality [29]. To appraise the quality and reliability of the provided information, tools such as JAMA criteria, DISCERN, GQS, and HONcode have been developed. Zirek and Tassoker [13] reported that the average JAMA score for Turkish websites providing information about oral cancer was 1.68. In their study, they noted that 2 websites met all JAMA criteria, while 12 websites did not meet any of these criteria. In our study, two groups were created for website sources: Group 1 and Group 2. According to the average JAMA scores, Group 1 had a score of 0.73 ± 0.76 , while Group 2 had a score of 0.35 ± 0.66 . These results indicate that the average JAMA score for Group 1 is higher than that of Group 2. However, both groups exhibited low-quality JAMA scores. It was found that none of the websites met all four JAMA criteria, which is quite surprising.

Zirek and Tassoker [13] reported that DISCERN scores ranged from 43 to 55, classifying the informational texts as of fair quality. In our study, according to the DISCERN scale, 3 out of 64 websites were classified as good, while 27 were rated as very poor. Additionally, the average DISCERN score for Group 1 was found to be higher than that of Group 2. These differences in studies are believed to be due to variations in the classification of website sources and inclusion criteria. Bernard et al. [23] developed the GQS for measuring the quality of websites associated with inflammatory bowel diseases. This scale evaluates the overall quality, flow, and usability of the pages. Our study found that both groups were of low quality.

Several limitations are present in this study. The primary limitation is that the examination pertains to a specific time frame. Search engines other than Google were not included in the study. During a cross-sectional assessment, it should

be considered that internet trends and search engines may present different results to various users. The study evaluated only websites containing written texts, excluding those with video or graphic content. Including such content could have provided more comprehensive and understandable results. While the JAMA score evaluates clinical parameters for reliability, it is challenging to definitively determine the academic accuracy and evidence-based currency of online information. The study assessed inter-observer reliability using a single observer. However, having the DISCERN and GQS scales evaluated by a different observer would provide more reliable results.

CONCLUSION

Oral cancer is a disease with high mortality and morbidity rates. Patients must obtain information about their condition and follow treatment guidelines, as this is essential. Having website readability scores at recommended levels, particularly at very easy levels, will enhance accurate patient information and improve treatment adherence. This study found that Turkish websites related to oral cancer are very inadequate in terms of content, with readability levels at a moderate difficulty level, and are of low quality and lacking in reliability. Preparing the informational content on websites according to evaluation criteria such as the JAMA, DISCERN, and GQS score is crucial for improving quality and reliability.

DECLARATIONS

Ethics Committee Approval: Not applicable.

Conflict of Interest: The author declared no conflict of interest.

Use of AI for Writing Assistance: The author declared that no AI tool was used.

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