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Research Article

EVALUATION OF READABILITY LEVELS OF ONLINE HALLUX VALGUS CONTENT

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Keywords

Comprehension,
Hallux valgus,
Health literacy,
Internet,
Readability.

ABSTRACT

Purpose: This study aimed to evaluate the readability levels of Turkish web-based information related to hallux valgus, a common forefoot deformity.
Methods: A descriptive content analysis was conducted. Using the keyword "Halluks Valgus," Turkish web pages accessible via Google Turkey were screened in November 2025. Among the first 97 search results, 46 eligible pages containing textual health information were included based on predefined criteria. Readability levels were assessed using the Ateşman Readability Index. Each text was analyzed through an online tool to obtain structural linguistic metrics, and readability scores were classified according to the Ateşman scale. Descriptive statistics were calculated using IBM SPSS 25.0.
Results: Among the included online sources, 44.7% were authored by physicians, 36.2% by hospitals, and 19.1% by other providers. Author information was available in 66% of the content, while 72.3% of pages were up-to-date. The mean Ateşman score was 57.91±6.04, indicating a moderate difficulty level. Overall, 89.4% of texts were categorized as moderately difficult, 2.1% as easy, and 8.5% as difficult. More than half of the content corresponded to an 11th–12th grade reading level.
Conclusion: Turkish online materials on hallux valgus generally require a high reading level and exhibit moderate readability. The frequent use of technical terminology and long sentence structures may limit accessibility for individuals with low health literacy. Improving clarity, simplifying language, and ensuring regular content updates may enhance the effectiveness and usability of digital health communication.

INTRODUCTION

Hallux valgus, a deformity characterized by lateral deviation of the big toe and structural deterioration of the first metatarsophalangeal joint, is a common forefoot deformity. It is a common orthopedic pathology affecting 19% of adults worldwide (1). The prevalence of the disease increases with age, with higher rates reported in women (2). The progressive nature of clinical symptoms increases individuals' search for information about treatment alternatives, nonsurgical approaches, and self-management strategies. A 2023 study found that Google search results related to hallux valgus and its treatments may lack transparency and quality (3).

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Therefore, the understandable and reliable nature of the initial information individuals obtain online is crucial for accurate guidance and early healthcare consultation.

Readability is a characteristic that defines the degree to which a text can be easily, fluently, and accurately comprehended by the reader through its language and structure (10). In the healthcare field, readability plays a crucial role in individuals' ability to understand, evaluate, and make informed decisions about health-related information. Low health literacy can lead to difficulties in understanding texts containing technical terms or complex structures. This can also lead to misinterpretation of information and delays in seeking healthcare services. National studies conducted in Turkey indicate that health literacy is insufficient for a large portion of the population (11). Therefore, preparing online health content at a level understandable to a wide audience has become essential for accurate and effective information delivery.

In the field of health communication, many tools have been developed and are widely used to measure the readability of digital content. The Ateşman, Bezirci-Yılmaz, and Çetinkaya-Uzun readability formulas, frequently used for Turkish texts, allow for systematic and objective assessment of comprehensibility using measurable criteria such as average word length, sentence structure, and grammatical features (12-14). Although the literature on occupational therapy (15) has examined the readability levels of online information resources for various conditions, such as tinnitus (16), hoarseness (17), scoliosis (18), dizziness (19), osteoarthritis (20), and carpal tunnel (21), it reveals that most online texts have a moderate or difficult readability level and largely require a high school education level or higher.

The internet is one of the most widely used patient resources for health information (4). Because it provides fast, up-to-date, easy-to-access, and rich information, the internet is an indispensable part of research. Web-based content is widely used by patients, their families, and healthcare professionals (5,6). However, the information it provides has limitations, such as being factually inaccurate, biased by the industry, and/or lacking peer review (7). Furthermore, the quality, accuracy, suitability for the target audience, and readability of online health information can vary significantly (8,9). Content with low readability can make it difficult for individuals to accurately understand illness, evaluate treatment options, and guide health behaviors. Therefore, the understandability of health information presented digitally is a fundamental component of effective health literacy.

In this study, we focused on web-based information sources related to hallux valgus, one of the most common disorders of the big toe. The quality and accuracy of online information were assessed through independent searches using the keywords "halluks valgus". The findings

will reveal the understandability of the content of web-based information sources and provide guidance for future web-based health content developers. This will help make digital health communication more accessible and effective.

METHODS

Purpose and Type of Research

This study is a descriptive content analysis that aims to examine the readability levels of online content. Turkish web pages accessible through the Google search engine were systematically searched using the keyword "Halluks Valgus."

Population and Sample of the Study

A search was conducted using the Google Turkey search engine (www.google.com.tr) in November 2025. The first 97 web pages listed in the search results were scanned; a total of 46 pages that met the inclusion criteria were evaluated. Only pages containing textual content and intended to provide health information were included in the study. Pages containing video/visual content, text shorter than 10 sentences, forum/blog/social media-based pages, pages that cannot be copied or with restricted access, and pages generated by artificial intelligence or that serve as referrals were excluded. The eligibility assessment was conducted by two independent researchers, and in cases of disagreement, the consensus method was used.

Ethical Aspects of the Research

Because this study relies on the analysis of publicly available web-based digital content, it does not involve any intervention on any individual and does not collect personal data. Therefore, ethics committee approval is not required. The principles of scientific research and publication ethics were meticulously observed throughout the research.

Data Collection and Analysis

The readability levels of the web pages were assessed using the Ateşman Readability Index. The text of each page was imported into the online tool okunabilirlikindeksi.com, and sentence length, total word count, and average syllable count per word were calculated. The Ateşman Readability Index is an adapted version of the Flesch Reading Ease formula, which determines the readability of Turkish texts. Scores were categorized as “very easy” (90–100), “easy” (70–89), “medium” (50–69), “difficult” (30–49), and “very difficult” (0–29). Data

distribution was assessed using the Shapiro–Wilk test, and descriptive statistics (mean, standard deviation, minimum, and maximum) were analyzed using IBM SPSS Statistics 25.0.

RESULTS

When the provider types of 46 online contents examined in the study on Hallux valgus were examined, it was determined that 44.7% of the contents were provided by doctors, 36.2% by hospitals, and 19.1% by other sources (Figure 1).

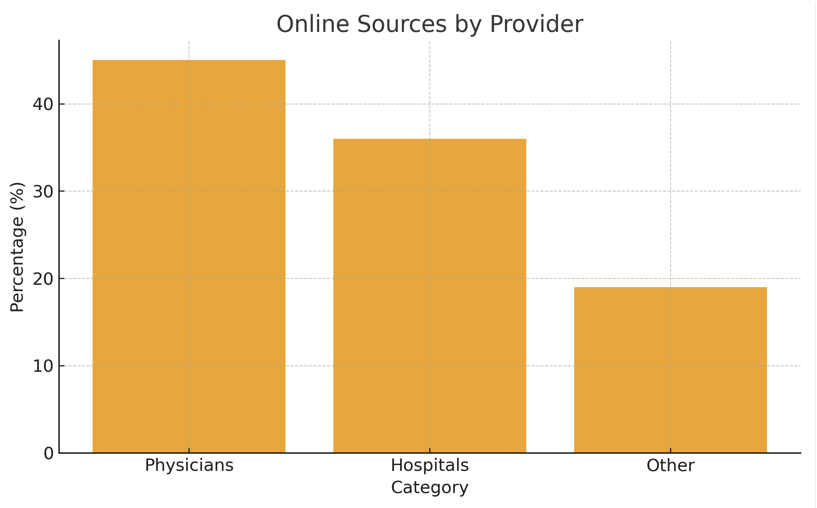

Figure 1. Providers of Online Resources

An examination of the accessibility of author information on web pages revealed that 66% of the content clearly identified the author, while 34% contained no author information at all. When the content was evaluated for currency, it was determined that 72.3% of the pages contained up-to-date information, while 27.7% were outdated or did not specify an update date. It was revealed that the most updates related to hallux valgus were made in 2025, 2023, and 2025, respectively.

Descriptive statistics for the analyzed texts, including word count, character count, difficult word count, unique word count, sentence count, paragraph count, average word length, and average sentence length, are presented in Table 1.

Table 1. Descriptive statistics on the analyzed texts

	Minimum	Maximum	Mean ± Standard Deviation
Word Count	52	3242	823.77 ± 672.59
Number of Characters	413	26022	6611.45 ± 5409.06
Number of Difficult Words	52	3210	814.74 ± 665.06
Number of Unique Words	43	1385	462.06 ± 298.69
Number of Short Words	6	427	114.32 ± 94.63
Number of Characters Without Spaces	361	22587	5968.57 ± 5136.20
Number of Sentences	6	406	83.34 ± 74.78
Number of Paragraphs	1	242	42.98 ± 24.79
Average Word Length	2.68	3.17	2.83 ± 0.11
Average Sentence Length	6.5	17.1	10.42 ± 2.26
Ateşman Readability Index	44.90	72.60	57.91 ± 6.04

According to the Ateşman Readability Index, 2.1% of the texts on the examined web pages on hallux valgus were found to be "easy" (7th-8th grade level), 89.4% were "medium" difficulty (9th-10th and especially 11th-12th grade level), and 8.5% were "difficult" (13th-14th grade level). When the educational level classification was evaluated, it was seen that 55.3% of the texts corresponded to the 11th-12th grade level (Figure 2).

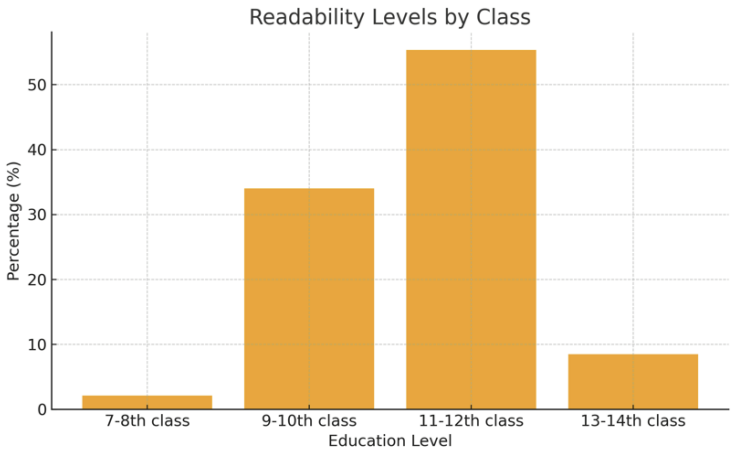

Figure 1. Readability Levels of Texts According to Ateşman (By Class)

DISCUSSION

The hallux valgus content examined in this study had a readability level of medium difficulty according to the Ateşman and Çetinkaya-Uzun indices. For example, 89.4% of the content was in the moderate category according to Ateşman, only 2.1% was in the easy

category, and the average Ateşman score was approximately 58 (above high school level). These findings are consistent with results from similar studies. An international study reported that the overall quality of online information about hallux valgus was low and written at a very high reading level (22). A study from Turkey emphasized that online content on scoliosis was mostly of medium difficulty (Ateşman mean score: 56.7) and geared towards high school level students, but that understanding needs to be improved for a wider audience (18). Systematic reviews indicate that patient education materials frequently exceed recommended reading levels, and much of the health information content uses complex language that is incomprehensible to the general readership (23).

The findings of our study present significant risks for individuals with low health literacy. These individuals may have difficulty understanding texts filled with long, complex sentence structures and medical terminology; this can lead to misinterpretation of information, delay of treatment decisions, or the development of inappropriate health behaviors. Sentell and Halpin demonstrated that low health literacy levels negatively impact individuals' ability to access, understand, and use health information to make informed decisions (24). In this context, it is crucial that digital health content be designed in a clear, concise manner, and appropriate to the target audience's comprehension level. In online informative content for common conditions such as hallux valgus, simplifying medical terminology, supporting it with short and understandable sentences, and enriching it with visuals if necessary will facilitate access to information.

The sources of content in our study exhibited similar trends. Healthcare providers (private hospitals, physicians) provided the majority of the sources; author information was missing in 34% of the content, and update dates were not provided in 28%. This reflects a problem highlighted by previous research. Tartaglione and colleagues noted that while physician-authored web content is more accurate than other sources, it is more difficult to read (22). Our findings also indicate that professionally prepared health information resources have a high reading level. While this increases the technical accuracy of the content, it can reduce its accessibility to the broader public.

One of the distinguishing features of this study is that, despite Hallux Valgus being a highly prevalent deformity, the language used in digital content still contains highly technical terms, which limits its understandability. The presentation of terms from physiotherapy, surgery, and orthopedics, in particular, without explanation, increases the medical accuracy of the texts but makes them difficult for the general public to access. Because Hallux Valgus is related to both the musculoskeletal system and motor functions, the use of multidisciplinary

language is necessary. However, presenting this language without simplification can prevent individuals, especially those with low health literacy, from accessing accurate information.

Limitations of the Study

This study has several limitations that should be acknowledged. First, the data were collected exclusively through the Google Turkey search engine, and other commonly used platforms such as alternative search engines or social media–based information sources were not included. This may have limited the diversity and representativeness of the examined online content. Second, only Turkish-language materials were analyzed; therefore, the findings cannot be generalized to online resources presented in other languages. Third, the study focused solely on publicly accessible textual information, excluding videos, visual-based materials, subscription-restricted pages, and user-generated content such as forums or social media comments. As a result, some potentially relevant sources may not have been captured. Future studies may benefit from incorporating user experience assessments, qualitative evaluations, and broader platform sampling to provide a more comprehensive understanding of online health information readability.

CONCLUSION

This study revealed that the majority of Turkish online materials related to hallux valgus are written at a moderate readability level according to the Ateşman Readability Index, corresponding predominantly to the 11th–12th grade education level. The high proportion of moderately difficult texts suggests that current online resources may not be fully accessible to individuals with low health literacy. In addition, the limited presence of author information and the insufficient reporting of update dates raise concerns regarding the transparency and currency of the available content.

Given the widespread use of the Internet as a primary source of health information, the readability and clarity of digital materials play a critical role in supporting accurate patient understanding and informed decision-making. The complexity introduced by medical terminology, lengthy sentence structures, and insufficient explanations may hinder comprehension, particularly among vulnerable populations. Therefore, efforts to simplify language, enhance structural clarity, and incorporate supportive visual elements are essential for improving the accessibility of online patient education materials.

This study highlights the need for standardized guidelines for the development of digital health content in Turkey. Collaboration between healthcare professionals and communication specialists may facilitate the creation of accurate, comprehensible, and user-friendly resources. Regular content updates, clear authorship, and adherence to readability criteria will further strengthen the reliability and effectiveness of online health information.

Ethics Committee Approval: This study does not require ethics committee approval, as it is based on the analysis of publicly available online content and employs a descriptive content analysis method. However, it was conducted in accordance with ethical research principles.

Informed Consent: Not required as the study was based on publicly available online data.

Peer-review: Externally peer-reviewed.

Author Contributions: EÖ: Conception, design, data collection, analysis/interpretation, literatüre review, writing, critical review. GKK: Conception, design, data collection, writing, critical review.

Conflict of Interest: The authors report there are no competing interests to declare.

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