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Readability Analysis of Turkish Internet Content on Varicose Veins

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ABSTRACT

Objective: Internet is one of the most widely used sources for health information. However, the comprehensibility of this content is critical for individuals' health literacy. This study examines the readability level of Turkish health content on “varicose veins” on the internet.

Methods: In the study, the contents of 30 websites ranked in the top 10 in Google, Yandex and Bing search engines for the word “varicose veins” were evaluated and 19 websites were analyzed after excluding the inappropriate ones. The texts were analyzed using two Turkish-specific readability formulas, Ateşman and Bezirci-Yılmaz formulas.

Results: According to Ateşman's formula, the average readability score of the texts was 54.0±6.1, indicating that these contents are comprehensible by individuals with 9th grade and above education level. Bezirci-Yılmaz scores averaged 10.6±2.1, indicating that some texts were simple while others were quite complex.

Conclusion: The vast majority of the health content on the analyzed websites requires a reading level above the recommended education grade level. This may negatively affect the access to and understanding of information, especially by individuals with low education levels. Therefore, presenting health content in a simpler and more understandable language would be an important step in increasing the overall health literacy of the population.

Keywords: Health literacy, internet, search engines, varicose vein

INTRODUCTION

Internet has been increasingly used in our country in recent years. The Turkish Statistical Institute reported internet usage in Turkey as 88.8% (1). Increasingly, internet users access information through websites by using search engines (2).

Changing demographics, advances in treatments and increasing health needs require more up-to-date and accessible health information, and with easier access to the internet, individuals' habits of seeking and using health information have changed, with many people turning to online resources before seeking a professional diagnosis. These searches are often related to personal health concerns, diseases and treatment options. Moreover, people are seeking this information not only for themselves but also for others. The increased search for health information online may change the way patients interact with their doctors and evaluate their health decisions (3).

When looking at how most individuals access health-related information online, the most common method is through searches using search engines. By providing a fast, easily accessible and low-cost opportunity to obtain personalized information about health conditions and preventive measures, search engines help users make informed health decisions (4).

While patients used to obtain health information from health personnel more frequently in the past, they try to obtain information from different sources due to intensive work of health professionals (5). For this purpose, many written sources are used to obtain information. The extent to which written sources can be understood by the reader can be measured by readability (6,7). For this purpose, various formulas have been developed to measure the readability of Turkish written texts (5-8).

The readability and comprehensibility of health-related materials has been shown to directly influence patient knowledge (9). Although many resources are available online, there are publications showing that these resources are not readable and accessible. Previous evidence has shown that medical information for patients is written at a higher reading level than that of the average adult (10).

In this study, the content on the subject of "varicose veins" on the internet was evaluated using two different Turkish-specific readability formulas- Ateşman and Bezirci-Yılmaz.

METHODS

This cross-sectional study was conducted using the most frequently used search engines in Turkey (11), Google, Yandex, Bing. On 15.03.2025, the keyword "varicose veins" was searched and the first 10 websites in each search engine were evaluated. All history and cookie information of the internet browser (Google Chrome) was deleted in order to prevent the search results from being affected by previous browser history and cookies. At the beginning of the study, it was planned to exclude websites that opened in other languages during the search, websites with sponsored links and advertisements, forum sites where detailed information can only be viewed with paid membership, websites that are not related to the search term, and websites that only contain videos such as YouTube.

The texts obtained from each site were analyzed according to their structural features such as the number of sentences, words, letters, characters, syllables and polysyllabic words, and the texts obtained as a result of the study were evaluated with Ateşman and Bezirci-Yılmaz readability formulas (12-13). For this purpose, the software developed by Bezirci-Yılmaz was used (13). With the software, the number of sentences, number of words, number of letters, number of characters, number of syllables, number of words with more than 4 syllables, Ateşman readability score, Bezirci-Yılmaz scores were obtained.

Ateşman's readability formula was developed in 1997 to measure Turkish readability. An increase in the score indicates an increase in readability (12) and is calculated as:

Readability score = 198.825- 40.175 x word length (total syllables total words)- 2.610 x sentence length (total words/total sentences).

Bezirci-Yılmaz readability formula was developed in 2010 to measure Turkish readability and is calculated as:

Readability score= √OKS x [(H3 x 0.84) + (H4 x 1.5) + (H5x3.5) + (H6 x 26.25)]

OKS: average word count; H3: mean number of 3-syllable words; H4: mean number of 4-syllable words; H5: mean number of 5-syllable words; H6: the average number of words with 6 or more syllables. Readability decreases as the score obtained from the scale increases (13).

All collected data were evaluated with SPSS, Version 23.0 (IBM Corp., Armonk, NY, USA). Mean ± standard deviation and median (minimum-maximum) were used for descriptive data. Results were expressed as numbers and percentages for categorical data.

The study was conducted in accordance with ethical research principles. The websites examined in our study are publicly accessible platforms, therefore our study did not require specific ethical committee approval and did not require informed consent from participants.

RESULTS

Since Internet users usually look at the first 10 results when using a search engine (2), the first 10 sites in Google, Yandex, Yahoo search engines were evaluated in our study.

When the keyword varicose veins was searched with the Google search engine, it was seen that eight websites belonged to the corporate sites of private hospitals and one belonged to the personal site of a healthcare worker. One search result belonged to the YouTube channel of a private hospital and was excluded from the evaluation for readability

A search with the Yandex search engine revealed that nine results belonged to private hospitals and one to a public hospital.

In the search conducted with the Bing search engine, it was determined that seven results belonged to private hospitals, one to a blog site, one to a health website that publishes various health-related publications and one to a magazine.

As a result of a total of 30 searches, three websites appeared in all three search engines. As shown in Tables 1, 2 and 3, the sites are indicated by numbers.

Table 1. Search results with the keyword "varicose veins" in the Google search engine.

Site no	Type of website	Number of Sentences	Number of Words	Number of Letters	Number of characters	Number of Syllables	Number of Words with More Than 4 Syllables
1	Private hospital	38	380	2565	3011	1079	102
2	Private hospital	280	3566	24020	28226	10268	1082
3	Private hospital	151	1671	11514	13543	4914	530
4	Private hospital	115	1023	7243	8484	3077	337
5	Youtube channel	-	-	-	-	-	-
6	Private hospital	51	531	3655	4284	1564	168
7	Private hospital	100	1006	7110	8287	3020	342
8	Private hospital	84	688	4704	5558	1995	209
9	Private hospital	34	462	3246	3802	1365	150
10	Kişisel web sitesi	34	476	3400	3943	1446	167

Table 2. Search results for the keyword "varicose veins" in the Yandex search engine.

Site no*	Type of Website	Number of Sentences	Number of Words	Number of Letters	Number of Characters	Number of Syllables	Number of Words with More Than 4 Syllables.
11	Private hospital	187	2451	16704	19594	7112	744
12	Private hospital	134	1083	7402	8723	3169	333
13	Private hospital	106	1270	8651	10179	3680	410
14	Private hospital	62	662	4363	5199	1841	173
15	Public hospital	74	649	4399	5214	1865	182

*Websites 1, 2, 4, 7, 8 also appeared in the top 10 results of the Yandex search

Table 3. Bing search engine search results for the keyword "varicose veins"

Site no*	Type of Website	Number of Sentences	Number of Words	Number of Letters	Number of Characters	Number of Syllables	Number of Words with More Than 4 Syllables
16	Blog site	85	974	6698	7919	2854	308
17	Private hospital	80	800	5208	6196	2234	218
18	Private hospital	126	1470	10052	11814	4278	471
19	Health blog	101	1117	7454	8736	3183	324
20	Magazine journal	156	1305	8771	10387	3709	364

*Websites 1, 2, 4, 11, 12 also appeared in the top 10 results of the Bing search

The average number of sentences in the evaluated texts was found to be 105.2 ± 60.2, the average number of words was 1136.0 ± 772.5, whereas the average number of letters was 7745.2 ± 5214.8, also the average number of characters was 9110.5 ± 6122.8, however the average number of syllables was 3297.5 ± 2229.5, and the average number of polysyllabic words (with more than four syllables) was 348.1 ± 236.85.

The mean Ateşman readability score of the texts was 54.0 ± 6.1, and the mean Bezirci-Yılmaz readability score was 10.6 ± 2.1. According to Ateşman's fomula, readability levels were found to be 9th or 10th grade education and above. According to the Bezirci-Yılmaz score, 3 sites required primary school education and above, and 4 sites required university education and above (Table 4).

Table 4. Website's readability score and education level of the score.

Site no	Ateşman Score	Education level towards Ateşman Can be read by anyone with a:	Bezirci-Yılmaz Score	Education level towards Bezirci-Yılmaz
1	58.65	11th or 12th grade education	8.81	High school
2	49.9	13th or 15th grade education	12.3	University
3	51.8	11th or 12th grade education	10.88	High school
4	54.77	11th or 12th grade education	8.73	High school
5	-	-	-	-
6	53.32	11th or 12th grade education	10.5	High school
7	51.96	11th or 12th grade education	10.38	High school
8	60.95	9th or 10th grade education	7.98	Primary school
9	44.66	13th or 15th grade education	14.65	University
10	40.24	13th or 15th grade education	14.78	University
11	48.04	13th or 15th grade education	12.63	University
12	60.17	9th or 10th grade education	7.98	Primary school
13	51.14	11th or 12th grade education	11.59	High school
14	59.23	11th or 12th grade education	10.05	High school
15	60.49	9th or 10th grade education	8.65	High school
16	51.2	11th or 12th grade education	11.16	High school
17	60.54	9th or 10th grade education	9.15	High school
18	51.46	11th or 12th grade education	11.95	High school
19	55.48	11th or 12th grade education	10.98	High school
20	62.81	9th or 10th grade education	7.89	Primary school

DISCUSSION

Internet has become an important resource that individuals frequently use to access health information. Especially in searches related to chronic and common diseases, users generally use search engines first and obtain information based on the content they Access (3-4). However, the extent to which this information is comprehensible depends on the readability of the texts as well as the health literacy level of individuals (14).

In our study, we evaluated the health content obtained from 19 different websites accessible on the internet using the keyword "varicose veins" according to Ateşman and Bezirci-Yılmaz readability formulas. The majority of the sites evaluated were private hospital websites, but there were also some personal health blogs and websites managed by physicians.

The readability scores of the texts analyzed are distributed in a wide range. According to Ateşman's formula, the scores vary between 40 and 60, and these values indicate that the texts can generally be understood by individuals with intermediate reading skills. In other words, the readability of the texts of the analyzed websites is at least above the 9th or 10th grade education level. However, it is noted that the recommended readability level for health-related information is usually 8th grade or below (9, 14).

Texts written in the field of health are expected to be appropriate to the knowledge level of the target audience, contain simplified and structurally understandable texts in which medical terms are explained. In particular, the readability of the content on the websites of health service providers directly affects the capacity of individuals to make informed decisions (15).

According to the Bezirci-Yılmaz formula, the scores ranged between 8 and 15, indicating that some of the content was written relatively simply, but some of it was more academic and complex. In a study conducted by Demirci et al. in Turkey, it was observed that there was a significant increase in the frequency of searching for health information on the internet as the level of education increased, and that health literacy problems may occur in people with low levels of education (3). Again, statistical data show that internet use

increases as the level of education increases (1,3). Despite all these data, this relationship between the level of education and the behavior of searching for health information on the internet can be explained by the fact that those with low levels of education give up the behavior of searching for information online because they cannot understand the information as a result of the complexity of the information they Access.

In our study, the most common readability level was determined as “barely readable”. This result coincides with the findings of previous readability studies conducted in Turkey for various disease groups. For example, in a study conducted by Saldırım et al. on the readability of internet content on tinnitus, it was reported that the majority of the content was suitable for individuals at high school level and above, while it was difficult to understand for the general public (16). Similarly, Eyüboğlu found that the readability of internet content on measles was low and insufficient in terms of health literacy (17).

Similar trends exist internationally. In a study by Berland et al., it was emphasized that the quality and readability of health information on the internet is variable and that the content is often loaded with medical terms and complex in structure (18). In the systematic review by McInnes and Haglund, it was found that the readability levels of patient information texts were mostly higher than the level recommended by the American health authorities (19).

The Ateşman, Bezirci-Yılmaz and Çetinkaya-Uzun readability formulas used in our study provide an objective measurement based on word and sentence lengths specific to Turkish language structure. These formulas have been previously applied in different medical fields and similar results were obtained. They stated that these formulas are limited especially in terms of depth of meaning when evaluating readability, but they are sufficient for a basic level evaluation (20).

The main limitation of these formulas is that they are based only on word and sentence lengths. It does not take into account other important components such as visual elements, headings, emphasis elements, clarity of language, and style of expression (21). In addition, since individual variables such as the level of health literacy, emotional state and motivation to access information may also affect readability, the results of this study should be interpreted in this context.

Considering that the level of health literacy in Turkey is still low, such simplification efforts are likely to contribute positively to public health (22). Readability is an important factor in Internet users' access to health-related information, and the use of plain, understandable language helps users increase their knowledge about health conditions to self-manage their health conditions and improve their quality of life. Poor readability can lead to misinformation, inappropriate care and other potential harms (23). Some sites were found to use very simple and accessible language, while others offered more technical and academic content. This may make it difficult for individuals with low health literacy to understand the information. It is important for healthcare providers to provide simplified content while preparing texts, taking into account the knowledge level of the target audience.

Limitations

This study has some limitations. First, only content from 20 websites was analyzed. A broader search using different search engines and keyword combinations may provide more generalized results. In addition, the content was analyzed only in Turkish language and in text format.

Since the Internet is growing day by day, users' search results and site contents may change over time. In addition, the analysis is based only on written texts and the impact of visual or interactive content is not evaluated. At the same time, the typeface and font size used in the analyzed texts were not taken into account.

CONCLUSION

Nowadays, the public's need for effective, understandable consumer health resources is increasing due to the importance of individuals as active partners in health care. We found that the readability of Turkish websites providing information about varicose veins was higher than the average education level in Türkiye. It would be useful to develop easy-to-read websites for varicose vein patients to obtain information about their disease. In future studies, more extensive internet scans should be conducted and different types of content (video transcripts, social media posts, etc.) should be included. In addition, healthcare organizations should use digital tools that measure readability levels when preparing content and present articles in a simpler, publicly understandable language. Basic training in copywriting and health communication for health professionals can improve the quality of written information materials. Readability analysis should be used as a routine control tool in the content production process.

DECLARATIONS

Ethical Consideration: The websites examined in our study are publicly accessible platforms, therefore our study did not require specific ethical committee approval and did not require informed consent from participants.

Authorship Contributions: This study is entirely one author's own work.

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Conflict of Interest Statement: There are no potential conflicts of interest to declare.

Data Availability Statement: The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

REFERENCES

1. Türkiye İstatistik Kurumu. Hane Halkı Bilişim Teknolojileri Kullanım Araştırması 2024 [Internet]. 2024 [cited 2025 Mar 15]. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2024-53492
2. Atay C, Alanyalı M, Uyan SB, Baş C. Arama motoru optimizasyonu. Akademik Bilişim. 2010;10:10-12.
3. Demirci Ş, Uğurluoğlu Ö, Konca M, Çakmak C. Socio-demographic characteristics affect health information seeking on the Internet in Turkey. Health Information & Libraries Journal. 2021;38(4):304-312.
4. Bachl M, Link E, Mangold F, Stier S. Search engine use for health-related purposes: Behavioral data on online health information-seeking in Germany. Health Communication. 2024;39(8):1651-1664.
5. Gürsoy E, Taştan K, Nas MA, Kartal İBY. Evaluation of summary of product characteristics and patient information leaflet of the best-selling drugs in Turkey in terms of readability. İstanbul Journal of Pharmacy. 2022;52(3):342-348.
6. Ay IE, Duranoğlu Y. Göz damlası prospektüslerinin okunabilirlik düzeyinin değerlendirilmesi. Anatolian Clinic the Journal of Medical Sciences. 2022;27(1):55-59.
7. Ay IE, Doğan M. An evaluation of the comprehensibility levels of ophthalmology surgical consent forms. Cureus. 2021;13(7):e17189.
8. Er A, Ay IE, Ceran TH. Evaluating Turkish readability and quality of strabismus-related websites. Cureus. 2024;16(4):e17189.
9. Temel MH, Erden Y, Bağcıer F. Information quality and readability: ChatGPT's responses to the most common questions about spinal cord injury. World Neurosurgery. 2024;181:e1138-e1144.
10. Restrepo E, Ko N, Warner ET. An evaluation of readability and understandability of online education materials for breast cancer survivors. Journal of Cancer Survivorship. 2024;18(2):457-465.
11. Novasta Bilişim Ltd. Şti. Türkiye'deki arama motoru kullanım oranları [Internet]. 2024 [cited 2025 Mar 15]. Available from: https://novasta.com.tr/turkiyede-ki-arama-motoru-kullanim-oranlari/
12. Ateşman E. Türkçede okunabilirliğin ölçülmesi. Dil Dergisi. 1997;58:71-74.
13. Bezirci B, Yılmaz AE. Metinlerin okunabilirliğinin ölçülmesi üzerine bir yazılım kütüphanesi ve Türkçe için yeni bir okunabilirlik ölçütü. Dokuz Eylül Üniversitesi Mühendislik Fakültesi Fen ve Mühendislik Dergisi. 2010;12(3):49-62.
14. Gu JZ, Baird GL, Guevara AE, Sohn YJ, Lydston M, Doyle C, et al. A systematic review and meta-analysis of English language online patient education materials in breast cancer: Is readability the only story? The Breast. 2024;103:102322.
15. Keselman A, Logan R, Smith CA, Leroy G, Zeng-Treitler Q. Developing informatics tools and strategies for consumer-centered health communication. Journal of the American Medical Informatics Association. 2008;15(4):473-483.
16. Saldırım HB, Eren M, Kurtuluş N, Kırlaroğlu SN, Şerbetçioğlu MB. Tinnitus ile ilgili çevrim içi hasta bilgilendirme materyallerinin okunabilirliğinin değerlendirilmesi. Balkan Sağlık Bilimleri Dergisi. 2023;2(1):1-6.
17. Eyüboğlu E. Ebeveynler ve online sağlık bilgisi arama davranışı: sağlık okuryazarlığı kapsamında bir inceleme. TRT Akademi. 2023;8(19):904-933.
18. Berland GK, et al. Health information on the Internet: Accessibility, quality, and readability in English and Spanish. JAMA. 2001;285(20):2612-2621.
19. McInnes N, Haglund BJ. Readability of online health information: Implications for health literacy. Informatics for Health and Social Care. 2011;36(4):173-189.
20. Temur T. Okunabilirlik (Readability) Kavramı. Türklük Bilimi Araştırmaları. 2003;13:169-179.
21. Orgun F, Paylan Akkoç C. Hasta eğitim materyallerinin değerlendirilmesi: Okunabilirlik formülleri ve materyal değerlendirme araçları. Turkiye Klinikleri Journal of Nursing Sciences. 2020;12(3):e1-e8.
22. T.C. Sağlık Bakanlığı. Türkiye Sağlık Okuryazarlığı Araştırması [Internet]. 2014 [cited 2025 Mar 15]. Available from: https://ekutuphane.saglik.gov.tr/Ekutuphane/kitaplar/SOYA%20RAPOR.pdf
23. Daraz L, Morrow AS, Ponce OJ, et al. Readability of online health information: A meta-narrative systematic review. American Journal of Medical Quality. 2018;33(5):487-492.