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The Readability Level of Websites Regarding COVID-19 Ocular Findings: An Internet-Based Analysis

COVID-19 Oküler Bulgulara İlişkin Web Sitelerinin Okunabilirlik Düzeyi: İnternet Tabanlı Analiz

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Abstract

Introduction: The purpose of this single-centered internet-based study was to determine the readability of COVID-19-related ocular findings on Turkish websites.

Materials and Methods: The first 33 websites that appeared when searching Google for phrases like "*Does coronavirus affect the eye*," "*Coronavirus eye findings*," *COVID-19-related ocular manifestations*," and "*Can coronavirus infect the eye*" were evaluated using two main readability scores for Turkish texts developed by Ateşman and Bezirci-Yilmaz.

Results: The average score on Ateşman's readability score was 47. Accordingly, websites providing information about COVİD-19-related ocular findings were discovered to be readable by the 13th, 14th, and 15th grade students. The same websites were found to be readable with an average of 14.7 points on the Bezirci-Yilmaz readability score, requiring 14-15 years of education.

Conclusion: The readability of COVID-19-related ocular findings websites was determined to be between 13th and 15th grade students. This level is relatively high when compared to the average education level. Treatment adherence issues may arise as a result of website information written in a language that patients and their relatives find difficult to understand.

Keywords: COVID-19; eye; internet; readability; education.

Özet

Giriş: Bu tek merkezli internet tabanlı çalışmada, COVID-19 ile ilgili oküler bulguların Türkçe web sitelerinde okunabilirliğini belirlemeye amaçlanmıştır.

Gereç ve Yöntem: Google'da "*Koronavirüs gözü etkiler mi*", "*Koronavirüs göz bulguları*", "*COVID-19 ile ilgili oküler belirtiler*" ve "*Koronavirüs gözü enfekte eder mi*" gibi ifadeler aranırken ortaya çıkan ilk 33 web sitesi Türkçe metinler için Ateşman ve Bezirci-Yılmaz tarafından geliştirilen iki ana okunabilirlik skorlama sistemi ile değerlendirildi.

Bulgular: Ateşman'ın okunabilirlik puanı ortalama 47 idi. Buna göre, COVİD-19 ile ilgili oküler bulgular hakkında bilgi veren web sitelerinin 13., 14. ve 15. sınıf öğrencileri tarafından okunabilir olduğu ortaya çıktı. Aynı web siteleri Bezirci-Yılmaz okunabilirlik puanında 14-15 yıl eğitim gerektiren ortalama 14,7 puanla okunabilir bulunmuştur.

Sonuç: COVID-19 ile ilgili oküler bulgular web sitelerinin okunabilirliğinin 13-15. sınıf öğrencileri arasında olduğu belirlenmiştir. Bu düzey, ortalama eğitim düzeyi ile karşılaştırıldığında nispeten yüksektir. Web sitesi bilgilerinin hasta ve hasta yakınlarının anlamakta zorlandıkları bir dilde yazılması sonucunda tedaviye uyum sorunları ortaya çıkabilir.

Anahtar Kelimeler: COVID-19; göz; internet; okunabilirlik, eğitim.

Introduction

Readability refers to the suitability of written texts for a specific educational level or age group. Using scientifically proven methods, it is possible to determine the readability level of a particular text (1-3). In today's clinical practice, the internet is frequently used as a source of information for patients and their relatives. In addition, after consulting with their physicians, patients frequently use the internet to learn more about their diseases and associated treatments. The COVID-19 pandemic has had a global impact (4), not to mention its effects, particularly on ocular health (5-9). As a result, many people have turned to the internet to learn more about the COVID-19 pandemic and its subsequent involvement in various organs. Furthermore, the increased risk of disease transmission, particularly in hospitals, has

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led to the closure of many ophthalmology polyclinics around the world. Consequently, people experiencing ocular problems have been more indirectly encouraged to seek information for diagnosis and treatment via the internet. This study was designed to determine the educational level-based readability of internet websites, which have primarily been used by society as a source of information regarding COVID-19-related ocular findings.

Materials and Methods

Study Design: In this study, no ethics committee approval was required because there were no human or animal experiments. Instead, the readability of COVID-19-related ocular involvement websites was assessed.

Internet-Based Analysis: People do, in fact, use the internet to solve health-related issues. This was also true during the COVID-19 pandemic, when it was thought that COVID-19-infected people or suspects could use the internet to look for information. In this study, the first 50 websites listed on the screen were evaluated after searching Google for phrases such as "*Does the coronavirus affect the eye*," "*Coronavirus eye findings," COVID-19-related ocular manifestations,* and *"Can coronavirus infect the eye."* Websites that only provided information in a foreign language and did not provide information about COVID-19 and ocular involvement despite a thorough search for ocular health were excluded. Websites listed multiple times via sponsored links were only evaluated once, after which 33 websites were eligible for evaluation. The readability level of a written text is generally determined by the number of words in a sentence and the number of syllables in a word. More than 50 scoring systems have been proposed to use such parameters to determine a text's readability level (10). This study ascertains the extent to which the websites that appeared on the screen were frequently created by news from health professionals and newspapers. Each informative text on the websites was transferred to a computer environment's Microsoft Notepad program. Before assessment, portions of websites with advertisements were removed to avoid affecting the readability levels of all informative texts on the websites, that were determined using the readability scoring systems developed for Turkish language by Ateşman (11) and Bezirci-Yilmaz, which have been implemented using computer software developed by Bezirci-Yilmaz (12).

Ateşman Readability Score: This scoring system, which generates a readability score between 0 and 100, is equal to 198.825-40.175 × word length (total syllables/total words)-2.610 × sentence length (total words/total sentences). Texts with a score near 100 are easier to read, while texts with a score near 0 are more difficult. The numerical score obtained determines the readability level of the text based on the individual's education level, as shown below: a) 90-100 points for ≤4th grade students, (b) 80-89 points for 5th-6th grades, (c) 70-79 points for 7-8th grades, (d) 60-69 points for 9th-10th grade, (e) 50-59 points for 11th-12th grade, (f) 40-49 points for 13-15th grade, (g) 30-39 point for undergraduate graduates, and (h) ≤29 point for graduates.

Bezirci-Yilmaz Readability Score: This scoring system computes the number of words in the sentence, the number of syllables in the words, and the word distribution graph based on the number of syllables. The result of this scoring system, which is based on the country's educational system, determines the readability level of a specific text. This equates to 1-8 points for primary education, 9-12 points for high school, 13-16 points for undergraduate, and >16 points for graduate education.

Data Analysis: The Statistical Package for the Social Sciences (SPSS Inc., version 18, Chicago, IL, USA) was used to conduct the statistical analysis. Collected data was analyzed using descriptive statistics (arithmetic mean, median, standard deviation, percentage distributions). The Mann-Whitney U test was used to compare the means of two independent groups. The Spearman test was used to perform correlation analysis. The significance level was set at $p<0.05$.

Results

Websites Readability Scores: The internet websites scored an average of 47.3 points on Ateşman's readability score, corresponding to the average readability level of 13th-15th grade students. Further, these websites were found to be readable by 14th and 15th grade students, scoring 14.7 points on the Bezirci-Yilmaz readability score. The distribution of readability levels of internet websites based on the Ateşman and Bezirci-Yilmaz scores is demonstrated in Table 1. Based on the Ateşman score, there was a predominance of undergraduate student level (13th, 14th, and 15th grade) of readability, whereas the Bezirci-Yilmaz score revealed a readability level associated predominantly with academics (≥16th grade). Moreover, there was a strong negative correlation between Ateşman and the Bezirci-Yilmaz scores ($p<0.0001$, $r=-0.951$).

Table 1: Distribution of readability levels of internet websites based on the Ateşman and Bezirci-Yilmaz scoring systems

Education level	Primary (4, 5, 6, 7, 8)	Secondary (9, 10, 11, 12)	Undergraduate (13, 14, 15)	Academic (≥16)
Ateşman score	1	9	14	9
Bezirci-Yilmaz score	1	7	12	13

Table 2: A comparison of internet websites created by health professionals and those containing newspapers, as measured by the Bezirci-Yilmaz and Ateşman readability scores.

Readability scores	Internet websites	Number of websites	Mean rank	Sum of rank	Z	U	p value
Bezirci-Yilmaz	Health professionals	14	15.54	217.50	-0.747	112.500	0.455
	Newspapers	19	18.08	343.50			
Ateşman	Health professionals	14	18.29	256.50	-0.657	115.000	0.511
	Newspapers	19	16.05	305.50			

Comparative Analysis: Fourteen websites were created by health professionals, that is, physicians and private health care institutions. These websites had readability corresponding to 14.2 years of education based on the Bezirci-Yilmaz score, and 13-15 years of education corresponding to 49 points based on the Ateşman readability score. Nineteen websites had newspapers with readability corresponding to 15.1 years of education based on the Bezirci-Yilmaz score, as well as 13-15 years of education corresponding to 45 points based on the Ateşman readability score. There was no statistically significant difference between websites created by health professionals and newspapers-containing websites (p=0.455, p=0.511), which were assessed using the Bezirci-Yilmaz and Ateşman readability scores (Table 2).

Discussion

This study determined the educational level-based readability of internet websites, which have primarily been used by society as a source of information about COVID-19-related ocular findings. In terms of the development of readability scoring systems, the first system developed by Fresch in 1948, the Flesch Reading Ease Score (FRESH), was calculated using word-to-sentence and syllable-to-word ratios. (13). The Gunning-Fog formula, simply called FOG Index, was developed in 1952 to determine the appropriate age group for a given text by analyzing the length and number of words in the sentence (2). Moreover, Mclaughlin (14) created the Simple Measurement of Goobledygook (SMOG) in 1969 as the readability metric. In this metric system, the number of words in the text with ≥3 syllables is included in the calculation, and the SMOG score is determined by selecting ≥10 sentences from the beginning, middle, and end of the text. These mathematical formulas resulted in the creation of the American educational system's readability score. The American Medical Association and the National Institutes of Health conducted a study in which seven different scoring systems were used, the most prominent of which was the Flesch-Kincaid. It was eventually revealed that consent forms used for invasive procedures had a readability level equivalent to a 15th grade education. Furthermore, the same study found that consent forms used for invasive procedures were extremely difficult to read, despite the fact that the average education level of adults in the United States was determined to be 8th grade. This prompted the American Medical Association and the National Institutes of Health to recommend that consent forms used for invasive procedures in the United States be readable at the grade 6 level or higher (15). Only a few studies on Turkish readability have been published, aside from Turkish internet websites associated to COVID-19-related ocular health. The eye drop prospectuses in the study by Ay et al. (16) were readable by people with an average of 13-15 years of education based on the Ateşman readability score, and by people with an average of 13 years of education based on the Bezirci-Yilmaz readability score. Ebem et al. (17) used Ateşman and Bezirci-Yilmaz scoring systems to analyze 90

different intramuscular and intravenous consent forms and discovered that the readability level of these consent forms was quite low. In addition, Çifçi et al. (19) used the Ateşman and Bezirci-Yilmaz scoring systems to evaluate the readability of substance abuse websites, finding that website texts were readable with an average of 14 years of education, which is consistent with our findings. Tahir et al. (18), on the other hand, evaluated the readability of vertigo websites using the Ateşman and Çetinkaya readability scoring systems, only finding them readable at the 8th and 9th grade levels. Unlike our study, it appears that the websites were much easier to read, possibly due to the use of a different readability scoring system in the preceding study. Panthagani et al. (20) evaluated keratoconus-related websites using English readability scoring systems in which websites were classified as difficult-to-read, and their findings were consistent with ours. Taking all of these findings into account, Turkey's educational level appears to correspond to 6.51 years, implying that websites should be written at the 4th and 5th grade levels. Nonetheless, additional research using a relatively large number of search websites could significantly illuminate this very intriguing internet information era society trend.

Study Limitations:

This study is not without drawbacks. In this study, websites about COVID-19-related ocular health were evaluated using scientifically validated readability scoring systems. People who are worried about their health and search the internet anxiously, on the other hand, may struggle to understand even easily readable texts. The font and point size of the text on the websites evaluated in the study were also ignored; however, reading text written in a small font may be more difficult. More research is needed, particularly on the education level, age, mental health, and visual acuity of internet users seeking health information.

Conclusion

The readability of COVID-19-related ocular involvement information websites corresponded to 13th-15th grade students' educational level. Given the country's average education level, this score seems to be quite high. Treatment adherence issues may arise as a result of the information on the websites being written in a language that patients and their relatives find difficult to understand.

Declarations:

- *Acknowledgments:* None
- *Conflicts of interest:* The authors declare that there is no conflict of interest for this study
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- *Data and Material Availability:* The manuscript contains all data. The datasets used and/or analyzed during the current study, however, are available upon reasonable request from the corresponding author.

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