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What is the readability of information about retinopathy of prematurity on Turkish websites?

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ABSTRACT

Objective: This study aimed to evaluate the readability of Turkish websites related to retinopathy of prematurity (ROP) and to determine whether there is a difference in readability between clinic-hospital websites and public health information websites.

Materials and Methods: The top 100 websites from the Google search "Retinopathy of Prematurity" in Turkish were compiled. The text on each website has been edited to remove unnecessary text. The readability value was used for Turkish.

Results: Fifty-three percent (n=35) of the 66 sites included in the study were clinic-hospital websites. The overall Ateşman and Bezirci-Yılmaz readability values of all sites included in the study were 55±12.7 and 10.6±2 respectively. No statistically significant difference was found between clinic-hospital and public websites in terms of the number of words, characters, difficult words, sentences, average word and sentence lengths, and readability index, except for readability level.

Conclusion: The readability of web-based topics related to ROP was found to be moderate according to Ateşman and at the high school level according to Bezirci-Yılmaz. There was no significant difference between clinic-hospital and public health information websites when compared using scoring systems. The readability of websites providing information about ROP aligns with the average education level in Turkey.

Keywords: Retinopathy of prematurity, Health literacy, Readability, Internet

1. INTRODUCTION

Retinopathy of prematurity (ROP) is a condition characterized by abnormal blood vessel development in the retina of premature infants, which can lead to vision impairment or blindness if not treated promptly [1]. ROP, one of the biggest problems of premature babies, is also an extremely annoying situation for parents. As digital health resources become primary tools for disseminating medical information, the readability of such websites is essential to ensure that users of varying literacy levels and medical backgrounds can understand and utilize the information effectively [2].

There are many studies in the literature that evaluate readability, most of which are in English. There are a few publications in Spanish, German, and Russian that investigate the readability of websites [3,4]. The readability of Turkish materials has also been evaluated in many areas [5-8]. Very few studies in the literature investigate web-based readability concerning newborns and the neonatal period [9]. Effective communication plays a crucial role in healthcare services. In this study, the readability of Turkish ROP-related websites was examined.

2. MATERIALS and METHODS

This study was exempted from the requirement for ethical approval because it was not conducted on humans or animals. In this cross-sectional study, conducted between July 20-22, 2024, searches were performed on Google, the most widely used search engine in Turkey, using the term "Retinopathy of Prematurity" in Turkish. The first 10 pages of search results from each query were collected. Websites with fewer than 100 words of information, those containing scientific articles or advertisements, and those in multimedia formats (e.g., videos) were excluded. Additionally, components of web pages not directly related to patient education, such as author information, copyright notices, disclaimers, acknowledgments, citations, and references, were removed. The remaining websites were categorized into clinic-hospital sites and public health information sites.

The Ateşman formula incorporates the total number of syllables, words, and sentences to determine the readability level of a text (198.825 – 40.175 × (total syllables/total words) – 2.610 × (total words/total sentences) [10]. In Ateşman's readability formula,

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the readability score ranges from 0 to 100, with higher scores indicating greater ease of reading (Table I).

Table I. *The readability defined by Ateşman regarding the readability criterion values [10]and education levels defined by Bezirci and Yılmaz [11]*

The Ateşman value	Readability	Education level (Bezirci-Yılmaz)
1-29	Very difficult	Academic level (+16th grade)
30-49	Difficult	13th-16th grade (Bachelor's degree)
50-69	Moderate	9th-12th grade (Secondary education)
70-89	Easy	5-8th grade (Primary education)
90-100	Very easy	4th grade (Primary education)

In the readability formula developed by Bezirci-Yılmaz, text readability is assessed by the Turkish education system using the specified formula, which relies on computations based on the number of words and syllables within sentences [11]. The word count, character count, number of difficult words, sentence count, average word length, average sentence length, readability index, and reading level were evaluated.

Statistical Analysis

Statistical Package for the Social Sciences version 25 software (SPSS, Chicago, Illinois) was used for data analysis. The categorical and numerical data were shown by using frequency and percentage values. A one-sample t-test was used to evaluate the mean readability level of patient education materials. Statistical significance was determined as $p<0.05$.

3. RESULTS

In the initial 100 search results on Google for the term "Retinopathy of Prematurity," a total of 12 YouTube videos, 12 academic sources, nine websites featuring advertisements, requiring payment, or operating under sponsorship, and one Facebook site were excluded from the study. Of the 66 websites analyzed, 35 were classified as clinical-hospital sites, while 31 were categorized as public health information websites.

The overall readability index and level of all sites were 55±12.7 and 10.6±2, respectively. As shown in Table II, there were no significant differences between the two groups in terms of word count, character count, number of difficult words, sentence count, average word length, average sentence length, and readability index. The reading level was found to be the only variable that showed a significant difference between the groups (p=0.012).

Table II. *Comparison of Turkish clinic-hospital websites and public health information websites on retinopathy of prematurity*

	Clinic-Hospital sites	Public Health Information sites	P
Word count	581.08±429.52	607.9±557.2	0.826
Character count	4452.11±3535.98	4891.25±4753.81	0.675
Number of difficult words	570.6±421.36	594.8±547.9	0.843
Sentence count	48.86±34.52	56.41±48.77	0.475
Average word length	2.81±0.13	2.77±0.18	0.432
Average sentence length	11.87±3.59	11.06±2.13	0.265
Ateşman Readability index	53.44±12.45	56.79±13.06	0.291
Bezirci-Yılmaz Reading level	11.22±2.01	9.96±1.94	0.012

4. DISCUSSION

In this study, we investigated the readability of Turkish websites related to ROP. Table II presents a comparative analysis of the textual attributes of Turkish clinic-hospital websites versus public health information websites regarding ROP. The metrics assessed include word count, character count, number of difficult words, sentence count, average word length, average sentence length, readability index, and reading level.

The average word count for clinic-hospital websites (581.08±429.52) was slightly lower than that for public health information websites (607.9±557.2), although this difference was not statistically significant. Similarly, the character count was lower for clinic-hospital sites (4452.11±3535.98) compared to public sites (4891.25±4753.81), with a p-value of 0.675 indicating no significant difference. The similarity in word and character counts implies that, despite potential differences in focus and detail, the quantity of information on ROP available on both clinic-hospital and public websites was similar. This outcome aligns with findings in the literature suggesting that basic textual features like word and character counts, and sentence structure, often do not significantly vary unless there is a targeted effort to modify these elements [12].

The average number of difficult words was somewhat higher on public websites (594.8±547.9) compared to clinic-hospital websites (570.6±421.36), though this difference was not statistically significant. The presence of difficult words is a critical factor in assessing the accessibility of health information. The similar number of difficult words across both types of websites suggests that specialized terminology was prevalent in the content about ROP, potentially affecting its comprehensibility for lay audiences. This finding underscores the importance of simplifying complex medical jargon to enhance the accessibility of health information, particularly on public websites that aim to reach a broader audience.

The average number of sentences was higher on public websites (56.41±48.77) compared to clinic-hospital websites (48.86±34.52), but this difference was not statistically significant. This suggests that public websites may use a more segmented approach to presenting information. A higher sentence count might facilitate easier navigation and comprehension for users by breaking down information into more digestible parts. However, the absence of a significant difference indicates that the

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overall approach to content segmentation is similar between the two types of websites.

The average word length was slightly shorter on public websites (2.77±0.18) compared to clinic-hospital websites (2.81±0.13), but this difference was not statistically significant. Similarly, the average sentence length was shorter on public websites (11.06±2.13) compared to clinic-hospital websites (11.87±3.59), though this difference was also not statistically significant. Shorter words and sentences are generally associated with better readability and ease of understanding.

The readability index is a key measure of how easily text can be understood. The Ateşman readability index for clinic-hospital websites was 53.44±12.45, while for public websites it was 56.79±13.06. This difference was not statistically significant, indicating that the overall readability of content on ROP was similar between the two website types. These values showed that the readability index of both groups of sites was medium readability. In our study, the reading level of clinic-hospital websites (11.22±2.01) was significantly higher than that of public websites (9.96±1.94), with a p-value of 0.012. This statistically significant difference suggests that clinic-hospital websites present information at a higher reading level compared to public websites. Higher reading levels on clinic-hospital websites likely reflect the use of more technical language and complex descriptions, which may be tailored for healthcare professionals or more informed patients. In contrast, public websites appear to cater to a broader audience by simplifying content to a more accessible reading level, aligning with their goal of reaching the general public. According to data from the Turkish Statistical Institute for the year 2023, the mean years of schooling for the population aged 25 and over is 9.3 years [13]. This data supports that the readability level of public information websites is appropriate for the educational level in Turkey.

In conclusion, readability is a critical factor in the effectiveness of online resources. This study found that Turkish clinic-hospital and public health information websites about ROP had similar word and character counts, number of difficult words, and average word and sentence length. Although the Ateşman readability index was similar and of medium difficulty for both groups of sites, there was a difference between Bezirci-Yılmaz readability levels, and it was found that the public websites were easier to read and were compatible with the year of education in Turkey. Clinic-hospital websites tend to present information at a higher reading level, which may potentially make it less accessible to the general public. However, the readability level remains consistent with the average education level in Turkey. Improving the readability of these websites is essential for ensuring that information is accessible and useful to patients, caregivers, and healthcare professionals. By addressing the issues identified in this study, website developers and health communicators can enhance the quality of digital health resources and support better outcomes for individuals affected by ROP.

Compliance with Ethical Standards

Ethical approval: This study was exempted from the requirement for ethical approval because it was not conducted on humans or animals.

Conflict of interest: The authors declare that there is no conflict of interest.

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Author contibution: SGK: Writing – Original draft, conceptualization, formal analysis, BA: Data collection, data curation, AM: Methodology, supervision, HO: Conceptualization, supervision, HSB: Writing – reviewing and editing. All authors approved the final manuscript.

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