To cite this article: Senoymak MC, Senoymak I. Understanding hypothyroidism: A comprehensive readability survey of health information sources. Turk J Clin Lab 2024; 4: 607-612

Research Article

Understanding hypothyroidism: A comprehensive readability survey of health information sources

Hipotiroidinin anlaşılması: sağlıkta bilgi kaynaklarının okunabilirliğine yönelik kapsamlı bir inceleme

Mustafa Can Senoymak*[1], Irem Senoymak[2]

[1]Department of Endocrinology and Metabolism, University of Health Sciences, Sultan Abdulhamid Han Training and Research Hospital, Istanbul, Turkey,

[2]Department of Family Medicine, Uskudar State Hospital, Istanbul, Turkey.

Abstract

Aim: The objective of this study is to evaluate the readability of Turkish-language online health information on hypothyroidism, a common endocrine disorder and to determine whether this information is sufficiently comprehensible for patients.

Material and Methods: A descriptive document analysis was conducted using the Ateşman readability formula to evaluate the readability of Turkish websites providing information on hypothyroidism. The study analyzed 52 websites, chosen from the first 100 results in Google searches for "What is hypothyroidism?" (in Turkish). The sources of these websites were categorized into health professionals, private institutions, university hospitals, medical laboratories, and others. The average Word length (AWL) and average sentence length (ASL) were calculated for each website, and readability scores were analyzed.

Results: The AWL ranged from 2.64 to 3.17 syllables, and the ASL ranged from 5.2 to 14.2 words per sentence. The average Ateşman readability score was 58.8 ± 6.4, indicating a moderate difficulty level. Of the websites, 86.5% were moderately difficult, 9.6% difficult, and 3.8% easy to read. No significant differences were found between different website sources regarding readability scores ($p > 0.05$).

Conclusion: The study found that Turkish online information regarding hypothyroidism is moderately difficult to read, which may hinder accessibility for individuals with lower educational levels. Simplifying these resources could improve public understanding and patient engagement in managing hypothyroidism.

Keywords: hypothyroidism, readability, health information

Corresponding Author*: Mustafa Can Şenoymak, Department of Endocrinology and Metabolism, University of Health Sciences, Sultan Abdulhamid Han Training and Research Hospital, Istanbul, Turkey,
E-mail:senoymak@gmail.com
Orcid: 0000-0002-1977-5127
Doi: 10.18663/tjcl.1555130
Recevied: 27.09.2024 accepted: 20.12.2024

TJCL Volume 15 Number 4 p: 607-612

Öz

Amaç: Bu çalışmanın amacı, yaygın bir endokrin hastalık olan hipotiroidi ile ilgili Türkçe dilindeki çevrimiçi sağlık bilgilerinin okunabilirliğini değerlendirmek ve bu bilgilerin hastalar tarafından yeterince anlaşılabilir olup olmadığını belirlemektir.

Gereç ve Yöntemler: Bu tanımlayıcı çalışmada, hipotiroidi hakkında bilgi sağlayan Türkçe web sitelerinin okunabilirliği Ateşman okunabilirlik formülü kullanılarak analiz edilmiştir. Çalışmada, Google aramalarında "hipotiroidi nedir" ifadesiyle ulaşılan ilk 100 sonuç arasından 52 uygun web sitesi incelenmiştir. Bu web sitelerinin kaynakları; sağlık profesyonelleri, özel sağlık kurumları, üniversite hastaneleri, tıbbi merkez ve laboratuvarlar ve diğerleri olarak sınıflandırılmıştır. Her web sitesi için ortalama kelime uzunluğu (OSU) ve ortalama cümle uzunluğu (OCU) hesaplanmış ve okunabilirlik puanları analiz edilmiştir.

Bulgular: OSU 2.64 ile 3.17 hece arasında değişirken, OCU cümle başına 5.2 ile 14.2 kelime arasında değişmiştir. Ortalama Ateşman okunabilirlik puanı 58.8 ± 6.4 olup, orta zorluk seviyesini işaret etmektedir. Web sitelerinin %86.5'i orta zorlukta, %9.6'sı zor ve %3.8'i kolay olarak sınıflandırılmıştır. Farklı web sitesi kaynakları arasında okunabilirlik puanları açısından anlamlı bir fark bulunmamıştır ($p > 0.05$).

Sonuç: Bu çalışma, hipotiroidi ile ilgili Türkçe çevrimiçi bilgilerin orta derecede zor olduğunu ve bu durumun düşük eğitim seviyesine sahip bireyler için erişilebilirliği sınırlayabileceğini göstermiştir. Bu kaynakların sadeleştirilmesi, halkın anlayışını ve hastaların hipotiroidi yönetimine katılımını artırabilir.

Anahtar Kelimeler: hipotiroidizm, okunabilirlik, sağlık bilgisi

Introduction

Advancements in information technologies and the increasing prevalence of internet usage have significantly improved access to health-related information. Research conducted by the Turkish Statistical Institute on internet usage rates among individuals aged 16 to 74 years have shown a rapid annual increase, reaching 72.9% in 2019. This study has also found that the most common purpose for using the internet, at a rate of 69.8%, is searching for health-related information [1]. Additionally, international studies corroborate that the internet is the primary resource for individuals seeking medical information, with approximately 85% of patients engaging in online research about health conditions prior to consulting with a physician [2,3].

In terms of health-related content, the readability of the information is as crucial as its reliability and comprehensibility [4]. Readability refers to the ease with which a reader can understand written text [5]. Various methods, formulas, and indexes are utilized in readability analyses, with commonly preferred formulas including the SMOG-Simple measure, Gunning-Fog index, Flesch-Kincaid grade level, and the ARI-Automatic Readability Index. For Turkish texts, the Ateşman readability index, tailored to the linguistic structure and based on average word and sentence lengths, is especially notable [6,7]. According to the Ateşman readability index, texts rated between 90-100 are considered very easy, 70-89 easy, 50-69 of medium difficulty, 30-49 difficult, and 1-29 very difficult to understand [8] (Table 1).

Table 1. Readability Classification According to the Ateşman Readability Formula

Readability Level	Score Range
Very Difficult	1-29
Difficult	30-49
Moderate	50-69
Easy	70-89
Very Easy	90-100

Hypothyroidism is a commonly encountered chronic disease in the general population, with its prevalence, including subclinical forms, reaching up to 12%, and it is more frequently observed in women [9]. The symptoms of hypothyroidism, such as weight gain, fatigue, sleep and mood disturbances, and constipation, are commonly observed. Hypothyroidism is a condition that is susceptible to misinformation, requiring significant patient involvement in its treatment and a substantial need for accurate information. Therefore, as a readily accessible source of information, itis critically important that internet content on hypothyroidism is accurate, reliable, and readable.

This study aims to assess the readability levels of written content on online platforms regarding hypothyroidism and to examine how comprehensible this information is to the general population.

Material and Methods

This study is a descriptive research based on document analysis conducted to assess Turkish content related to patient education and information on hypothyroidism. It is based on

publicly available information, does not include human subjects or patient data, and therefore does not require ethical approval.

For this study, the search phrase used to access Turkish websites offering information on hypothyroidism was determined by selecting “Türkiye” as the location in Google Trends. The most frequently used search term identified in Google Trends for hypothyroidism was " what is hypothyroidism "in Turkish (as “hipotiroidi nedir”). Searches were conducted using the term "what is hypothyroidism" on Google between August 14 and 17, 2024, by a single researcher using a single computer, after setting the search parameters to the Turkish language and location in Turkey. The first 100 web pages from the top 10 search result pages were included in the study. The sources of these texts were categorized into health professionals, private health institutions, university hospitals, medical laboratories or centers, and others.

Only publicly accessible Turkish websites that provide information on hypothyroidism without requiring membership were included. Websites that required membership, mandated cookie settings acceptance, offered only video content instead of written text, were not in Turkish, did not contain information about hypothyroidism, were promotional for specific products, or contained texts shorter than 20 sentences, as well as academic articles, forum sites, sites designed for health professionals, commercially oriented sites, sites with product advertisements, and sites with repetitive content were excluded from the study.

The texts from the included websites were transferred to a free online readability calculator (http://okunabilirlikindeksi.com/) that uses the Ateşman readability formula to determine their readability levels. This calculation engine utilizes the Flesch readability formula, adapted to Turkish by Ateşman in 1997 [8]. This formula estimates the readability levels of texts based on the total number of syllables, words, and sentences. The detailed formula is as follows: Readability Score = 198.825 - 40.175 × (total syllables/total words) - 2.610 × (total words/total sentences).

The Ateşman Readability Formula considers groups of words ending with a period (.), question mark (?), exclamation point (!), or ellipsis (…) as sentences. Sequential clauses separated by commas (,) are treated as a single sentence. The average word length (AWL) is calculated by taking the mean number of syllables per word, while the average sentence length (ASL) is determined by the mean number of words per sentence. Using the Ateşman Readability Formula, readability scores between 1 and 100 are obtained. These scores are categorized into five distinct readability levels. Details of the Ateşman readability classification are presented in Table 1. In this study, the number of sentences, words, and syllables were calculated according to the formula, and the data were recorded in a Microsoft Excel file. Readability levels for each text were scored and classified according to the Ateşman formula.

Statistical Analysis

Statistical analyses were conducted using SPSS 24 (SPSS Inc., Chicago, IL, USA). The Kolmogorov-Smirnov test was employed to assess the normality of distributions. Based on the assessment of normal distribution, descriptive statistics were presented as medians with interquartile ranges. For comparisons involving more than two groups where quantitative variables did not follow a normal distribution, the Kruskal- Wallis test was utilized. A significance level was set at $p < 0.05$ for all statistical tests.

Results

Of the initial 100 websites evaluated, 52 met the inclusion criteria. Upon examining the sources of the texts included in the study, 40% were authored by health professionals, 31% by private health institutions, 13% by medical laboratories or medical centers, 6% by university hospitals, and 10% by other sources. The distribution of websites according to the institutions hosting them is illustrated in Figure 1.

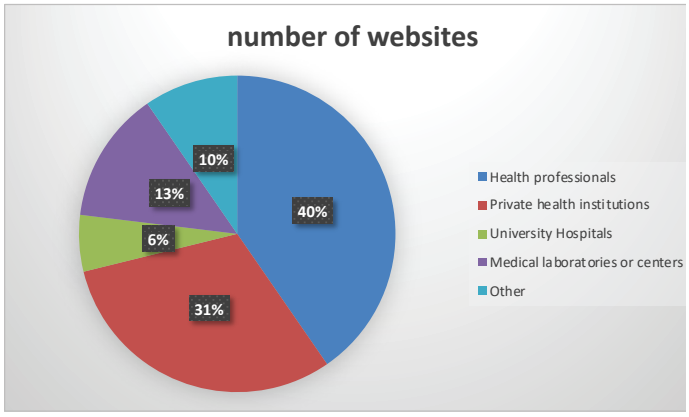

Figure 1. Number of Websites by Hosting Institutions

The AWL values of the websites included in the study ranged from 2.64 to 3.17, while the ASL varied between 5.2 and 14.2, as determined by the Ateşman readability formula. The average Ateşman readability score was found to be 58.8 ± 6.4. According to the findings aligned with the Ateşman readability index, 9.6% of the websites were categorized as difficult, 3.8% as easy, and 86.5% as moderately difficult. No websites were found with very easy or very difficult readability levels. Readability values for each of the five groups are presented in Table 2. Our study found no significant differences in AWL, ASL, or readability scores among the website sources ($p = 0.699, 0.093, 0.161$).

Table 2: Median Readability and Statistical Analysis of Websites by Source			
	Websites	Median (Interquartile Interval)	P
AWL	University hospitals	2.89 [2.89-2.91]	0.699
	Other	2.76 [2.76-2.89]	
	Medical laboratories or centers	2.85 [2.8-2.91]	
	Private health institutions	2.91 [2.85-2.95]	
	Health professionals	2.89 [2.8-2.93]	
ASL	University hospitals	11.3 [10.25-11.6]	0.093
	Other	6.9 [5.9-7.4]	
	Medical laboratories or centers	9.2 [8.35-9.65]	
	Private health institutions	8.55 [8.1-10.4]	
	Health professionals	9.5[8-11.4]	
Readability Value	University hospitals	53.2 [52.45-55.15]	0.161
	Other	67.3 [61.6-68.6]	
	Medical laboratories or centers	60.3 [55.1-64.55]	
	Private health institutions	59.6 [54.65-61.6]	
	Health professionals	58.7 [54.5-62.1]	
AWL: Average Word length ASL: average sentence length. Statistical significance was set at $p < 0.05$.			

Discussion

This study is significant as it is the first to analyze the readability of Turkish-written texts on the internet concerning 'hypothyroidism' a condition frequently encountered in our country. Our findings revealed that the average readability level of the texts is of moderate difficulty (58.8±6.4), and no significant differences were found in readability levels between different sites and author groups.

The advancements brought by modern technology have greatly facilitated access to information. This ease of access lays the groundwork for individuals to seek answers to health-related questions through online platforms before consulting a health professional [10]. Studies indicate that more than 70% of adults acquire health information from the internet, and over 30% attempt to diagnose a health condition on their own or for someone they care for [11]. As a result, an increasing number of doctors and health professionals are sharing health-related content online. Patients access this information using search engines, which influences their adherence to treatment processes. It is well-known that information obtained from accessible and reliable sources positively supports the patient's treatment journey [12]. The educational level of readers is a determining factor in the comprehension of texts; there is a linear relationship between reading and comprehension levels [13,14]. Especially for online health publications, aligning with the literacy levels of the community is essential for ensuring text comprehensibility [4]. According to Ateşman, the average sentence length in Turkish is 9–10 words, and the average word length is 2.6 syllables [8]. It has been reported that enhancing the readability of health-related information should involve limiting sentences to 8-10 words and using simpler terms instead of complex medical jargon [15]. In our study, the average word length was found to be 2.89 syllables, and the average sentence length was 9.05 words, aligning with the expected values.

The 2011 Human Development Report indicated that the average duration of education for individuals aged 15 and above was 6.5 years; similarly, the other study conducted in 2018-2019 reported an average of 8.2 years. More recently, studies conducted in 2023 found that the average education duration for adults over the age of 25 was 9.3 years, which remains below the level of high school education [16-18]. Studies suggest that for individuals without medical training to comprehend medical content, the readability of such texts should be at a 6th grade level or lower [19]. Given this, the need for informative texts to be written in a clear and simple language becomes evident.

The increasing prevalence of hypothyroidism in older adults, the extensive considerations required for using levothyroxine sodium in medical treatment (including the timing of intake, interactions with other medications and food), and the critical need to understand the symptoms that can occur from incorrect dosing all highlight the necessity for easily accessible and understandable texts about hypothyroidism [9]. Additionally,

the need for a diet alongside medical treatment further emphasizes the importance of such information. Considering the literacy levels of our country's readership, the readability of texts available online is of paramount importance.

In the literature, numerous studies have used the Ateşman scale to evaluate the readability of web-based informative texts concerning medical conditions. Similar to our results, a study by Otu et al., which assessed 80 websites related to fibromyalgia, found the readability index to be at a moderate level [20]. In another study on colorectal cancer, the median Ateşman readability score was determined to be 50.81, indicating a moderate level of readability; no significant differences were found in readability among the classified website sources [21]. In the study by Sezin and colleagues, 73 websites concerning hoarseness were evaluated, and the Ateşman readability score was found to be 62.3, also at a moderate level [22]. Although a study examining web-based texts on dizziness found the readability score to be 72.3, indicating an easy readability level, no statistically significant differences were observed when the texts were classified according to their sources [23].

When examined according to the sources of the websites, it is encouraging to find that readability levels are generally similar and that authors with academic titles also share texts that are of a moderate level of readability. This situation facilitates patients' access to reliable information; however, it is observed that all sites are comprehensible to individuals with at least a middle school education. Nevertheless, considering the literacy levels in our country, there is a need to further simplify these texts to ensure they are accessible to a broader audience, including those with basic educational backgrounds.

While studies on the reliability of online resources in Turkey are lacking, research examining the readability and reliability of online information regarding hypothyroidism and hyperthyroidism in English and Spanish has revealed that the sources generally demonstrate poor readability and reliability [24].

This study has several limitations. One primary constraint is that the Ateşman formula relies solely on written texts and does not assess comprehensibility. Traditional readability formulas, such as those developed by Ateşman (1997) and Bezirci-Yılmaz (2010), are based on superficial features of texts (syllable, word, and sentence lengths) and do not fully reflect their comprehensibility. For instance, if valid and reliable Turkish versions of tools like the Patient Education Materials Assessment Tool (PEMAT) are developed, future studies could evaluate comprehensibility alongside readability [25]. Additionally, since the Ateşman formula is limited to counting syllables, words, and sentences, it may be inadequate for measuring the readability of visual materials, such as graphics and tables [26]. The most recent formula for assessing Turkish readability was developed in 2010, and since then, efforts have been ongoing to create new scales that can more comprehensively and accurately evaluate the readability and comprehensibility of Turkish texts. In a similar vein, a study has taken steps toward developing an artificial intelligence-based readability formula for the Turkish language [27]. Future research should focus on creating more comprehensive assessment tools that include the readability of tables, graphics, and other visual content.

Conclusion

This study highlights the essential need for readily understandable and accessible information on hypothyroidism. The findings indicate a moderate level of readability across different online sources discussing hypothyroidism and suggest that while health information is somewhat accessible, there is room for improvement to better meet the needs of the general population.

Conflict of Interest/ Funding

Authors declare no conflict of interest.

This study received no financial support.

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