

# Readability Analysis of Turkish Patient Informing Texts about Teeth Whitening on the Internet: Cross-Sectional Study

## İnternet Ortamında Diş Beyazlatma ile İlgili Türkçe Hasta Bilgilendirme Metinlerinin Okunabilirlik Analizi: Kesitsel Çalışma

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### ABSTRACT

**Objective:** Considering that the texts presented on the internet will be read by people of very different education levels, it is important to examine the readability of these texts. The aim of this study was to evaluate the readability analysis of Turkish patient information texts about teeth whitening on the internet.

**Method:** A Google search using the term “Teeth Whitening” revealed the top 100 websites. Turkish patient information texts on the 86 websites included in this study were evaluated according to the Atesman Readability Index. The information texts originated from dentists, specialist dentists, private health institutions, university hospitals, and newspapers. The Kolmogorov–Smirnov test and descriptive statistics were used for statistical evaluation. Statistical significance level was accepted as  $P < .05$ .

**Results:** Atesman Readability Index score was  $59.08 \pm 8.14$ . According to the findings obtained in the research, 0% of the websites examined were rated as very easy, 7% as easy, 86% as moderately difficult, 5.8% as difficult, and 1.2% as very difficult. When the readability levels of the texts were examined according to grade levels, the following was found: 43% were grades 11th–12th, 43% grades 9th–10th, 7% grades 7th–8th, and 5.8% grade associate degree.

**Conclusion:** The readability of Turkish texts on teeth whitening on the internet was found to be of medium difficulty. When creating texts for the internet about teeth whitening, it would be beneficial to make them easier to read by using readability programs before they are published.

**Keywords:** Access to information, dentists, internet, teeth whitening

### ÖZ

**Amaç:** İnternette sunulan metinlerin çok farklı eğitim seviyesindeki kişiler tarafından okunacağı düşünüldüğünde bu metinlerin okunabilirliğinin incelenmesi önemlidir. Bu çalışmanın amacı, internet ortamında diş beyazlatma ile ilgili Türkçe hasta bilgilendirme metinlerinin okunabilirlik analizlerinin değerlendirilmesidir.

**Yöntem:** “Diş Beyazlatma” terimini kullanan bir Google araması, en iyi 100 web sitesini ortaya çıkardı. Bu çalışmaya dahil edilen 86 internet sitesinde yer alan hasta bilgilendirme metinleri Atesman Okunabilirlik İndeksi'ne göre değerlendirildi. Bilgilendirme metinleri diş hekimleri, uzman diş hekimleri, özel sağlık kuruluşları, üniversite hastaneleri ve gazetelerden alındı. İstatistiksel değerlendirme için Kolmogorov-Smirnov testi ve tanımlayıcı istatistikler kullanıldı. İstatistiksel anlamlılık düzeyi  $P < .05$  olarak kabul edildi.

**Bulgular:** Atesman Okunabilirlik İndeksi puanı  $59.08 \pm 8.14$  bulundu. Araştırmada elde edilen bulgulara göre; incelenen web sitelerinin %0'ı çok kolay, %7'si kolay, %86'sı orta derecede zor, %5,8'i zor ve %1,2'si çok zor düzeyde olduğu bulundu. Metinlerin okunabilirlik düzeyleri sınıf düzeylerine göre incelendiğinde; %43'ü 11-12. sınıflar, %43'ü 9-10. sınıflar, %7'si 7-8. sınıflar, %5,8'i ön lisans sınıf derecesinde olduğu bulundu.

**Sonuç:** İnternette diş beyazlatma ile ilgili Türkçe metinlerin okunabilirliği orta zorlukta bulunmuştur. İnternette diş beyazlatma ile ilgili metinler oluşturulurken yayınlanmadan önce okunabilirlik programları kullanılarak daha kolay okunabilir hale getirilmesi faydalı olacaktır.

**Anahtar Kelimeler:** Bilgiye erişim, diş hekimleri, internet, diş beyazlatma

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## INTRODUCTION

Since the 1990s, the use of the internet as a resource used to both publish and obtain health advice or information has been growing.<sup>1</sup> As a result, it has become easier for internet users to access information on health and other matters.<sup>2</sup> The internet offers rich information on many subjects, and its omnipresence in daily life has resulted in it becoming a common source of information for many users. Thanks to the internet, the opportunity to access information has increased exponentially, and almost all the services that people need are covered in digital media.<sup>3</sup> While the rate of internet usage in Turkey was 82.6% in 2021 for individuals in the 16–74 age group, it was 85.0% in 2022, according to the Turkish Statistical Institute (TUIK).<sup>4,5</sup> It has been reported that doing research on the internet provides people with the opportunity to obtain more information, support communication with their physician, and enable them to make more informed decisions about their treatment.<sup>6</sup>

Advances in media technologies have reshaped today's patient–health relationship, and this has enabled the use of digital health technology by all types of patients and in all areas of health services.<sup>3</sup> However, the internet offers its readers both true and false (fake) information. In a previous study, the difficulties of accessing accurate and reliable information on the internet were mentioned.<sup>7</sup> There are no regulations regarding the sources that upload information on the internet, but there are also no mechanisms in place to check the accuracy or usefulness of the information.<sup>8</sup> However, although the reliability and accuracy of health-related information found on the internet is of primary importance, it is also essential that the information is readable and understandable for a wide range of users.

Users who procure health information from the internet must have digital skills and be able to understand the information they read in order to improve their health.<sup>9</sup> The text should be easy for the user to read and fully comprehend.<sup>10</sup> Richards and Schmidt defined readability as the measure of how easily the text can be read and understood; they focused on the variables that determine readability, such as average sentence length, number of words contained in the sentences, and the complexity of the language used.<sup>11</sup> Various formulas are used in readability analysis, and many have been developed, including the Gunning Fog value, the Simple Measure of Gobbledygook (SMOG) measurement, Automatic Readability Index (ARI), and Flesch–Kincaid value.<sup>12</sup> The Atesman Readability Index was developed in accordance with the Turkish language structure.<sup>13,14</sup>

Today, with the increase in personal aesthetic concerns, the frequency of visiting a dentist with a tooth discoloration concern is increasing. A whitening treatment is a more conservative approach than other restorative treatments.<sup>15</sup> As teeth whitening treatments become more readily available, many patients request this cosmetic treatment. It is critical that patients are adequately informed before receiving these treatments, and the use of the internet may be a suitable option in raising public awareness, since texts containing sufficient, understandable information are accessible to the general public. Considering that most of the information on the internet is in a text format, it is important that the reader can easily read the text about teeth whitening. Considering that the texts presented on the internet will be read by people with different education levels, it is important to examine the readability of these texts. Therefore, the aim of this study was to evaluate the readability analysis of patient information texts about teeth whitening on the internet. The hypothesis of the study was that the readability analysis of Turkish patient information texts about teeth whitening on the internet was very easy.

## METHOD

In the current study, informative articles about teeth whitening which are available to the public on easily accessible websites were evaluated. Therefore, ethics committee approval was not required. To identify written texts about teeth whitening, a single researcher searched the internet using the keyword “Teeth Whitening” with the Google (Google LLC, Mountain View, CA, USA) search engine in February 2023. The top 100 websites appearing in the search results were recorded. Except for languages other than Turkish, websites for commercial and advertising purposes, videos, academic articles, websites that can be accessed with registration and payment, social media, book content, websites for the education of dental professionals, websites describing patient experiences, and appointment sites held. In this study, websites concerning patient information and education about teeth whitening were included. According to author sources, the texts on 86 websites that met the inclusion criteria: dentist, specialist dentist, private health institution or private oral and dental health center, university hospital, and newspaper sources were evaluated. To determine the readability level, text contents were transferred to the free online readability calculation engine using the Atesman Readability formula.<sup>13</sup> The data obtained were then transferred to a Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

Flesch's Reading Ease classification was used as a basis for the development of the Atesman formula. The values ranged from 90–100 for students from grades 4th and below; from 80–89 for grades 5th–6th; from 70–79 for grades 7th–8th; from 60–69 for grades 9th–10th; from 50–59 for grades 11th–12th; from 40–49 for grades 13th–15th (associate degree); by undergraduate graduates; 29 and below that indicates that it is easily understood by postgraduate graduates.<sup>12,13</sup>

### Statistical analysis

IBM SPSS Statistics V22.0 (IBM, Armonk, NY, USA) statistical package software was used for data analysis. Within the scope of the study, the normal distribution of the data was determined using the Kolmogorov–Smirnov test. The obtained results were presented as the mean, standard deviation, median, minimum, and maximum values. Readability Index value was classified according to the Atesman Readability Index classification.

## RESULTS

When the included studies were examined with respect to the source of the texts, it was determined that 7% of the sources were dentists, 4.7% specialist dentists, 83.7% private health institutions, 2.3% the university hospitals, and 2.3% newspapers (Figure 1). None of the data showed normal distribution (Table 1). Linguistic statistics are shown in Table 2. The mean number of words was  $760.67 \pm 712.39$ . The average number of characters was  $5,929.6 \pm 5,607.06$ . The average number of difficult words was  $743.7 \pm 703.34$ . The average number of unique words was  $426.13 \pm 271.25$ . The average number of short words was  $151.62 \pm 144.16$ . The average number of characters without spaces is  $5,146.55 \pm 4,888.24$ . The average number of sentences was  $69.39 \pm 61.59$ . The average number of paragraphs was  $31.10 \pm 21.36$ . The average word length was  $2.75 \pm 0.1$ . The average sentence length was  $11.21 \pm 2.73$ . The mean Atesman Readability Index was  $59.08 \pm 8.14$  (Table 2). The readability level of the examined websites is presented in Figure 2, based on the Atesman readability classification (Table 3) in line with the Atesman Readability Index values. According to the results in this study, 0% of the websites were very easy, 7% easy, 86% moderately difficult, 5.8% difficult, and 1.2% very difficult (Figure 2). When the readability levels of the texts were examined, 43% of the texts were at the grades

11th–12th readability level, 43% were at grades 9th–10th, 7% were at grades 7th–8th, 5.8% were at grades associate degree, and 1.2% were at grade degree (Table 4).

**Table 1.** Normality test results (Kolmogorov-Smirnov)

	Statistic	df	P
Number of word	0.221	86	.000
Number of characters	0.217	86	.000
Number of difficult words	0.228	86	.000
Number of unique words	0.194	86	.000
Number of short word (<5 characters)	0.217	86	.000
Number of characters without spaces	0.219	86	.000
Number of sentences	0.227	86	.000
Number of paragraph	0.129	86	.001
Average word length	0.102	86	.027
Average sentence length	0.160	86	.000
Atesman readability index	0.103	86	.024

**Table 2.** Linguistic statistics of website texts

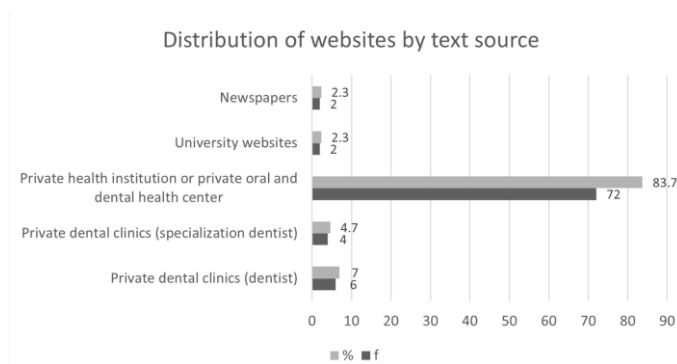
	n	Minimum	Maximum	Median	Mean	Std. Deviation
Number of word	86	128	5983	575.5	760.67	712.39
Number of characters	86	1,034	47,571	4,573.5	5,929.6	5,607.06
Number of difficult words	86	128	5,919	562	743.7	703.34
Number of unique words	86	106	2207	366.5	426.13	271.25
Number of short word (<5 characters)	86	18	1180	113	151.62	144.16
Number of characters without spaces	86	903	41,583	3981	5,146.55	4,888.24
Number of sentences	86	11	511	56.5	69.39	61.59
Number of paragraph	86	4	117	26	31.1	22.36
Average word length	86	2.52	3.01	2.76	2.75	0.1
Average sentence length	86	7.8	29.9	11.05	11.21	2.73
Atesman Readability Index	86	9.9	72.4	59.95	59.08	8.14

**Table 3.** According to Atesman readability index range readability classification

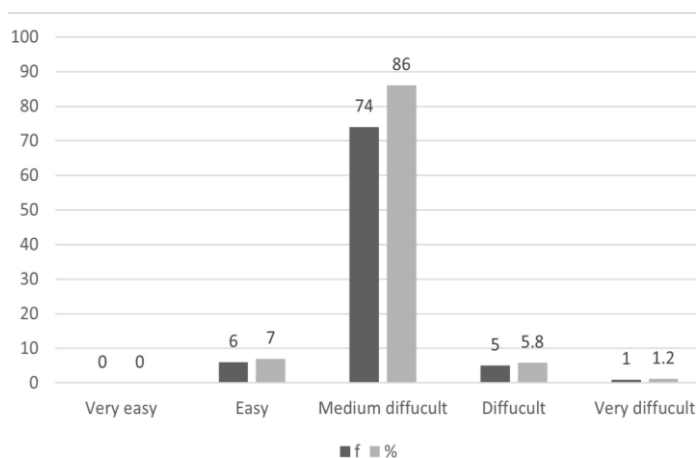
	Atesman Readability Index Range
Very easy	90-100
Easy	70-89
Medium difficult	50-69
Difficult	30-49
Very difficult	1-29

**Table 4.** Readability at grade level

	f	%
Grade 7-8	6	7.0
Grade 9-10	37	43.0
Grade 11-12	37	43.0
Associate degree	5	5.8
Graduate degree	1	1.2



**Figure 1.** Distribution of websites by text source



**Figure 2.** Readability level of websites (according to Atesman index classification)

## DISCUSSION

The tested hypothesis was rejected as it was found that the readability analysis of Turkish patient information texts about teeth whitening on the internet was not very easy.

Since restorative dental treatment is a specialty that aims to rehabilitate patients both aesthetically and functionally and includes very different treatment plans, it is natural for patients to want to research this subject because they have questions and expectations about their own treatment. The increase in information sharing via the internet and patients' ability to directly ask questions of their dentists allow patients to more effectively research teeth whitening treatments. In the study, it was determined that the websites that provide information about teeth whitening in Turkish should be of medium readability difficulty, and that people who want to get information from in these websites should have a level of education.

Conducting health-related research can have a positive effect on people's health-related behaviors.<sup>16</sup> However, it is also important that the information obtained by people doing research on health is comprehensible. Because information presented about teeth whitening contains scientific language, it may be difficult for people who have no knowledge of dentistry to understand it.

In determining the readability of a text, Flesch's Ease of Reading formula was used for texts in English, an analytical language, while the Atesman readability formula was developed for texts in Turkish.<sup>13</sup> Since only Turkish texts were evaluated in our study, the Atesman readability formula was used. When the Atesman readability formula values were examined, it was found that the average readability for the 86 websites was  $59.08 \pm 8.14$ . According to the readability index of this value was 11th–12th of the texts. It can be understood by individuals in the class of degree range. This finding is similar to those of previous studies in the field of dentistry in Turkey.<sup>12,17</sup> However, one study reported that the average education grade level in Turkey was 6.51.<sup>18</sup> Accordingly, it would be appropriate to prepare these websites, which are to provide information, in a way that could be understood by a grade 5th individual. The preparation of informative articles without considering the average education level of individuals living in Turkey negatively affects the readability level.<sup>19</sup> Informative articles sometimes consist of lengthy sentences and contain a large number of scientific terms, and these are factors that negatively affect readability level.

The patient may forget the information given to them after talking to the doctor,<sup>20</sup> and patients may want to do internet research to refresh their memory.<sup>19</sup> One study concluded that 75% of people who received health-related information verifying the credibility of the source of this information.<sup>21</sup> However, as the websites are difficult to read and cannot be understood by some patients, they may turn to photographs on the website. Individuals who try to evaluate photographs without properly understanding the text may have misconceptions about their own treatment.<sup>19</sup> Therefore, it is important to have general information texts that are accessible to people on the internet and are prepared using plain language that patients can understand.

Google was the only search engine used for our study, as it is the most commonly accessed search engine in Turkey. The use of other search engines in Turkey is quite low compared with Google usage.<sup>22</sup> In the present study, the majority of the text resources on the websites by private health institutions, followed by dentists and specialist dentists, respectively. In some of the private health institutions examined, the author of the text was not specified, but even in cases where the author was specified, credit was given to the source of the website in the evaluation. In other words, even if the author on the website of the private health institution was a dentist or a specialist dentist, the source of that site was considered a private health institution.

To the best of our knowledge, the present study is the first to examine the readability of Turkish texts on teeth whitening. However, as in all studies, there are some limitations. Since commercial websites were not included in the study, brand names were not included in the keywords. In addition, the findings are valid for a limited population as this study was conducted only on websites in Turkey using the Google search engine and with Turkish keywords. No research was done using other search engines. Factors such as type size, font, and text color of the analyzed texts were not included in the evaluation. In addition, the research was conducted within a specific time period. Considering that the internet environment is continuously evolving, new websites may have been prepared or updates may have been made to existing websites. In addition, it would be beneficial if future studies are conducted to evaluate the effect of reader characteristics on readability.

## CONCLUSION

Our findings indicate that the readability of Turkish internet texts about teeth whitening is of medium difficulty. We found that the readability of the texts that were accessible via the internet and aimed to provide information to the patients was at various levels and ranged from easy to very difficult. Particular attention should be paid to ensure that the information is easy to read and can be understood by readers of different education levels. In addition, for readers who want to obtain further information, it will be useful to show the source of the information presented. This can be beneficial in terms of making the texts on the internet about teeth whitening easier to read by using readability programs before they are published.

**Etik Komite Onayı:** Çalışmada herkesin kolaylıkla erişebileceği internet sitelerinde kamuya açık olan diş beyazlatma ile ilgili bilgilendirici metinler değerlendirilmiştir. Bu nedenle etik kurul onayına gerek duyulmamıştır.

**Hasta Onamı:** Herkesin kolay erişilebileceği internet sitesinde kamuya açık olduğu için hasta onamına gerek duyulmamıştır.

**Hakem Değerlendirmesi:** Dış bağımsız.

**Yazar Katkıları:** Fikir – M.F.; Tasarım – M.F.; Denetim - M.F.; Kaynaklar – M.F.; Malzemeler – M.F.; Veri Toplanması ve/veya İşlemesi – M.F.;

Analiz ve/veya Yorum - M.F.; Literatür Taraması - M.F.; Yazan – M.F.; Eleştirel İnceleme – M.F.

**Çıkar Çatışması:** Herhangi bir çıkar çatışması bulunmamaktadır.

**Finansal Destek:** Bu çalışma için herhangi bir finansman sağlanmamıştır.

**Ethics Committee Approval:** In the study, the informative text about teeth whitening that are available to the public on the websites that everyone can easily access were evaluated. Therefore, ethics committee approval was not required

**Informed Consent:** Patient consent is not required as it is publicly available on the website where everyone can easily access it.

**Peer-review:** Externally peer-reviewed

**Author Contributions:** Concept – M.F.; Design – M.F.; Audit – M.F.; Sources – M.F.; Materials – M.F.; Data Collection and/or Processing – M.F.; Analysis and/or Interpretation - M.F.; Literature Review – M.F.; Writing – M.F.; Critical Review – M.F.

**Conflict of Interest:** There is no conflict of interest..

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## REFERENCES

1. Beck F, Richard JB, Nguyen-Thanh V, Montagni I, Parizot I, Renahy E. Use of the internet as a health information resource among French young adults: results from a nationally representative survey. *J Med Internet Res*. 2014;16(5):e128.
2. Bujnowska-Fedak MM. Trends in the use of the Internet for health purposes in Poland. *BMC Public Health*. 2015;15:194.
3. Ekinci Y, Tutgun-Unal A, Tarhan N. A Literature review on digital health literacy. *BAYTEREK | Int Academic Res*. 2021;4(2):148–165.
4. TÜİK.(İnternet).[https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilim-Teknolojileri-\(BT\)-Kullanim-Arastirmasi-2021-37437](https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2021-37437). Access date: 05.02.2023
5. TÜİK.(İnternet).[https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilim-Teknolojileri-\(BT\)-Kullanim-Arastirmasi-2022-45587](https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2022-45587). Access date: 05.02.2023
6. Tan SSL, Goonawardene N. Internet health information seeking and the patient-physician relationship: A systematic review. *J Med Internet Res*. 2017;19(1):e9.
7. Gokay GD, Gorurgoz C. Laminate veneer: A quality assessment of Turkish-Written internet information. *Turkiye Klinikleri J Dental Sci*. 2021;27(4):660-666.
8. Yeap CK, Slack-Smith LM. Internet information on child oral health and the first dental visit. *Aust Dent J*. 2013;58(3):278–282.
9. Wångdahl J, Dahlberg K, Jaensson M, Nilsson U. Arabic version of the electronic health literacy scale in Arabic-Speaking individuals in Sweden: Prospective psychometric evaluation study. *J Med Internet Res*. 2021;23(3):e24466.
10. Cheng C, Dunn M. Health literacy and the Internet: a study on the readability of Australian online health information. *Aust N Z J Public Health*. 2015;39(4):309–314.
11. Richards JC ve Schmidt R. Longman dictionary of language teaching and applied linguistics. London: Longman. 4th Ed. 2010. p:482. Available from: [https://www.academia.edu/44568181/Longman\\_Dictionary\\_of\\_Language\\_Teaching\\_and\\_Applied\\_Linguistics](https://www.academia.edu/44568181/Longman_Dictionary_of_Language_Teaching_and_Applied_Linguistics)
12. Akbulut AS. İ Readability analysis of information on the internet about clear aligner treatment. *NEU Dent J*. 2022;4(1):7–11.

13. Atesman E. Measuring readability in Turkish. *AU Tömer Lang J.* 1997;58:71–74.
14. Coban A. The review towards the concept of redeability. *J Lang Lit Educ.* 2014;9:96–111.
15. Ozduman ZC, Celik C. Tooth discolorations and bleaching treatments. *7tepeklirik.* 2017;13(1):37–44.
16. Jayaratne YSN, Anderson NK, Zwahlen RA. Readability of websites containing information on dental implants. *Clin Oral Implants Res.* 2014;25(12):1319–1324.
17. Ozmen EE. Readability and contents evaluation o patient informing texts on orthognathic surgery in Turkish websites: Methodological study. *Turkiye Klinikleri J Dental Sci.* 2023;29(1):1–6.
18. Yesilyurt ME, Karadeniz O, Gülel FE, Çağlar A, Uyar SG. Mean and expected years of schooling for provinces in Turkey. *PJESS.* 2016;3(1):1–7.
19. Degirmenci K. Evaluation of readability levels of Turkish internet sites providing information about dental prosthesis: A qualitative research. *Turkiye Klinikleri J Dental Sci.* 2022;28(4):905–912.
20. Basaran MM, Kuzucu I. The comparison of the readability of rhinoplasty information texts on surgeons web site between different specialisations. *Turkiye Klinikleri J Med Sci.* 2019;39(3):304–309.
21. Dilaver E, Kılınc DD, Dilaver E, Kılınc DD. Evaluation of quality and reliability of websites about orthognathic surgery using Google Trends™ application. *APOS Trends Orthod.* 2020;10(1):46–49.
22. <https://gs.statcounter.com/browser-market-share/all/turkey>. Access date: 05.02.2023.