

MEDICAL AND HEALTH SCIENCES

EDITED BY

Assist. Prof. Dr. Seyhan ANKAYA

AUTHORS

Prof. Dr. İhsan BAKIR

Assist. Prof. Dr. Burhanettin UYSAL

Assist. Prof. Dr. Glay EKİNCİ

Assist. Prof. Dr. Glcan BAĐEİOĐLU TURAN

Assist. Prof. Dr. Kevser TURAL

Assist. Prof. Dr. Neslihan TEKE

Assist. Prof. Dr. Seyhan ANKAYA

Assist. Prof. Dr. Zlfnaz ZER

Dr. Sevin AKAY

Nurse Tlay AKSOY

Midwife Mine TIRPAN



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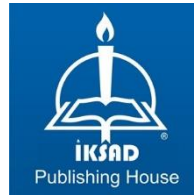
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Assist. Prof. Dr. Zülfünaz ÖZER

Dr. Sevin AKAY

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CHAPTER 1

ANALYSIS OF THE INFORMATION CONTENT AND READABILITY OF TURKISH WEB PAGES RELATED WITH COVID-19

Assist. Prof. Dr. Zülfünaz ÖZER¹, Assist. Prof. Dr. Neslihan TEKE²,
Assist. Prof. Dr. Gülcan BAHÇECİOĞLU TURAN³

¹İstanbul Sabahattin Zaim University, Faculty of Health Sciences, Department of Nursing, İstanbul, Turkey, zulfinazoyer@gmail.com

²İstanbul Sabahattin Zaim University, Faculty of Health Sciences, Department of Nursing, İstanbul, Turkey, neslihanteke@gmail.com

³Firat University, Faculty of Health Sciences, Department of Nursing, Elazığ, Turkey, glcnbah@hotmail.com

INTRODUCTION

The internet, which provides the opportunity to adapt to the rapidly developing world and learn correct information more quickly, is an indispensable element in the life of today's people (Kozanhan & Tutar, 2017). According to the data of Digital 2019, the rate of internet use is 72% in Turkey (Datareportal, 2019). The main purposes for the emergence of the internet include facilitating information and accessing information easily, cheaply, quickly and safely. It has been reported that the increase in the use of computer and smart phones has caused the internet to spread much faster than estimated (Arısoy, 2009). There was a 9% increase in the rate of internet users in 2019 when compared with the year before. It has been reported that individuals spend an average of 7 hours a day on the internet and that the rate of smart phone use is 77% (Datareportal, 2019). With the internet becoming more widespread, a large number of individuals refer to the information pages on the internet for health-related decisions (Kozanhan & Tutar, 2017). According to TÜİK 2016 data, the frequency of searching health information on the internet for any reason is 65.9%. In a study conducted by Beck et al., it was reported that 48.5% of the individuals used the internet to access health information and that they found the information on websites accurate and reliable (Beck et al., 2014). In a study conducted on elderly individuals, it was found that while 43.8% of the participants used the internet to access health information the most; television, newspapers and health magazines ranked the second in the search of information (Medlock et al., 2015). In another study conducted, it was found that

more than half of the individuals who reported that they used the internet in the field of health used the information they obtained from these websites to make medical decisions (Fox & Jones, 2009).

Patient information texts presented on the internet can be used to help patients by explaining the indications, benefits and possible risks of medical practices (Strachan et al., 2012). In a study conducted, it was found that the individuals used the internet most frequently to get information about the symptoms they experience, the course of their disease, treatment options, to obtain additional information about drugs and about how to deal with the side effects and to get information about practical care and nutrition/exercise (Medlock et al., 2015). In a different study, it was found that getting health information through the internet was beneficial in individuals' evaluating their health and managing health-related problems (Ahmad, Hudak, Bercovitz, Hollenberg, & Levinson, 2006). In addition, it has been shown that patient information texts can be effective in solving health problems with their benefits such as providing communication between the patient and healthcare personnel and facilitating the compliance of the patient to the treatment (Ritterband, Thorndike, Cox, Kovatchev, & Gonder-Frederick, 2009). However, since the value of information is limited with the ability of patients to comprehend this, the "readability" and "understandability" of this information on the internet is as important as reliability and up-to-datedness (Finnie, Felder, Linder, & Mullen, 2010).

Readability is defined as the texts' being easy or difficult to comprehend by the readers and it is reported as an objectively measurable concept (Eker, Tüzün, Aytar, & Daşkapan, 2013). According to the studies conducted on the relationship between readability and the ability to understand, it has been found that the comprehension rate of the reader increased as the suitability of the text to the reader's level increased. In other words, there is a linear relationship between reading level and comprehension level (DuBay, 2004; Wang, Miller, Schmitt, & Wen, 2013). While a text's being difficult makes reading difficult, its being easy reduces the interest in reading. For these reasons, training materials should be prepared taking into account the characteristics of the target group (Huang et al., 2015).

The main criteria used in evaluations made in terms of texts' being easy or difficult to understand are parameters such as sentence length, word length, and number of syllables in the word. Concrete-abstract words, compound-simple words, affixes and phrases can also be listed in addition to these three parameters (Boztaş et al., 2014). With these parameters, many different proportional values/readability formulas have been developed by researchers. By using these formulas developed, the level of education required to comprehend the information in the text is described (DuBay, 2004). Fry Readability Formula, Flesch–Kincaid Readability Formula, Flesch Reading Ease Test (FRES), Simple Measure of Gobbledygook (SMOG), Gunning Fog index and Dale Cale formula are some of the frequently used

international tools. Ateşman readability formula and Bezirci–Yılmaz readability formula are formulas designed to find out the readability levels of Turkish texts (Orgun & Akkoç, 2020). The American National Institute of Health recommends complex medical information to be written in an effective way to maximize comprehension and in a way suitable for a six-year long or less level of education since approximately 40% of American population have insufficient health literacy (Finnie et al., 2010). The American National Institute of Health, American Medical Association (Walsh & Volsko, 2008) and U.S. Department of Health and Human Services (U.S. Department of Health and Human Services, 2010) recommend patient information materials to be written at 4th and 6th grade reading level; while Centers for Disease Control Prevention recommended readability to be lower than 8th grade reading level (Centers for Disease Control Prevention, 2018). Studies conducted show that if the content of information exceeds an average reading level of 7th grade, it will not be very possible for consumers to understand (Walsh & Volsko, 2008).

The present age, which is called the information age, provides easy access to information thanks to the internet, while at the same time it has prepared the ground for the formation of information stacks. Considering that there are about 500 million websites, it will be easier to understand the level of information pollution. In the process of reaching information through the internet, the masses that turn into

user and participation from audience-listener begin to prefer stacks of information the sources of which are unknown (Yüksel, 2014).

COVID-19, which has spread to all continents except Antarctica since its appearance in late 2019, is a health crisis that reveals the contemporary situation of the world in 21st century. While this health crisis continues, states all around the world are fighting with all their power to slow down the spread of the disease by taking various economic, social and political measures (UNDP Turkey, 2020). As a result of the restricted freedom of individuals during COVID-19 pandemic days, and due to fear of being sick and losing the loved ones, health anxiety levels increase (Tutku, Iliman, & Dönmez, 2020). During the pandemic, various kinds of information have been included on the web pages designed to inform the society about COVID-19. However, in order for informative texts on web pages to be beneficial to individuals, they should be prepared at a level appropriate to the education level of the readers. Since the value of information is limited to the ability of readers to comprehend it, the readability and understandability of this information on the internet is very important (Deniz, Kozanhan, Tutar, & Özler, 2020). In the light of all this information, it is important for healthcare personnel who are obligated to provide health education to society to follow these developments and to be aware of how individuals can benefit from the web environment. It is thought that examining the websites that provide health information to the society will be beneficial especially during this period of COVID-19 pandemic. The present study was conducted

to examine the information content quality and readability of Turkish web pages related with COVID-19.

1. METHOD

In this descriptive study, the first 100 websites accessed in the search conducted in May 2020 by using the key words “COVID-19”, “COVID-19 and disease”, “COVID-19 and treatment” in the Google search engine were evaluated. Commercial blog sites, sites including ads, sites including only pictures or videos, chat sites, forum sites, magazine sites, sites which were not informing the society and sites with less than 100 words were excluded from the study. The sample of the study consisted of 38 websites. Information content of the web pages was evaluated with Quality of Criteria for Consumer Health Information (DISCERN) measurement instrument, readability levels were evaluated with Flesch Reading Ease Test (FRES), Ateşman readability formula and Bezirci–Yılmaz readability formula.

1.1. Quality of Criteria for Consumer Health Information (DISCERN)

DISCERN was developed by Charnock et al. (1999) to evaluate the content and quality of education material. Turkish validity and reliability study of DISCERN was conducted by Gökdoğan (2003). DISCERN includes 16 questions about the content of the material. While the first part consisting of eight questions evaluates the reliability of the material, the second part consisting of seven

questions measures the quality of the information provided about the treatment/care options and the third part consisting of one question makes an overall evaluation of the material. In DISCERN, each question is scored from 1 to 5 and "5" indicates the appropriateness of the material, while "1" indicates its inappropriateness. By adding the responses to each item, a score between 15 and 75 is obtained. Item 16 which gives the overall evaluation is evaluated separately. A low score in the evaluation shows poor quality, while a high score shows good quality.

1.2. Readability Measurement

Information texts in the websites included in the research were transferred to Microsoft Word program separately and author information, titles, website URLs and links were removed to prevent readability evaluation results from being affected. The texts edited in Microsoft Word were transferred to computer software program developed by Bezirci-Yılmaz. The data transferred to software program were used in the calculation of readability values of FRES, Ateşman and Bezirci-Yılmaz formulas.

Flesch Reading Ease Test (FRES) was published in 1948 by Flesch. The readability test gives numerical data about how easily readable and understandable the prepared content is and which age groups can understand it easier. For example, in Flesch Reading Ease Test, a paragraph of 100 words is chosen, total number of words, syllables and sentences is calculated and reading ease score is calculated according to the following formula.

Flesch Reading Ease Formula= $206.835 - 1.015 \times (\text{number of words/number of sentences}) + 84.6 \times (\text{number of syllables/number of words})$

A high score found with this test shows that the prepared content can be read easily, while a low score shows that the content is difficult to understand. The FRES score obtained can be converted into an approximate level of education. In FRES formula, if the readability score of a text is between 90 and 100, it is defined as “very easy” at 5th grade level; if it is between 80 and 89, it is defined as “easy” at 6th grade level; if it is between 70 and 79, it is defined as “fairly easy” at 7th grade level; if it is between 60 and 69, it is defined as “standard” at 8th-9th grade level; if it is between 50 and 59, it is defined as “fairly difficult” at 10th-12th grade level; if it is between 30 and 49, it is defined as “difficult” at university level and if it is between 0 and 29, it is defined as “very confusing” at university graduate level (The Flesch Reading Ease Readability Formula <http://www.readabilityformulas.com/flesch-reading-ease-readability-formula.php>).

Ateşman Readability Formula, which was defined by Ateşman in 1997, was developed with the adaptation of Flesch Reading Ease formula based on the length of words and sentences.

Readability score= $198.825 - 40.175 \times (\text{total number of syllables/total number of words}) - 2.610 \times (\text{total number of words/total number of sentences})$.

In Ateşman formula, the readability of the text is defined as “very easy” when the score is between 90 and 100, as “easy” when the score is between 70 and 89, as “moderate” when the score is between 50 and 69, as “difficult” when the score is between 30 and 49 and “very difficult” when the score is between 1 and 29 (Ateşman, 1997).

Bezirci Yılmaz Readability Formula ; Bezirci Yılmaz Readability Formula was developed in 2010 based on the characteristics of different readability formulas developed so far and the statistical characteristics of Turkish. Two features are especially emphasized in the use of this new formula. The first of these features is average sentence lengths, while the second is the number of syllables. The number of words in sentences affects the readability of that text.

$$\sqrt{OKS \times ((H3 \times 0,84) + (H4 \times 1,5) + (H5 \times 3,5) + (H6 \times 26,25))}$$

OKS: Average number of words

H3: Average number of words with 3 syllables

H4: Average number of words with 4 syllables

H5: Average number of words with 5 syllables

H6: Average number of 6 or more words

According to this formula, readability level of texts decrease as the number of words in sentences decrease in texts. Similarly, the increase in word length also makes the readability of words and sentences more difficult. The readability score from this formula corresponds to

grades in Turkish education system. Level of education shows “primary education” for grades 1-8; “secondary education (high school) for grades 9-12; “university” for grades 12-16 and “academic education” level for grades 16 and higher (Bezirci & Yılmaz, 2010).

Data Analysis

Descriptive statistics of the categorical data in the study were shown by using frequency and percentage values, while numerical data were shown by using averages and standard deviation. SPSS 25.00 (IBM Inc, USA) software was used for data analysis.

2. RESULTS

38 web pages which met the inclusion criteria were evaluated. No application was found on any of the web pages where users could interact and make suggestions.

The quality of information, reliability and general evaluation of the content of web pages were evaluated by using DISCERN measurement instrument. Table 1 includes each item of DISCERN, score averages of websites and standard deviations. The first, second, third and sixth questions in the first part of the measurement instrument which evaluated the reliability of web pages had the highest average. In the second part in which the quality of the content of web page was evaluated, question 15 was found to have the highest score average. The average of the third part in which the overall

quality of the web page was evaluated was found as 3.1 ± 0.7 out of 5 (Table 1).

Table 1. DISCERN score averages of Websites

	Ave±sd
PART 1	
1. Is the purpose of the Web page clear?	4.8±0.4
2. Can these purposes be achieved?	4.7±0.5
3. Is the Web page relevant with the subject?	4.9±0.1
4. Are the resources used in the preparation of Web page clearly stated?	1.7±1.3
5. Is the date of the information reported or used on the website clearly stated?	2.4±1.9
6. Is the information provided on the website consistent and unbiased?	4.9±0.1
7. Does the Web page give details about additional information or support resources?	1.5±1.1
8. Does the Web page mention any ambiguous aspects?	2.7±1.2
PART 2	
9. Is it described how each treatment is applied?	2.5±1.3
10. Does it describe the benefits of each treatment?	1.5±0.9
11. Does it describe the risks of each treatment?	1.2±0.5
12. Does it describe what will happen if treatment is not given?	1.4±0.8
13. Does it describe how treatment options affect quality of life?	1.4±0.8
14. Is it explained that there may be more than one treatment options?	2.1±1.2
15. Does it provide support for the patient to decide?	3.1±1.0
PART 3	
16. What is the overall evaluation of the web page?	3.1±0.7

Table 2 includes the score averages of DISCERN measurement instrument and its sub-dimensions. It was found that average score taken from the first part of DISCERN measurement instrument (reliability of the material-8 items) was 28.0 ± 3.8 , while the average score taken from the second part (treatment/care options) was 13.5 ± 5.1 and the average score taken from the third part in which the overall quality of the web page was evaluated was 3.18 ± 0.7 . Total average score of the websites according to DISCERN measurement instrument was 41.5 ± 7.35 .

Table 2. Score averages of DISCERN Measurement Instrument and Sub-scores

DISCERN Score	Score range	Ave \pm sd
Items 1-8	8-40	28.0 \pm 3.8
Items 9-15	7-35	13.5 \pm 5.1
Items 16	1-5	3.18 \pm 0.7
Total Score	15-75	41.5 \pm 7.35

Readability average of all websites in the study was found as 24.54 ± 4.7 “very difficult” and at university graduate level according to FRES readability value; as 53.27 ± 9.3 and “fairly difficult” according to Ateşman’ readability value. Bezirci-Yılmaz’s readability value was found as 14.35 ± 3.05 at university level.

3. DISCUSSION

The results obtained as a result of the analysis of research data were discussed in the light of the related literature.

In the web pages evaluated in the study, no applications were found where users could interact and make suggestions. In a study conducted by Moick and Terlutter (2012), it was shown that with the use of the internet for communicating with patients, control visits of patients decreased, chronic disease management improved and the attitudes of patients and physicians for online communication changed positively. Laugesen et al. (2015) showed that when the physician was consulted through the internet, patients' fears decreased, adaptation to the proposed treatment program improved and the consultancy given through the internet closed the information gap between the physician and the patient.

Online communication opportunity on web pages will enable individuals to access more reliable information about health.

In the first part of our study in which the reliability of the material was evaluated according to DISCERN measurement instrument, score average was found as 28.0 ± 3.8 ; in the second part in which treatment/care options were evaluated, score average was found as 13.5 ± 5.1 and in the third part in which the overall quality of the web page was evaluated, score average was found as 3.18 ± 0.7 . In a study in which the quality of web pages developed about childhood epilepsy was analysed by using DISCERN measurement instrument, 50

websites were reached and it was found that only 9.6% of these websites had good reliability, 7.2% had good quality information about treatment options and 21.5% had good quality of content (Cerminara, Santarone, Casarelli, Curatolo, & El Malhany, 2014).

In our study, total score of the websites according to DISCERN measurement instrument results was found as 41.5 ± 7.35 . In DISCERN measurement instrument, total score being 40 and higher shows that the content of the material developed is good (Tirlapur, Leiu, & Khan, 2013). According to this result, it can be seen that the information quality, content and reliability of the website is high. In their study which evaluated the usability of 22 websites developed about childhood asthma, Banasiak and Meadows-Oliver (2017) used the 6-item short version of DISCERN measurement instrument in which the total score ranged between 6 and 30. As a result of this, it was found that the average score of the websites evaluated was 17.32 ± 6.71 . In their study which evaluated the quality of web pages developed for informing patients about tonsillectomy and sleep apnoea by using DISCERN measurement instrument, Chi et al. (2017) found that the average score of websites was 60.5 ± 12.3 . In a study in which 421 websites about systemic lupus erythematosus were evaluated in terms of quality, reliability and readability, it was found that DISCERN score ranged between 19 and 75 and average score was 47.7 ± 13.2 (Reynolds, Hoi, & Buchanan, 2018). The results of the study are similar to the results in literature.

In our study, it was found that readability value was 24.54 ± 4.7 at “very difficult” level and at a level university graduates could understand according to Flesch Reading Ease (FRES) formula. In their study they evaluated the online patient training materials of ophthalmology associations, Huang et al. (2015) found readability value as 40.7 according to FRES formula; in their study they evaluated the readability of internet based patient training materials for parathyroid surgery, Patel et al. (2015) found readability value as 42.8 ± 16.3 according to FRES formula; in their study they evaluated the readability of internet based patient training materials for endoscopic sinus surgery, Cherla et al. (2012) found readability value as 47.1 ± 13.4 , at “difficult” and university level according to FRES formula. In their study, Banasiak and Meadows-Oliver (2017) found readability value as 53.57 ± 15.03 , at 10-12th grade level and as “fairly difficult” according to FRES formula. Although the study results are different from the literature, it was found that the websites examined were found to be in higher levels than the recommended education level.

In our study, Ateşman’s readability value was found as 53.27 ± 9.3 and at “fairly difficult” level. In their study they evaluated the readability of patient information texts provided in internet websites in the field of anaesthesiology, Kozahan and Tutar (2017) found Ateşman readability value as 48,9 (45,2-53,1) for spinal and epidural anaesthesia and as 42,9 (38,9-48,6) for general anaesthesia. According to this result, average readability range was found as “difficult” for

both anaesthesia types. In their study they evaluated the readability of informed consent forms used for emergency procedures, Sönmez et al. (2018) found Ateşman readability value as 62.7 ± 9.8 and at “fairly difficult” level. In their study they evaluated the readability of patient training materials about breast cancer, Aksoy et al. (2019) the readability of websites as “fairly difficult” according to Ateşman readability formula. In a study in which the readability of online texts about autism spectrum disorder was evaluated, Kara (2019) found readability value as 43.72 ± 1.45 and at “difficult” level according to Ateşman readability formula. In their study they evaluated the readability and content of patient information texts related with lymphedema published on internet websites, Tolu and Basım (2018) found readability value of websites as 58.81 ± 10.88 and at “fairly difficult” level according to Ateşman readability formula. In their study they evaluated the readability of intravenous and intramuscular injection approved consent forms, Ebem et al. (2019) found readability value of all consent forms as 56 (50–60) and as “fairly difficult” according to Ateşman readability formula. In their study they evaluated the readability of Turkish internet websites about substance abuse, Çifci et al. found readability value as $46,03\pm 11,67$ and at “difficult” level. In their study they evaluated the readability and content of internet information texts about triple test, Deniz et al. (2020) found readability value as 57.6 (53.9-61.9) and at “fairly difficult” level according to Ateşman readability formula. In their study they evaluated the readability of pre-anaesthesia existing informed consent forms, Boztaş et al. (2014) found Ateşman

readability value as 33.2 (26.0-37.0) and at “difficult” level. The result of the study was found to be similar with the literature.

In our study, Bezirci-Yılmaz’s readability value was found as 14.35 ± 3.05 at university level. In Kozahan and Tutar’s (2017) study, Bezirci-Yılmaz readability value was found as 15,0 (12,7-15,9) for general anaesthesia and as 12,5 (11,3-14,0) for spinal and epidural anaesthesia. With this formula, it was found that the texts prepared for both anaesthesia types required “university graduate” education level according to the education system of our country. In Sönmez et al.’s (2018) study, Bezirci-Yılmaz readability value was found as 10 ± 1.12 at “high school” level. In Aksoy et al.’s (2019) study, “secondary (high school)” level was found according to Bezirci-Yılmaz readability formula. In Kara’s study (2019), Bezirci-Yılmaz readability value was found as $14.68 \pm 0,52$ requiring “university graduate” education level. In Tolu and Basım’s (2018) study, Bezirci-Yılmaz readability value was $11.47 \pm 3,48$ at “secondary (high school)” level. In Ebem et al.’s study readability value of all consent forms was found as 2,93 (2,85–2,99) at “secondary (high school)” level according to Bezirci-Yılmaz readability formula. In Çifci et al.’s study (2020) Bezirci-Yılmaz readability value was found as $14,04 \pm 4,12$ at “university graduate” level. In Deniz et al.’s study (2020) Bezirci-Yılmaz readability value was found as 12.27 (10.83-13.90) at “university graduate” level. Although study results were found to be different from the literature, it was found that the websites

examined were found to be in higher levels than the recommended education level.

4. CONCLUSION

It was found that web pages had moderate level of quality and their readability was difficult at a level individuals with university education level could understand. It was found that the readability level of websites related with COVID-19 were much higher than the recommended level. Providing information with clear, understandable and appropriate reading level will contribute to the development of communication between healthcare professionals and individuals. It is recommended to revise the existing information texts according to readability criteria and to develop new texts which the general population will understand.

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