



Evaluation of Readability of Turkish Websites on Obesity and Bariatric Surgery

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ABSTRACT

Objective: This study aimed to investigate the readability levels and contents of Turkish websites on obesity and bariatric surgery.

Methods: A search was performed in June 2019 with the words "obesity" and "bariatric surgery" in Google's search engine. We evaluated the websites on the first ten pages of Google's search engine results. Commercial websites, advertisement websites, chat websites, forum websites, magazine websites, websites containing only images or videos, and websites with less than ten sentences were excluded. Ateşman and Bezirci-Yılmaz's readability formulas were used to analyze the readability level. Websites were evaluated in terms of content (definition, risk factors, complications, and treatment of obesity) and were divided into three groups (Group 1: hospitals and specialist physicians, Group 2: national news websites, and Group 3: other websites).

Results: A total of 79 websites were evaluated. There were 43 (54.4%) websites in Group 1, 25 (31.6%) websites in Group 2, and 11 (13.9%) websites in Group 3. The readability level of all sites was 'difficult,' according to the Atesman readability formula, and at 'undergraduate level,' according to the Bezirci-Yılmaz readability formula. When the contents of these websites were examined, 51.9% contained a definition of obesity, 7.6% contained information on waist circumference, 12.7% contained obesity risk factors, and 43.0% contained obesity-related diseases.

Conclusion: This study revealed that the readability level of Turkish websites on obesity and bariatric surgery was above the average literacy level of the Turkish people. Furthermore, it determined that these websites did not provide adequate information about bariatric surgery risks, adverse effects, and contraindications.

Keywords: Obesity, bariatric surgery, readability, internet

1. INTRODUCTION

Obesity is one of the most critical health problems in all societies. With the rapid change of lifestyle in Turkey, obesity has become an increasing and health-threatening problem (1). The Turkish Diabetes Epidemiology Study-I (TURDEP-I) conducted among 24,788 adult Turkish people in 540 centers found that the prevalence of obesity was 22% (30% for females and 13% for males) (2). The Turkish Diabetes Epidemiology Study-II (TURDEP-II) involving 26,499 adult Turkish people also found that the prevalence of obesity was 31.2% (44% for females and 27% for males) (3). The results of TURDEP-I and TURDEP-II have demonstrated that the prevalence of obesity in Turkey has increased by 41% in the past 12 years (46% for females and 107% for males). Obesity has become a big problem not only for adults but also for children in our country. According to Turkey Nutrition and

Health Survey data, the prevalence of obesity in children and adolescents was 8.5% (4).

Diet, exercise, cognitive behavioral therapy and pharmacotherapy are methods used in obesity treatment. In cases where these treatment methods fail, bariatric surgery is a treatment option required to reduce obesity-related morbidity and mortality and to improve organ function (5). A body mass index (BMI) greater than 40 kg/m^2 or a BMI greater than 35 kg/m^2 plus the presence of at least one obesity-related comorbidity (such as hypertension, diabetes mellitus, dyslipidemia, sleep apnea syndrome, nonalcoholic steatohepatitis, asthma) is an indication for bariatric surgery (6). The use of bariatric surgery has increased, especially in parallel with the increased rate of morbid obesity (7). It has

increased by 85.1% from 1998 to 2013 worldwide. As a result, the number of physicians and medical centers interested in bariatric surgery is increasing in our country (8). This is related to the fact that non-surgical treatment methods used in obesity are insufficient to improve mortality and morbidity rates and show that bariatric surgery's incidence is gradually increasing.

As in the whole world, internet usage is growing, especially with the growth in smartphone usage in our country. According to the data released by the Turkey Statistical Institute in 2019, the internet usage rate was 18.7% in illiterates, 87.3% in primary school graduates, 94.5% in high school graduates and 98% in university graduates and over. The same data also showed that the number of people using the internet to search for health-related information was 69.3% (9).

Although internet usage seems to be a practical, easy and inexpensive method for obtaining information on diseases, medicines, and surgical methods, there are marked difficulties in understanding the obtained health information. One of the most important reasons for this is the readability level of health-related websites. Readability is defined as that texts are easy or difficult to understand by the reader and is an objectively measurable concept (10). Average word length, word frequency, number of words with more than one syllable, average sentence length, and number of words with more than one meaning affect the readability level (11). Even though many formulas are used to determine the readability level of texts, many have been developed for English texts. Studies show that the formulas developed for determining the readability level of English texts are insufficient in determining the readability level of Turkish texts (10,12). Atesman (13) and Bezirci-Yilmaz's (14) readability formulas are often used to measure the readability level of Turkish texts.

This study aimed to examine the readability levels of Turkish websites on obesity and bariatric surgery according to Atesman and Bezirci-Yilmaz readability formulas and evaluate the contents of these websites.

2. METHODS

The Hamidiye Scientific Research Ethics Committee approved this descriptive study of the University of Health Sciences (Decision Date: 13/06/2019 and Decision No: 48929119/774).

A search was performed in June 2019 by typing the words "obesity" and "bariatric surgery" in Google's search engine (<https://www.google.com>). We evaluated the websites on the first ten pages of Google's search engine results. Commercial websites, advertisement websites, chat websites, forum websites, magazine websites, websites containing only images or videos, and websites with less than ten sentences were excluded from the study. Informational texts on the websites were transferred to the "Microsoft Word" program. Training titles, author information, URLs, addresses, and links were deleted not adversely to affect readability results.

Atesman and Bezirci-Yilmaz's readability formulas were used to calculate the readability level of Turkish websites on obesity and bariatric surgery. According to the institutions and organizations that prepared them, these websites were divided into three groups (Group 1: hospitals and specialist physicians, Group 2: national news websites, and Group 3: other websites).

2. 1. Bezirci-Yilmaz Readability Formula

This formula was developed in 2010 based on the features of various readability formulas developed until that day and the statistical properties of the Turkish population (13). Two features are especially emphasized in the use of this new formula. They are the average sentence length and the average number of syllables. A large or small number of words in sentences affects the readability of texts. On the other hand, increased length of sentences in texts and increased number of syllables in words reduce the readability of texts.

This formula is as follows:

NRV:

$$\text{NRV} = \sqrt{\text{ANW} \times ((H3 \times 0.84) + (H4 \times 1.5) + (H5 \times 3.5) + (H6 \times 26.25))}$$

NRV: New readability value

ANW: Average number of words

H3: Average number of 3-syllable words

H4: Average number of 4-syllable words

H5: Average number of 5-syllable words

H6: Average number of words with 6 or more syllables

This formula explains readability levels of texts by corresponding to a certain grade level according to the education system in our country: 1-8: primary school; 9-12: secondary school (high school); 12-16: undergraduate, and ≥16: higher education (13).

2. 2. Atesman Readability Formula

It was adapted into Turkish from Flesch's Reading Ease Formula by Atesman (1997) and is a formula based on word and sentence length (14). This formula gives a score on a scale ranging from 0–100; 90-100: very easy, 70-89: easy, 50-69: moderate, 30-49: difficult, and 1-29: very difficult.

Readability Score = $198,825 - 40,175 \times (\text{total number of syllables}/\text{total number of words}) - 2,610 \times (\text{total number of words}/\text{total number of sentences})$

2. 3. Content Evaluation of Texts

The texts were evaluated regarding whether they contained information about the definition of obesity, waist circumference, body mass index, obesity risk factors,

obesity-related diseases when to treat obesity, obesity treatment options, medical nutrition, physical activity, cognitive behavioral therapy, and pharmacological treatment. In addition, they were evaluated in terms of whether they contained information about contraindications for surgical treatment, surgical treatment methods, complications of surgical treatment, and postoperative nutrition.

2. 4. Statistical Analysis

While categorical data were expressed as frequency and percentage, numerical data were expressed as mean \pm standard deviation (SD). The Shapiro-Wilk test was used to assess whether the data were normally distributed. While the Kruskal-Wallis test was used to compare numerical data between independent groups, the Chi-square test was used to compare categorical data between independent groups. All statistical analyzes were performed bi-directionally at the 5% significance level and the 95% confidence interval. The SPSS® 21 (IBM Inc, USA) software was used to analyze the data.

3. RESULTS

A total of 79 websites from 325 websites were determined to meet the inclusion criteria. There were 43 (54.4%) websites in Group 1, 25 (31.6%) websites in Group 2, and 11 (13.9%) websites in Group 3. The mean \pm SD number of sentences was 70.04 ± 7.43 (min: 15, max: 430). The mean \pm SD number of words was 977.78 ± 99.502 (min: 228, max: 5193). The mean \pm SD number of letters was 6182.89 ± 588.47 (min: 1466, max: 34162). The mean \pm SD number of syllables in each word was 2.86 ± 0.3 (min: 1, max: 3.17). The mean \pm SD number of words in each sentence was 13.89 ± 0.32 (min: 5.86, max: 24.04). The mean \pm SD number of words with 4 or more syllables in each sentence was 4.48 ± 0.13 (min: 1.43, max: 8.80). The mean \pm SD Atesman and Bezirci-Yilmaz readability values were 45.95 ± 1.12 (min: 15.96, max: 76.54) and 14.34 ± 0.36 (min: 5.57, max: 26.04), respectively. Therefore, the readability level of the websites was "difficult," according to the Atesman readability formula.

There were no statistically significant differences in the mean Atesman and Bezirci-Yilmaz readability values ($p=0.169$ and $p=0.273$, respectively), the average number of words with 4 or more syllables in each sentence ($p=0.327$) and the average number of syllables in each word ($p=0.395$) between the three groups (Table 1).

When the readability levels of the websites were examined according to the Atesman readability formula, 5 (6.3%) were 'very difficult,' 47 (59.5%) were 'difficult,' 26 (32.9%) were 'moderate,' and 1 (1.3%) was 'easy.' There was no statistically significant difference in the readability levels of the websites according to the Atesman readability formula between the three groups ($p=0.211$) (Table 2).

The contents of the website were analyzed, and we found the definition of obesity, information on waist circumference,

body mass index, obesity risk factors and obesity-related diseases as 41 (51.9%), 6 (7.6%), 45 (57.0%), 10 (12.7%), and 34 (43.0%), respectively. In addition, 50 (63.3%) contained when to treat obesity, 78 (98.7%) contained obesity treatment options, 26 (32.9%) contained medical nutrition, 25 (31.6%) contained physical activity, 8 (10.1%) contained cognitive behavioral therapy, and 16 (20.3%) contained pharmacological treatment. While all websites gave information about bariatric surgery, only 6 (7.6%) contained contraindications for surgical treatment, 60 (75.9%) contained surgical treatment methods, 22 (27.8%) contained complications of surgical treatment and 23 (29.1%) contained postoperative nutrition.

Table 1. Comparison of readability values of groups

	Group 1 n=43 Mean \pm SD	Group 2 n=25 Mean \pm SD	Group 3 n=11 Mean \pm SD	p
Atesman readability value	44.03 \pm 1.37	48.98 \pm 2.29	46.55 \pm 2.74	0.169
Bezirci-Yilmaz readability value	14.86 \pm 0.45	13.66 \pm 0.76	13.87 \pm 0.87	0.273
Average number of words with 4 or more syllables in each sentence	4.64 \pm 0.15	4.22 \pm 0.28	4.47 \pm 0.34	0.327
Average number of syllables in each word	2.90 \pm 0.01	2.86 \pm 0.01	2.69 \pm 0.24	0.395

SD: standard deviation, n: number; Kruskal-Wallis test

Table 2. Evaluation of readability intervals of groups according to the Atesman readability formula

Readability intervals according to the Atesman readability formula	Group 1 n=43 n (%)	Group 2 n=25 n (%)	Group 3 n=11 n (%)	p
Very difficult + difficult	32(74.4)	14(56.0)	6(54.5)	0.211
Moderate + easy	11(25.6)	11(44.0)	5(45.5)	

n: number; Chi-square test

4. DISCUSSION

Obesity is a significant health problem because it increases the frequency of cardiovascular diseases, dyslipidemia, type 2 diabetes mellitus, stroke, gallbladder diseases, osteoarthritis, sleep apnea syndrome, and cancer types. Obesity and its related diseases have not only biological effects but also psychosocial and economic effects on human life. It has been determined that obese people consult a doctor more often, have a more extended hospital stay, and take more drugs than ordinary people (5). In order to effectively combat obesity, the frequency of which is increasing in our country, it is necessary to ensure that individuals gain healthy habits such as balanced nutrition, regular exercise, or increased physical activity. Therefore, online informational patient educational texts may play a significant role in reducing the

frequency of obesity and bariatric surgical procedures in obesity treatment in our country.

In the digital age, patients often search for information using the internet before meeting physicians. Thus, Turkish texts must contain correct information and be easily read. To our knowledge, there are no studies in the literature evaluating the readability level of Turkish websites on obesity and bariatric surgery. Our study is the first study on this subject.

A study conducted in the USA found that the readability of texts below the 6th-grade level was easy, the readability of texts between the 6th-9th grade levels was moderate, and the readability of texts above the 9th-grade level was difficult (15). Kozanhan et al. examined patient information texts of anesthesia on Turkish websites and evaluated their readability. They revealed that undergraduate education was required to understand these texts (16). Our results were similar to the results of this study. The readability of internet-based patient education materials related to breast cancer and mammography used in breast cancer screening was evaluated in two different studies. Aksoy et al. examining the readability of internet informational texts on breast cancer showed that the readability level of these texts was 'moderate' according to the Atesman readability formula and at 'high school level' according to the Bezirci-Yilmaz readability formula (17). Al Khalili et al. demonstrated that the texts on mammography were 'difficult' according to the Atesman readability formula (18).

Cheng et al. investigating the readability of Australian online health information, reported that the readability of Australian health websites was above the average Australian levels of reading (5). Mathew et al. examining the readability of Consumer Medical Information Leaflets (CMILs) on obesity and lipid-lowering drugs in India, indicated that university graduates could understand these leaflets, but not by high school graduates (19). Similar results were found in other studies examining the readability of medical sites prepared in Turkish (9,20-22).

Meleo-Erwin et al. searching the words "weight loss surgery" on English websites, reported that 93% of websites received an unacceptable readability score (23). Our study found that the readability level of Turkish websites on obesity and bariatric surgery was 'difficult' according to the Atesman readability formula and at 'undergraduate level' according to the Bezirci-Yilmaz readability formula. The 2011 Human Development Report indicated that Turkish adults' average length of education was 6.5 years (24). Accordingly, it can be said that the readability levels of online Turkish informational texts on obesity and bariatric surgery are much higher than the education level of Turkish people.

The average sentence length in Turkish is 9-10 words according to the Atesman readability formula and 10-11 words according to the Bezirci-Yilmaz readability formula. The average word length in Turkish is 2.6 syllables, according to both formulas (13,14). Our study showed that the average number of words in each sentence was 13.89, and

the average number of syllables in each word was 2.86. The fact that both the sentence and syllable lengths of texts included in our study were above the specified values suggests a low readability level. Health literacy is defined as how individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (25). Accordingly, the texts containing information about obesity should have a high readability level and high information content (such as importance, frequency, and prevention methods of obesity, obesity treatment methods, bariatric surgery indications, and surgical methods complications). Some studies have reported incorrect and unprofessional information on websites containing information about obesity and bariatric surgery (26,27). Our study showed that the texts on websites examined for obesity gave enough information about only obesity treatment. More than half of the texts on bariatric surgery included information about surgical treatment methods. Very few texts contained information about complications of surgical treatment and contraindications for surgical treatment. Hence this suggests that it is aimed at encouraging patients to bariatric surgery. For patients and their relatives to understand what they read on internet texts, a simple language should be chosen in which the number of syllables in words is small, sentences with a small number of words are used, and medical terms are preferred as little as possible.

5. CONCLUSIONS

This study demonstrated that the readability level of Turkish websites on obesity and bariatric surgery was very low. Furthermore, it was determined that these websites did not provide adequate information about the risks, adverse effects and contraindications related to bariatric surgery. Therefore, online informational texts on obesity and bariatric surgery should be prepared according to the readability criteria at a level that the general population can easily understand.

Limitations of the Study

The limitations of this study are that there are few sites included in the study and that these sites do not have the necessary medical certification.

Conflicts of Interest

There is no conflict of interest regarding the publication of this article.

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