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EVALUATION OF READABILITY AND CONTENT OF TEXTS ON AUTISM SPECTRUM DISORDER

Otizm spektrum bozukluğu ile ilgili metinlerin okunabilirliğinin ve içeriğinin değerlendirilmesi

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Abstract

Informative texts on the websites may make positive contributions to patient-physician communication and patients' compliance. The readability and comprehensibility of the information resources on the Internet is as important as the content, accuracy, and reliability. Access to accurate and understandable resources for individuals who want to learn about Autism Spectrum Disorder (ASD) will play an important role in the management of ASD. In our study, it was aimed to evaluate the contents and readability of information texts presented on Turkish websites about ASD. A total of 400 websites were evaluated in Google search using the keywords "autism, autism spectrum disorder, autistic disorder, pervasive developmental disorder". The average readability level was analyzed using the Ateşman and Bezirci-Yılmaz readability formulas. The text contents were divided into two groups as "websites prepared by healthcare professionals" and "websites prepared by non-health professionals" and compared. Forty-three websites were eligible for evaluation. The readability level of the websites is “difficult” according to the Ateşman formula; According to the Bezirci-Yılmaz formula, it was found to be "undergraduate level". The percentage of content of all evaluated websites (n=43) was found to be 65.12±22.71. The content percentage of the websites prepared by health professionals was 81.18±19.32, and the content percentage of websites prepared by non-healthcare professionals was 42.00±3.94 (p=0.001). Access to health information on the Internet has a critical value for individuals with chronic diseases and their family. Early diagnosis of children with ASD and access to early intensive intervention have an important place in the prognosis of the disorder. The readability and comprehensibility of the texts on websites, which are the first source of reference for most families, may contribute to the management.

Keywords: Readability, autism, autism spectrum disorder.

Özet

İnternet sitelerindeki bilgilendirme metinlerinin hasta hekim iletişimine ve hastaların tedaviye uyumuna olumlu katkılar sağlayabileceği bildirilmektedir. İnternetteki bilgi kaynaklarının içeriği, doğruluğu ve güvenilirliği kadar kullanıcılar tarafından okunabilirliği ve anlaşılabilirliği de önemlidir. Otizm Spektrum Bozukluğu (OSB) son yıllarda görülme sıklığı gittikçe artan bir halk sağlığı sorunu olduğundan bu alanda bilgi edinmek isteyen bireylerin doğru ve anlaşılabilir kaynaklara ulaşması OSB’nin yönetiminde önemli bir rol alacaktır. Çalışmamızda OSB ile ilgili olarak Türkçe internet sitelerinde sunulan hasta bilgilendirme metinlerinin içeriklerinin ve okunabilirlik düzeylerinin değerlendirilmesi amaçlanmıştır. İnternet arama motoru Google’da “Otizm, Otizm Spektrum Bozukluğu, Otistik Bozukluk, Yaygın Gelişimsel Bozukluk” anahtar kelimeleri kullanılarak yapılan aramada ulaşılan toplam 400 internet sitesi değerlendirmeye alındı. Ateşman ve Bezirci-Yılmaz okunabilirlik formülleri kullanılarak ortalama okunabilirlik düzeyi analiz edildi. Metin içerikleri ‘‘Sağlık çalışanları tarafından hazırlanan internet siteleri’’ ve ‘‘sağlık çalışanı olmayanlar tarafından hazırlanan internet Siteleri’’ olarak iki gruba ayrılıp karşılaştırıldı. 43 internet sitesi değerlendirme için uygun bulundu. İnternet sitelerinin okunabilirlik düzeyi Ateşman formülüne göre “zor”; Bezirci-Yılmaz formülüne göre ise “lisans düzeyinde” olduğu saptandı. Değerlendirilen tüm internet sitelerinin (n=43) içerik yüzdesi 65,12±22,71 olarak bulundu. Sağlık çalışanları tarafından hazırlanan internet siteleri içerik yüzdesi 81,18±19,32, sağlık çalışanı olmayanlar tarafından hazırlanan internet siteler içerik yüzdesi ise 42,00±3,94 olarak tespit edildi. Sağlık enformasyonuna internet üzerinden erişim, kronik hastalığı olan bireyler ve onların yakınları açısından da kritik değere sahiptir. OSB’li çocukların erken teşhis edilmesi ve erken yoğun müdahaleye ulaşabilmesi hastalığın prognozunda önemli bir yere sahiptir. Bu alanda çoğu ailenin ilk başvuru kaynağı olan internet sitelerindeki metinlerin okunabilir, anlaşılabilir ve hastalıkla ilgili temel bilgileri içermesi OSB’nin prognozuna olumlu katkı sağlayabilir.

Anahtar kelimeler: Okunabilirlik, otizm, otizm spektrum bozukluğu.

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Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by persistent impairment in reciprocal social communication and interaction, and restricted, repetitive behavioral patterns, interests, or activities (1). Although its frequency is gradually increasing, recent studies show that one out of every 54 children is diagnosed with ASD (2). With the increase in the frequency of ASD, more families are affected, and the financial needs for treatment and support increase. This situation makes ASD an important issue in the field of scientific research and public health (3).

With the development of technology, the use of the Internet has become an indispensable tool for people in the rapidly changing world. As of 2021, approximately 4.9 billion people around the world are using the Internet and there are 1.8 billion websites. The number of searches made via the Google website alone daily is 7.5 billion (4). The Turkish Statistical Institute reports the rate of individuals using the Internet in our country as 79% and the most visited website is the Google search engine (5). The widespread and intensive use of the Internet and the development of Internet tools affect the field of health as well as many other fields. Health-related websites, blogs, social media pages, forums, and search engines have become an important source of information for patients (6). When the websites used in the health field were analyzed, it was found that search engines had an important place. (7). A recent study showed that health-related topics are the second most common Google search category (8). It has been reported that informative texts on websites can contribute positively to patient-physician communication and patients' compliance with treatment (9). However, there are concerns regarding the reliability, quality, and accuracy of information sources on the Internet (10).

The readability and comprehensibility of the information resources on the Internet by the users is as important as the content, accuracy, and reliability. The concept of readability is a concept based on the number of words and syllables and measured with mathematical formulas to determine the difficulty level of texts (11). It was recommended that informational materials should be at the 6th-8th grade level for readers to read and understand easily (12). Since ASD is an increasing public health problem in recent years, individuals who want to obtain information in this field will have an important role in the management of ASD to reach accurate and understandable sources. This is the first study in our country to investigate the content of patient information texts on ASD on the Internet. In our study, it was aimed to evaluate the content and readability of patient information texts presented on Turkish websites about ASD.

Material-Method

Permission was obtained from the Board of Health Sciences University, Konya Training and Research Hospital for the descriptive study planned (04.07.2019/ 27-15). The data of the study were obtained through the most frequently used search engine "http://www.google.com.tr/" in Turkey. In March 2020, a total of 400 websites in the first 10 pages reached in the search engine using the keywords "autism, autism spectrum disorder, autistic disorder, pervasive developmental disorder" was evaluated. Sites containing less than ten sentences of information, forum and chat sites, and sites containing only pictures, tables and videos were excluded from the study. The information texts on these sites were transferred to the Microsoft Word

program and the training titles, author information, site address and links were removed so that they do not affect the readability results. The average number of words (mean sentence length), average number of syllables (mean word length), and the average number of words of four syllables and above were calculated in the edited texts. The readability values of the data were analyzed according to Ateşman and Bezirci-Yılmaz formulas (13, 14).

Measuring tools

Ateşman Readability Formula

It is a formula based on word and sentence length. It was developed as a result of adapting the Flesch-Kincaid reading ease into Turkish (13, 15). According to the Ateşman formula, the readability level of a text is easy as it approaches 100 and difficult as it approaches zero (Table 1).

Table 1: The readability level of a text according to the Ateşman formula.

Ateşman value	Readability range
90-100	Very easy
70-89	Easy
50-69	Moderate difficulty
30-49	Difficult
1-29	Very difficult

Bezirci-Yılmaz Readability Formula

It was developed by considering the structural features of the Turkish language and the readability formulas that were developed before. It is a formula based on sentence lengths in texts and the number of syllables in words (14). According to this formula, the readability level is calculated as follows.

$\sqrt{}$(OKSx((H3x0,84)+(H4x1,5)(H5x3,5)+(H6x 26,25))

AWC: Average word count
S3: Average number of three syllable words
S4: Average number of four syllable words
S5: Average number of five syllable words
S6: Average number of words with six or more syllables

According to the Bezirci-Yılmaz Readability Formula, the increase in sentence lengths and the number of syllables in words makes the readability of the texts difficult. This formula also explains which grade level a reading text addresses according to the education system in our country. The education system indicates the primary education level for grades 1-8, secondary (high school) for grades 9-12, undergraduate education for grades 12-16, and academic education for grades 16 and beyond.

Content Evaluation of the Texts

The texts accessed by using the keywords determined in the study, "Healthcare Professionals Based Websites (HW)" and "Non-Healthcare Professionals Based Websites (NHW)" according to the expertise of the content creators and their proximity to the subject, were divided into two groups. In the content evaluation of each site, the current information in UpToDate on "Patient Education Basic Information about Autism Spectrum Disorder" was taken as reference. Content evaluations were made by two different child and adolescent psychiatry specialists who were not involved in the study and had at least five years of professional experience. For this purpose, the percentage of content was obtained by

determining how many of the following five questions about autism spectrum disorder were answered correctly in the patient information texts on the Internet:

Question 1. What is autism spectrum disorder?
Question 2. What are the causes of autism spectrum disorder?
Question 3. What are the symptoms of autism spectrum disorder?
Question 4. How is the diagnosis of autism spectrum disorder made?
Question 5. What is the treatment for autism spectrum disorder?

Statistical Analysis

Descriptive statistics of categorical data in the study were shown using frequency and percentage values, and numerical data were shown using mean and standard deviation. The Shapiro Wilk Test was used to determine whether the groups were normally distributed in the study. In the numerical data comparisons made between independent groups in the study, the Independent two-sample t-test was used in groups with normality assumption, and the Mann-Whitney U-Test was used in groups without normality assumption. All statistical analyzes applied in the study were carried out bilaterally, with a 5% significance limit and 95% confidence interval. SPSS v.21 (IBM Inc, USA) software was used for data analysis.

Results

As a result of the search made using keywords in the Google search engine, 100 websites were examined for each keyword. A total of 400 websites were evaluated. As a result of the application of exclusion criteria and removal of duplicate websites, a total of 43 websites was deemed suitable for content and readability evaluation (Table 2). It was determined that 17 of the websites included in the evaluation were created by healthcare professionals and 26 were created by people who are not healthcare professionals. The average readability level of Ateşman and Bezirci-Yılmaz, average number of syllables, average number of words, average number of words of four syllables and above of the texts on the evaluated websites are shown in Table 3. There was no significant difference between the two groups in terms of means of readability levels, average number of syllables, average number of words, average number of words of four syllables and above. With Ateşman's readability formula, the Ateşman value was calculated as 47.03±7.46 in the HW group and 47.16±11.09 in the NHW group. The average readability level for both groups was determined as "difficult". Bezirci-Yılmaz readability values were 13.54±3.62 in the HW group and 13.72±4.07 in the NHW group. With this formula, it was determined that the readability levels of the texts prepared by both groups were at the "undergraduate level" according to the education system in our country. The percentage of content of all evaluated websites (n=43) was found to be 65.12±22.71. The content percentage of HW was 81.18±19.32, and the percentage of NHW content was 42.00±3.94. The difference between the two groups was found to be statistically significant. (p=0.001) (Figure 1). Comparison of the response rates of the groups to the research questions is shown in Table 4.

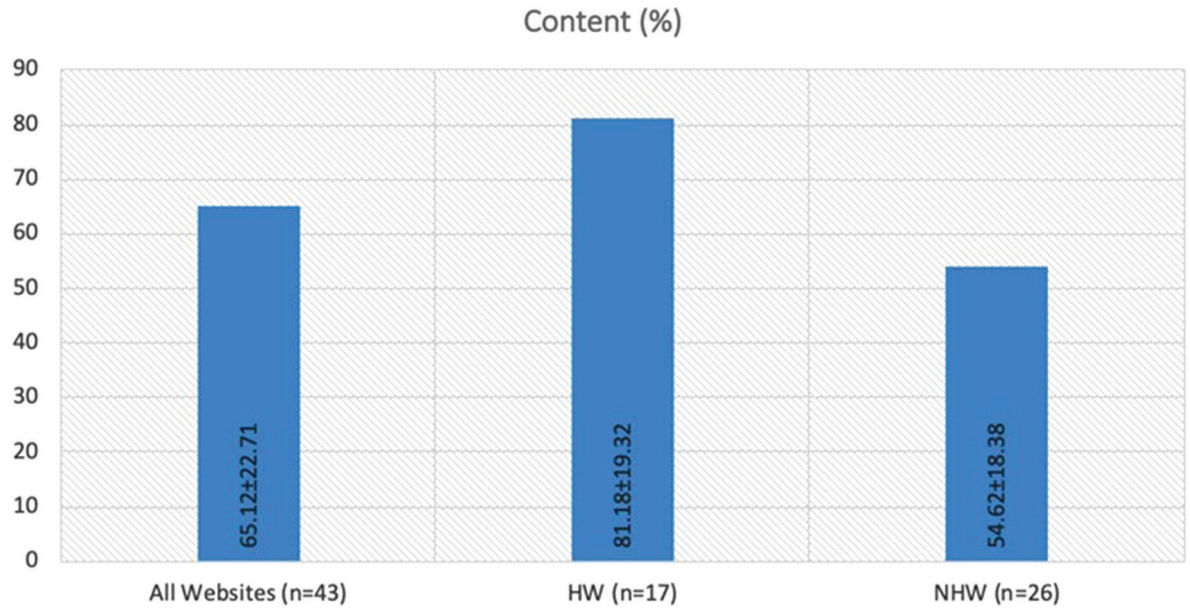
Table 2: Websites analyzed.

https://www.tohumotizm.org.tr	https://www.e-psikiyatri.com
https://www.otizmvakfi.org.tr	https://www.medicalpark.com.tr
https://npistanbul.com	https://www.memorial.com.tr
https://www.sabah.com.tr	http://www.ilootizm.com
https://www.acibadem.com.tr	https://otsimo.com/tr
https://www.ntv.com.tr	http://www.hurriyet.com.tr
https://www.haberturk.com	https://www.algiozelegitim.com.tr
https://www.florence.com.tr	https://tr.euronews.com
https://www.dbe.com.tr	http://www.aio.com.tr
http://www.acibadem.com.tr	https://www.trtcocuk.net.tr
https://www.medstar.com.tr	http://www.doksat.com
https://www.cocukludunya.com	https://www.sozcu.com.tr
http://www.taniozelegitim.com.tr	https://ab-ilan.com
http://www.bizimaile.com	http://besiktasram.meb.k12.tr
http://www.cocukpsikiyatri.org	https://www.memurlar.net
http://www.ivek.org.tr	http://eregli75yil.com
https://ozelegitimverehabilitasyon.com	https://www.anneoluncaanladim.com
https://www.ozguroner.dr.tr	https://psikolojigazetesi.com
http://www.gelisimselyaklasim.com	https://indigodergisi.com
https://sagligim.gov.tr	http://www.armpsikiyatri.com
http://www.monomente.com	https://www.rehabilitasyon.com
https://hthayat.haberturk.com	

Table 3: Readability values of texts related to autism spectrum disorder.

The texts related to autism spectrum disorder	**All Websites (n=43) Mean±SD**	**HW (n=17) Mean±SD**	**NHW (n=26) Mean±SD**	**p**
Ateşman Readability	47.11±9.72	47.03±7.46	47.16±11.09	0.967*
Bezirci-Yılmaz Readability	13.54±3.62	13.26±2.90	13.72±4.07	0.842**
Average number of syllables	2.90±0,13	2.92±0.12	2.89±0.15	0.487**
Average word count	13.23±2.89	13.13±2.49	13.30±3.16	0.941**
Average number of words with 4 or more syllables	4.17±1.09	4.12±0.79	4.20±1.26	0.921**

*HW: Healthcare Professionals Based Websites, NHW: Non-Healthcare Professionals Based Websites, SD: Standard Deviation. * Independent two-sample t-test, **Mann-Whitney U test.*



*HW: Healthcare Professionals Based Websites, NHW: Non-Healthcare Professionals Based Websites. SD: Standard Deviation. *Student-t test. p<0.001*

Figure 1: Comparison of the contents of the groups.

Table 4: Comparison of the response rates of the groups to the research questions.

Response	HW	NHW	p
Question 1			
No	0 (0,0%)	0 (0,0%)	---
Yes	17 (100,0%)	26 (100,0%)	
Question 2			
No	4 (23,5%)	13 (50,0%)	0.083*
Yes	13 (76,5%)	13 (50,0%)	
Question 3			
No	0 (0,0%)	2 (7,7%)	0.511*
Yes	17 (100,0%)	24 (92,3%)	
Question 4			
No	7 (41,2%)	24 (92,3%)	**0.001****
Yes	10 (58,8%)	2 (7,7%)	
Question 5			
No	5 (29,4%)	20 (76,9%)	**0.002****
Yes	12 (70,6%)	6 (23,1%)	

*HW: Healthcare Professionals Based Websites, NHW: Non-Healthcare Professionals Based Websites. *Chi-Square Test, **Fisher's Exact Test.*

Discussion

In this study, in which the websites prepared for the purpose of informing patients about ASD were analyzed, it was showed that the readability levels of the texts were "undergraduate level" and "difficult" according to the education system in our country. When we divided and compared the people who prepared the information

on these sites into two groups as HW and NHW, no significant difference was observed between the groups. ASD basic patient information content was found to be lower in the NHW information texts compared to the HW information texts. To the best of our knowledge, this is the first study to evaluate the adequacy of patient information texts on ASD-related websites.

In recent years, the Internet has become an important source of reference for individuals seeking health-related information. The content and readability of online information resources are critical during pandemics and in psychiatric disorders like ASD, which has become a public health problem. The coronavirus COVID-19 pandemic has developed into the 21st century's greatest worldwide health problem (16). Therefore, the demand for knowledge about COVID-19 has increased dramatically throughout this pandemic. Public is interested in information such as the most recent news updates on the pandemic, its symptoms, prevention, and transmission method (17). Because the Internet is frequently the primary source of information for consumers seeking health care, it is critical to quality the content's readability (18). Research in this area most websites on COVID-19 for the public had moderate to low scores regarding readability, usability, reliability, and quality (19). In a study comparing the readability of official public health information on COVID-19 on the websites of 15 Countries, found that information about COVID-19 exceeded the proposed reading level, exhibited complex syntax, and used technical terminology (20). Proper public education is critical for patients to prevent and control infection. Because the Internet is usually a patient's initial source of health-related information, it is vital to convenience the content's readability. Most families do research on the Internet before consulting a doctor about a situation they suspect in their children. Access to health information on the Internet is also critical for individuals with chronic diseases and their relatives (21). Early diagnosis of children with ASD and access to early intensive intervention are critical in the prognosis of the disease (22). The fact that the texts on the websites, which are the first reference source for most families in this area, are readable, understandable and contain basic information about the disease, could contribute positively to the prognosis of ASD.

Readability is a concept that can be measured objectively and gives information about whether the text prepared in any language is suitable for the education level of the reader (23). The aim in readability studies was to make the language more understandable, and it was reported that a formula developed in accordance with the structure of any language might not give the same results for another language (24). In our study, Ateşman and Bezirci-Yılmaz readability formulas, which were prepared according to Turkish grammar, were used. According to Ateşman's formula, the average sentence length in Turkish texts is 9-10 words, and the average word length is 2.6 syllables (13). According to Bezirci-Yılmaz, the average sentence length in Turkish texts is 10-11 words, and the word length is 2.6 syllables (14). It was determined that the average sentence and word lengths of the texts on the websites evaluated in our study were higher than the values specified in both readability formulas. For this reason, it was revealed that the readability levels of these texts were low. The results of our study are similar to other readability studies conducted in our country such as cancer, vaccination and specific learning disorder (25-29).

Since access to information on the Internet is easy and fast, individuals search for health-related issues on the Internet. This situation has potential benefits such as applying to the right doctor and correcting wrongly known medical information. However, inaccurate and incomplete information could increase the anxiety level of individuals about medical conditions or prevent them from making the right decisions (6). Individuals had difficulty in choosing a reliable and relevant source due to the uncontrollable nature of the Internet (30). There are no data on the reliability of medical information on the Internet. This issue causes individuals to make a medical diagnosis, and sometimes to use wrong

treatment (31). The fact that web sites related to diseases are not prepared by experts in the field emerges as an important problem (32). Containing inappropriate information in NHW may cause families who want to learn about ASD to engage in wrong practices. The support of NHW from professional mental health experts regarding medical conditions may contribute to improve the health-related conditions of individuals.

Health-related websites can have significant benefits in raising awareness of patients and society. Correct use of the Internet by patients increases their compliance with treatment (33). It was reported that the effective use of the Internet strengthens the patient-doctor relationship, increases patient satisfaction, increases the efficient use of medical services and improves health care outcomes (34). In our study, it was determined that the two questions, "How is the diagnosis/treatment of autism spectrum disorder made?", which we used in the content evaluation of the texts, were answered at a low rate. Inadequate and inaccurate information resources available on the Internet may adversely affect the participation of children with ASD risk in diagnosis and treatment processes.

Websites that make it easier to obtain health information on the Internet make important contributions to the development of health (35). Since most individuals do not have sufficient level of knowledge about health, they choose websites that present information easily and where medical terms are not used extensively (36). In a study conducted in 2010, the average education level of all individuals over the age of 15 in our country was reported to be 7.18 years (37). The readability levels of the websites we examined in our study were found to be much higher than the average education level in our country. The easy design of these ASD related sites and the fact that the information is understandable and easy to read will increase the efficiency in this area.

Conclusions

In this study, it was determined that the readability levels and information content of the information texts about ASD on the websites were not sufficient and appropriate. High-quality health information about diseases is associated with lower stress levels and better psychological health. It is recommended to support the scientific content of the websites existing or to be prepared in this field by experts in the field and to facilitate the readability of the texts.

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