Evaluating the readability, quality and reliability of online information on Behçet's disease

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SUMMARY

There are concerns over the reliability and comprehensibility of health-related information on the internet. The goal of our research was to analyze the readability, reliability, and quality of information obtained from websites associated with Behçet's disease (BD).

On September 20, 2021, the term BD was used to perform a search on Google, and 100 eligible websites were identified. The Flesch Reading Ease Score (FRES), Flesch-Kincaid Grade Level (FKGL), and Gunning Fog (GFOG) were used to evaluate the readability of the website. The JAMA score was used to assess the websites' reliability, the DISCERN score and the Health on the Net Foundation code of conduct (HONcode) were used to assess quality, and Alexa was used to analyze their popularity.

Sections of the text were evaluated, and the results revealed that the mean FRES was 35.49±14.42 (difficult) and the mean GFOG was 14.93±3.13 years (very difficult). According to the JAMA scores, 36% of the websites had a high reliability rating and 20% adhered to the HONcode. The readability was found to significantly differ from the reliability of the websites ($p<0.05$). Moreover, websites with scientific content were found to have higher readability and reliability ($p<0.05$).

The readability of BD-related information on the Internet was found to be considerably higher than that recommended by the National Health Institute's Grade 6, with moderate reliability and good quality. We believe that online information should have some level of readability and must have reliable content that is appropriate to educate the public, particularly for websites that provide with patient education material.

***Key words**: Rheumatology, health information, internet, online patient formation, Behcet's disease, readability.*

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INTRODUCTION

Behçet's disease (BD) is a multisystem vasculitis, heterogeneous among patients in terms of demographic characteristics, organ manifestations, severity, course of the disease, response to treatment, and prognosis (1). Clinically, the disease presents in most patients with oral and genital ulcerations, papulopustular lesions, erythema nodosum-like lesions, and organ/system involvement, including uveitis, arterial and venous thrombosis, aneurysms, nervous system involvement, and gastrointestinal tract involvement (1). The disease, seen in countries located on the Silk Road, is present in 20-420/100,000 in Turkey, 80/100,000 in Iran, and 0.64/100,000 in the United Kingdom (2). Treatment often involves colchicine, topical steroids, azathioprine, systemic and topical steroids, and anti-TNF agents (3).

The Internet is one of the most essential and accessible tools to receive information and raise awareness about health-related problems. Thanks to its increased usage, it has become easier to access information on diseases, as well as medications, treatment alternatives, and surgical protocols. The need for a reliable health-related website increases with the demand for accessing health information via the Internet (4, 5). Many people look up information about their health conditions on the Internet before going to a doctor. Half of the population of the United States has access

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to health-related information on the Internet. Furthermore, over 70% of people said they first utilized the Internet to get health information, according to the 2018 Health Information National Trends Survey (6, 7). The competition among health websites to attract patients is becoming increasingly intense. This has raised concerns over site content quality and timeliness, the reliability of information offered to individuals, and advertising and sponsorship relationships (8). These websites contain a wide spectrum of health-related information ranging from highly reliable to deceptive. This information is not peer-reviewed, its quality differs, and the reading level of online information is not appropriate for the public. Conversely, there is no mechanism in place to control this information. According to the National Institutes of Health, the US Department of Health and Human Services, and the American Medical Association, patient education materials on the Internet should be written at a sixth-grade level (9). If the readability of online material on a website exceeds this threshold, it is likely to be difficult to read and comprehend for the typical reader. As a result, it is critical that health-related material on websites be appropriate for the reader and thoroughly assessed before being used. There have been numerous studies published in the literature on the readability, reliability, and quality of online information in various disorders (10-13).

Patients with rheumatological disorders commonly use the Internet to learn about alternate treatment options, risk factors, and disease complications. There is no study in the literature that analyzes information on BD found online. The goal of our research was to assess the readability, quality, and reliability of BD-related websites. Furthermore, website typologies that provide highly reliable information on BD were investigated.

MATERIALS AND METHODS

Our study was conducted with the approval of the Non-Interventional Research Ethics Committee (6494-GOA 2021/20-12). Two independent authors searched the keyword 'Behçet's disease' on Google (https://www.google.com.tr), the most popular search engine, on September 20, 2021. Our study was based on data from June 2020, and we selected Google because it is the most popular search engine with an 83.75% market share (14).

During the website search, cookies and the computer's browser history were cleared to ensure that the search results were unaffected for reasons such as Google Ads. In addition, the study was conducted by logging out of the Google account. Completing the search, the first 200 websites' uniform resource locators (URLs) were recorded, following the methodology of similar research in the literature (15, 16). The top 10 websites on the first page were ranked as the most viewed websites (17). The study excluded websites with non-English content, websites without information about BD, websites that demand registration or subscription, repetitious websites, websites with video or audio recording content but no written content, and websites with less than 300 words. In addition, graphics, pictures, videos, tables, figures, and list formats in the texts, all punctuation marks, URL websites, author information, addresses, and phone numbers, as well as references to avoid erroneous results were not included in the evaluation (18).

During the website evaluation, if an evaluation criterion could not be identified on the homepage, the three-click rule was used (19), which states that a website user should be able to find any information in three mouse clicks or less. Although this is not an official rule, it is believed that if information cannot be found in three clicks, the users will be unable to complete their task and will leave the site.

Website typology

Two independent authors classified websites into six categories based on their typology. If there were any discrepancies between the authors, the website typology was re-evaluated by both scientists, and a final verdict was reached.

Typologies were professional (websites

created by organizations or individuals with professional medical qualifications), commercial (websites that sell product for profit), health portals (websites that provide information about health issues), news (news and information created to provide magazine websites or newspaper), government (websites created, regulated or administered by an official government agency), scientific journal (accessible academic publications or scientific articles).

Journal of American Medical Association (JAMA) Benchmark Criteria

The JAMA benchmarks analyze online information and resources under 4 criteria: authorship, attribution, disclosure, and currency [JAMA score 0-4, Authorship (1 point): Authors and contributors, their affiliations, and relevant credentials should be provided; Attribution (1 point): References and sources for all content should be listed; Disclosure (1 point): Conflicts of interest, funding, sponsorship, advertising, support, and video ownership should be fully disclosed; Currency (1 point): Dates that on which the content was posted and updated should be indicated]. JAMA is used to evaluate the accuracy and reliability of information. The scorer awards 1 point for each criterion in the text, and the final score ranges from 0 to 4. Four points represent the highest reliability and quality (8).

DISCERN criteria

The DISCERN criteria, a technique for assessing the quality of websites, consists of 16 questions with scores ranging from 1 to 5 (20). The first eight questions ask about the website's basic content, such as "are the aims clear?" and "were citations used?" The last eight questions test treatment knowledge, such as "is it clear that there is more than one treatment option?". Using the DISCERN criteria, two authors independently examined websites. Averaging the data from the two separate authors yielded the final DISCERN score for each website. The final DISCERN score varies from 16 to 80. According to the results, 63 to 80 represents "excellent," 51 to 62 represents "good," 39 to 50 represents "fair," 28 to 38 represents "poor," and 16 to 27 represents "very poor" (21).

Health on the Net Foundation code of conduct (HONcode) certification

The Health on the Net Foundation (HON) was founded to promote the efficient transmission and use of reliable and useful health information via the Internet. HONcode was created by HON to assist standardize the accuracy of health-related information on the Internet (22). To meet the HONcode criteria, the content's date and source should be disclosed, the authors' qualifications should be specified, the privacy policy should be explained, the patient-physician relationship should be supported rather than replaced, the website's financing and advertising policy should be specified, and contact information should be explained (23). HON grants HONcode certificates to websites as an option. HONcode is an affordable and optional certificate. Therefore, information providers and website administrators cannot apply for HONcode certification. The HONcode certificate is subject to a price and its use is restricted. In our research, we investigated if the main page or a connected URL had a HONcode stamp.

Readability

The following readability formulas were used to assess website readability: Flesch reading ease score (FRES), Flesch-Kincaid grade level (FKGL), Simple Measure of Gobbledygook (SMOG), Gunning FOG (GFOG), Coleman-Liau score (CL), automated readability index (ARI), and Linsear Write (LW) readability formulas from "www.readabilityscore.com" (24-28).

A total of 300 words from the beginning, middle, and end of the texts were examined in this study. All websites' ranking values were calculated and recorded. Microsoft Office Word 2007 (Microsoft Corporation, Redmond, WA) was used to copy and save the texts. Based on the sixth-grade level specified by the American Medical Association and the National Institutes of Health, the average readability level according to all readability formulas was compared.

Popularity and visibility analysis

Alexa (https://www.alexa.com/) is a popular traffic engine (29), and it's frequently used to assess area visibility and popularity. It compares the number of times a website has been visited in the last three months to the number of times other websites have been visited. The higher the score, the more popular the site is because of more clicks.

Compete Rank is a Compete, Inc. traffic analysis and ranking unit (www.compete.com). Every website that Compete Rank crawls and indexes is assigned a number and ranked based on its traffic popularity.

WebRank (http://www.webrankstats.com/) is a toolbar that rates websites and pages in multiple search engines automatically.

Content analysis

Websites were assessed based on their typologies to see if they contained any BD-related content (diagnosis, pathophysiology, symptoms, vasculo-Behçet, oculo-Behçet, risk factors, complications, mortality, and treatment).

Statistical analysis

For statistical analysis, data were uploaded to SPSS Windows 25.0 software (SPSS Inc., Chicago, IL). Continuous values are indicated as mean ±SD, while frequency variables are given as number (n) and percentage (%). For statistical analysis, the Mann-Whitney U test was used to compare groups with continuous values such as readability indices and sixth class level. For comparison of frequency variables, the Chi-square or Fisher exact test was used. A p value lower than 0,05 was accepted as a statistically significant difference.

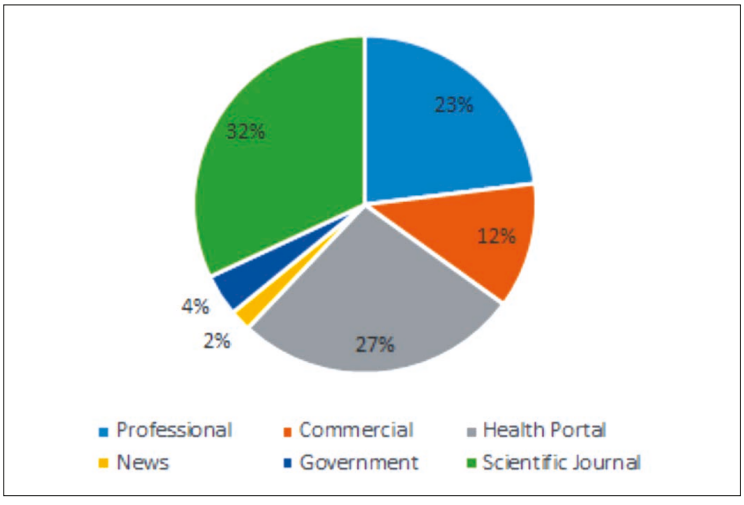

Figure 1 - Types of websites in the whole search.

RESULTS

The study comprised 200 websites; 100 were eliminated because they did not match the inclusion requirements, and the remaining 100 were evaluated. Scientific Journals (n:32, 32%) and professional (n:23, 23%) websites were found to be the most common when 100 websites were compared according to their typologies (Figure 1).

Previous research has indicated that visitors place a high value on the first page of a search engine's results. On Google's first page, there are ten search results. There was no statistically significant difference between the first 10 search results and the remaining search results when they were analyzed according to their typologies (p=0.050). The readability values of the top 10 websites differed significantly from the readability values of the remaining websites, indicating that the top 10 websites were more readable (FRES p=0.031, GFOG=0.012, FKGL=0.012, SMOG p=0.015) (Table I). A significant result (p=0.003) was obtained when the Alexa values of the first 10 sites were compared to the Alexa values of the remaining sites. As one might assume, the top ten websites on the first page were more popular in terms of search, viewing, and traffic. There was no significant correlation between the presence of JAMA reliability (p=0.743), DISCERN quality (p=0.598), or HONcode (p=0.096) on other websites and the top 10 websites (Table II).

These 100 websites had an average JAMA score of 2.61±1.28, a DISCERN score of 51.52±23.80, a Web Rank of 6.20±1.69, an Alexa score of 834,420.13±1,837,592.2, and a Compete Rank of 9961.63±19946.48. The websites included in the study with these results have been assessed to be

Table I - All group of websites' mean results and statistical comparison of text content to 6th grade reading level.

	Top 10 (n=10)	Others (n=90)	Total (n=100)	Comparison of top 10 and remaining 90 websites by readability	Comparison of text content of 100 websites with 6th grade reading level (p)*
Readability indexes	Mean±SD	Mean±SD	Mean±SD		
FRES	45.23±12.84	34.40±14.24	35.49±14.42	0.031	<0.001*
GFOG	12.69±2.22	15.17±3.12	14.93±3.13	0.012	<0.001*
FKGL	11.14±2.34	13.07±2.71	12.88±2.73	0.012	<0.001*
The CL index	12.7±2.04	13.21±1.75	13.16±1.77	0.345	<0.001*
The SMOG index	9.61±1.69	11.23±2.07	11.07±2.09	0.015	<0.001*
ARI	11.36±2.71	12.62±3.02	12.49±3.00	0.159	<0.001*
LW formula	10.84±3.07	12.92±3.84	12.71±3.81	0.079	<0.001*
Grade level	11.13±1.98	12.68±2.52	12.52±2.5	0.059	<0.001*

FRES, Flesch reading ease score; FKGL, Flesch-Kincaid grade level; SMOG, simple measure of Gobbledygook; GFOG, Gunning FOG; CL, Coleman-Liau score; ARI, automated readability index; LW, ve Linsear Write. *p<0.05.

Table II – Comparison of top 10 and remaining 90 websites by popularity, reliability, quality and typology.

		Top 10 (n=10)	Others (n=90)	Total (n=100)	Comparison of top 10 and remaining 90 websites by parameters (p)
Popularity indexes					
Web Rank Score		6.33±0.91	6.16±1.87	6.20±1.69	0.892
Alexa Rank		17240.62±25217.91	911331.15±1904915.48	834420.13±1837592	0.003*
Compete Rank		3866.94±7086.34	11993.20±22537.08	9961.63±19946.48	0.316
JAMA Mean±SD		2.50±1.26	2.62±1.29	2.61±1.28	0.743
DISCERN Mean±SD		56±18.58	51.02±24.32	51.52±23.80	0.598
JAMA		**n (%)**	**n (%)**	**n (%)**	0.916
Insufficient Data		3 (10.7%)	25 (89.3%)	28 (28%)	
Partially Sufficient Data		4 (11.1%)	32 (88.9%)	36 (36%)	
Completely Sufficient Data		3 (8.3%)	33 (91.7%)	36 (36%)	
DISCERN		**n (%)**	**n (%)**	**n (%)**	0.487
Very Poor n (%)		0 (0%)	16 (100%)	16 (6%)	
Poor n (%)		3 (11.5%)	23 (88.5%)	26 (26%)	
Fair n (%)		1 (20%)	4 (80%)	5 (5%)	
Good n (%)		4 (15.4%)	22 (84.6%)	26 (26%)	
Excellent n (%)		2 (7.4%)	25 (92.6%)	27 (27%)	
HONcode n (%)	+	4 (20%)	16 (80%)	20	0.096
	-	6 (7.5%)	74 (92.5%)	80	
Typology		**n (%)**	**n (%)**	**n (%)**	0.050
Professional		6 (26.1%)	17 (73.9%)	23 (23%)	
Commercial		0 (0%)	12 (100%)	12 (12%)	
Health portal		2 (7.4%)	25 (92.6%)	27 (27%)	
News		0 (0%)	2 (100%)	2 (2%)	
Government		1 (25%)	3 (75%)	4 (4%)	
Scientific Journal		1 (3.1%)	31 (96.9%)	34 (34%)	

JAMA, Journal of American Medical Association Benchmark Criteria; HONcode, The Health on the Net Foundation Code of Conduct; GQS Global Quality Score. *Statistically different at p<0.05.

moderately reliable and of good quality. In the examination of the texts of the 100 evaluated websites, the mean FRES was 35.49±14.42 (difficult), and the mean GFOG was 14.93±3.13 (very difficult). The mean FKGL and SMOG were determined to be 12.88±2.73 and 11.07±2.09 years of education, respectively, while the CL index was 13.16±1.77 years and the ARI index was 12.49±3 years of education. The site typologies and all readability indices were compared, and the results indicated a significant relationship ($p<0.05$). It was shown that scientific journals were more difficult to read ($p<0.05$). A statistically significant difference was found when the readability index averages of 100 websites were compared to the grade 6 reading level ($p<0.001$) (Table I).

When the top 10 websites were compared to the other websites using content analysis, a significant difference was identified ($p=0.001$). This significant difference was due to risk factor content being more prevalent among the top ten websites. Only websites with OculoBehcet content ($p=0.036$) showed a statistically significant difference in their contents according to typology when all 100 websites were assessed ($p>0.05$) (Table III).

There was a significant correlation between typologies of the 100 websites and JAMA reliability scores ($p<0.001$), DISCERN quality scores ($p<0.001$), and HONcode ($p=0.001$). This statistical difference can be explained by higher JAMA reliability scores and DISCERN quality scores in scientific journals. Only n=20 (20%) of all sites had HONcode. The highest number of HONcode was found on health portals with 13 (Table IV).

The FRES, FKGL, SMOG, GFOG, CL, ARI, LW readability formula averages, JAMA and DISCERN scores, and HONcode entities were analyzed with respect to the site rankings. There was a weak positive correlation between the JAMA reliability scores of the texts and the mean of FKGL ($r=0.308$, $p=0.002$), SMOG ($r=0.405$, $p<0.001$), and GFOG ($r=0.392$,

Table III - Content analysis by typology.

		Professional	Commercial	Health Portal	News	Government	Scientific Journal	p
Diagnosis	+	16 (69.6%)	8 (66.7%)	15 (55.6%)	2 (100%)	4 (100%)	20 (62.5%)	0.466
	-	7 (30.4%)	4 (33.3%)	12 (44.4%)	0 (0%)	0 (0%)	12 (37.5%)	
Pathophysiology	+	20 (87%)	10 (83.3%)	21 (77.8%)	2 (100%)	3 (75%)	27 (84.4%)	0.951
	-	3 (13%)	2 (16.7%)	6 (22.2%)	0 (0%)	1 (25%)	4 (12.5%)	
Symptoms	+	22 (95.7%)	11 (91.7%)	22 (81.5%)	2 (100%)	4 (100%)	31 (96.9%)	0.386
	-	1 (4.3%)	1 (8.3%)	5 (18.5%)	0 (0%)	0 (0%)	0 (0%)	
Vasculobehcet	+	21 (91.3%)	8 (66.7%)	17 (63%)	1 (50%)	2 (50%)	17 (53.1%)	0.083
	-	2 (8.7%)	4 (33.3%)	10 (37%)	1 (50%)	2 (50%)	15 (46.9%)	
OculoBehcet	+	22 (95.7%)	7 (58.3%)	16 (59.3%)	1 (50%)	2 (50%)	18 (56.3%)	0.036*
	-	1 (4.3%)	5 (41.7%)	11 (40.7%)	1 (50%)	2 (50%)	14 (43.8%)	
Risk Factors	+	8 (34.8%)	1 (8.3%)	7 (25.9%)	0 (0%)	0 (0%)	4 (12.5%)	0.194
	-	15 (65.2%)	11 (91.7%)	20 (74.1%)	2 (100%)	4 (100%)	28 (87.5%)	
Complications	+	9 (39.1%)	2 (16.7%)	8 (29.6%)	0 (0%)	0 (0%)	6 (18.8%)	0.319
	-	14 (60.9%)	10 (83.3%)	19 (70.4%)	2 (100%)	4 (100%)	26 (81.3%)	
Mortality	+	1 (4.3%)	0 (0%)	2 (7.4%)	0 (0%)	0 (0%)	2 (6.3%)	0.924
	-	22 (95.7%)	12 (100%)	25 (92.6%)	2 (100%)	4 (100%)	30 (%93.8)	
Treatment	+	17 (73.9%)	10 (83.3%)	20 (74.1%)	2 (100%)	4 (100%)	19 (59.4%)	0.334
	-	6 (26.1%)	2 (16.7%)	7 (25.9%)	0 (0%)	0 (0%)	13 (40.6%)	

*Statistically different at $p<0.05$.

p<0.001). Similarly, the DISCERN quality scores had a weak positive correlation with the mean of GFOG (r=0.371, p<0.001), FKGN (r=0.283, p=0.004), and SMOG (r=0.371, p<0.001) (Table V). As a result, it is reasonable to conclude that websites with high readability scores provide more reliable and high-quality content. The readability indexes had a correlation, however, there was none between the readability scores and the HONcode quality assessment or the popularity and visibility analy-

Table IV - Comparison of JAMA, DISCERN scores, HONcode presences and reading levels according to the typologies of the websites.

	Professional	Commercial	Health Portal	News	Government	Scientific Journal	p*
N(%)	23 (23%)	12 (12%)	27 (27%)	2 (2%)	4 (4%)	32 (32%)	
JAMA (Mean±SD)	1.69±0.97	1.75±1.28	2.74±1.02	1.00±0.00	1.5±1.73	3.71±0.58	<0.001*
Insufficient data n:28	12 (52.2%)	7 (58.3%)	4 (14.8%)	2 (100%)	3 (75%)	0 (0%)	
Partially sufficient data n:36	10 (43.5%)	3 (25%)	16 (59.3%)	0 (0%)	0 (0%)	7 (21.9%)	
Completely sufficient data n:36	1 (4.3%)	2 (16.7%)	7 (25.9%)	0 (0%)	1 (25%)	25 (78.1%)	
DISCERN (Mean±SD)	38.26±19.13	33.33±23.09	50.96±19.36	16	36±20.13	72.5±13.46	<0.001*
Very poor n:16	5 (21.7%)	6 (50%)	2 (7.4%)	2 (100%)	1 (25%)	0 (0%)	
Poor n:26	11 (47.8%)	3 (25%)	8 (29.6%)	0 (0%)	2 (50%)	2 (6.3%)	
Fair n:5	1 (4.3%)	0 (0%)	3 (11.1%)	0 (0%)	0 (0%)	1 (3.1%)	
Good n:26	5 (21.7%)	2 (16.7%)	11 (40.7%)	0 (0%)	1 (25%)	7 (21.9%)	
Excellent n:27	1 (4.3%)	1 (8.3%)	3 (11.1%)	0 (0%)	0 (0%)	22 (68.8%)	
HONcode							0.001*
+ n:20	2 (8.7%)	2 (16.7%)	13 (48.1%)	1 (50%)	0 (0%)	2 (6.3%)	
- n:80	21 (91.3%)	10 (83.3%)	14 (51.9%)	1 (50%)	4 (100%)	30 (93.8%)	
Reading level							0.001*
Standard/Average n (%)	6 (26.1%)	5 (41.7%)	0 (0%)	0 (0%)	2 (50%)	2 (6.3%)	
Fairly difficult to read n (%)	5 (21.7%)	1 (8.3%)	4 (14.8%)	0 (0%)	0 (0%)	0 (0%)	
Difficult to read n(%)	9 (39.1%)	5 (41.7%)	13 (48.1%)	2 (100%)	1 (25%)	13 (40.6%)	
Very difficult to read n (%)	3 (13%)	1 (8.3%)	10 (37%)	0 (0%)	1 (25%)	17 (53.1%)	
Readers age							0.625
11-13 Years old (Sixth and Seventh Graders) n (%)	1 (4.3%)	1 (8.3%)	2 (7.4%)	0 (0%)	0 (0%)	0 (0%)	
12-14 Years old (Seventh and Eighth Graders) n (%)	2 (8.7%)	0 (0%)	1 (3.7%)	1 (50%)	0 (0%)	5 (15.6%)	
13-15 Years old (Eighth and Ninth Graders) n (%)	4 (17.4%)	1 (8.3%)	5 (18.5%)	0 (0%)	2 (50%)	5 (15.6%)	
14-15 Years old (Ninth to Tenth Graders) n (%)	1 (4.3%)	1 (8.3%)	3 (11.1%)	0 (0%)	0 (0%)	1 (3.1%)	
15-17 Years old (Tenth to Eleventh Graders) n (%)	8 (34.8%)	3 (25%)	7 (25.9%)	0 (0%)	1 (25%)	4 (12.5%)	
17-18 Years old (Twelfth Graders) n (%)	1 (4.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (3.1%)	
18-19 Years old (College Level Entry) n (%)	3 (13%)	4 (33.3%)	5 (18.5%)	1 (50%)	1 (50%)	4 (12.5%)	
College Graduate n (%)	3 (13%)	2 (16.7%)	4 (14.8%)	0 (0%)	0 (0%)	12 (37.5%)	

JAMA, Journal of American Medical Association Benchmark Criteria; HONcode, The Health on the Net Foundation Code of Conduct. *Statistically different at p<0.05.

Table V - Correlation relationships between rank and readability formulas, JAMA, DISCERN scores, HONcode presences.

Rank	Alexa Rank		Compete Rank		Google Rank		Web Rank Skor		JAMA		DISCERN		HONcode	
	r	p	r	p	r	p	R	p	r	p	r	p	r	p
Mean FRES	–0.019	0.858	–0.058	0.807	–0.131	0.195	0.038	0.848	–0.435*	<0.001*	–0.425*	<0.001*	0.145	0.150
Mean GFOG	0.057	0.589	0.151	0.526	0.128	0.205	–0.090	0.647	0.392*	<0.001*	0.371*	<0.001*	–0.154	0.127
Mean FKGL	0.088	0.402	0.180	0.448	0.158	0.116	–0.137	0.487	0.308*	0.002*	0.283*	0.004*	–0.157	0.118
Mean CL Index	0.011	0.920	0.064	0.790	–0.007	0.944	0.151	0.442	0.179	0.075	0.180	0.073	–0.054	0.591
Mean SMOG index	0.087	0.406	0.062	0.794	0.155	0.124	–0.107	0.587	0.405*	<0.001*	0.371*	<0.001*	–0.126	0.212
Mean ARI	0.135	0.195	0.271	0.247	0.132	0.191	–0.110	0.577	0.056	0.579	0.031	0.756	–0.112	0.268
Mean LW Formula	0.157	0.132	0.230	0.329	0.159	0.114	–0.185	0.345	0.136	0.177	0.100	0.322	–0.122	0.225
Grade Level	0.108	0.303	0.252	0.283	0.143	0.155	–0.102	0.605	0.200*	0.046*	0.165	0.100	–0.122	0.226
Reading Level	0.718*	<0.001*	0.737*	<0.001*	0.759*	<0.001*	0.811*	<0.001*	0.393*	<0.001*	0.360*	<0.001*	–0.091	0.367
Readers Age	–0.096	0.358	0.291	0.213	0.932	0.100	–0.334	0.083	–0.071	0.481	–0.060	0.553	0.089	0.380

FRES, Flesch reading ease score; FKGL, Flesch-Kincaid grade level; SMOG, simple measure of Gobbledygook; GFOG, Gunning FOG; CL, Coleman-Liau score; ARI, automated readability index; LW, ve Linsear Write; HONcode, The Health on the Net Foundation Code of Conduct; JAMA, Journal of American Medical Association Benchmark Criteria. *Statistically different at p<0.05.

sis indexes (Alexa, Compete, Web Rank). There was a statistically significant difference between the reading level and the typologies of 300 words chosen from the texts (p=0.001). This statistical difference can be attributed to government and scientific journal websites.

DISCUSSION AND CONCLUSIONS

There is a rapid increase in the use of Internet-based health information, a phenomenon known as the e-patient revolution (30). Although offering quick access to health information benefits patients, the lack of control mechanisms for the distribution of health care information on the Internet creates plenty of issues (31). Some of these issues include illegal product sales, unlicensed health product promotion, and poor health and information management (32). Furthermore, previous research has often indicated that there is no standard for the readability and reliability of information available on the Internet (33). It is possible to fully comprehend this information if the individual can read and understand it, develop health literacy, and apply it to sound decision-making. Health literacy is described as "the level of accessing, processing, and understanding basic health information that individuals require in order to make health decisions" (34). Because of their health literacy, people can access and read correct health information. Given that Google receives millions of health-related queries every day from around the world, and that nearly 80% of American Internet users get health-related information online, the need of creating a readable website becomes clear once more (34-36). Even when an Internet site provides reliable and high-quality content, a low level of readability might make it tough for users to comprehend it.

Most of the websites in our analysis were created by scientific journals and health portals. Like us, Lee et al. (37) also found that these sources' websites were more widespread and that scientific journals were more difficult to read. Our study showed that scientific journals were difficult to read, using language that was more difficult for the public to understand, like that of the literature. Unlike our study, there are studies in the literature on various themes that demonstrate a higher number of commercial sites (16, 38). It is well known that many financial-oriented websites do not provide reliable information and may mislead their visitors. Fortunately, there are no commercial websites like those in the literature among the top 10 websites in our study (16, 38). Given that people are more drawn to the top ten websites, it is possible that this is a mechanism designed by the search engine to limit the spread of misleading information. The sites established by professional institutions came out on top in our survey, with six of the top ten websites. Our findings are comparable to those reported by Bagcier et al. (39) on the readability of myofascial pain. This is because search engines highlight the contents of professional institutions and associations and offer them to the user to deliver reliable information.

HONcode was found on 20% of 100 websites in our study. In their study on readability of osteoporosis, Yurdakul et al. (40) discovered HONcode in 12.6% of websites, Reynold et al. (41) discovered 30.8% in their study on systemic lupus erythematosus, and Arif et al. (16) discovered HONcode in 17.9% of websites on breast cancer. In this regard, our findings are consistent with those found in the literature. In our study, there was a significant relationship between typology and the presence of HONcode. This statistical difference was found to be related to health portals. Similarly, Chumber et al. (42) discovered that health portals have more HONcodes. Scientific journals appear to have more HONcodes (16, 38). Only two (2/32) of the scientific Journal-sourced websites in our study had the HONcode stamp. It is debatable whether there should be a HONcode stamp for scientific publications. However, adequate certification methods for online health information should be offered. Evaluation of health-related information by a community or an institution before it reaches the public may be considered to provide better quality information.

In our study, the mean DISCERN score was found to be "good" with 51.52±23.80. This score was found by Reynold et al. (39) to be 47.7±13.2 for lupus, and 53.7±10.3 for rheumatological conditions by in Willen et al. (43). In our study, there was a significant difference between website typologies and DISCERN quality scores. Scientific Journals have been found to contain higher DISCERN scores. The average DISCERN score for news sources was the lowest. In this regard, our study is in keeping with previous research (37, 44). In addition, readability scores (FRES, GFOG, FKGL, and SMOG) and DISCERN quality scores were shown to differ significantly. As a result, it is reasonable to conclude that websites with difficult-to-read content provide higher-quality content. In their research, Willen et al. (43) discovered the same inverse association. This can be explained by the fact that in order to produce easy-to-read texts, it is sometimes necessary to sacrifice quality.

Arif et al. (16) and Basavakumar et al. (15) found no significant difference in JAMA score between the top 10 and other websites in their research. In this way, our study is comparable to previous research. Furthermore, there was a significant difference in JAMA scores according to the typology of the websites. Scientific journals have higher JAMA reliability scores, according to an assessment of this significant relationship.

FKGL readability scores were lower in the top 10 websites, according to Basavakumar et al. (15). There was a significant relationship between the top 10 websites and other websites in terms of readability scores (FRES, GFOG, FKGN, and SMOG readability scores) in our study, which was consistent with the literature, and it was concluded that the top 10 websites were more

readable. Kocyigit et al. (38) and Bagcier et al. (39) observed no significant difference between the two groups. Because the top ten websites are the most visited, their readability will aid consumers in comprehending the material.

The typologies and readability of all websites were compared, and there was a statistically significant difference in all readability formulas. It was more difficult to read scientific journals, although professional websites were easier to read. Our study's average readability findings were found to be well above the National Institute of Health's suggested reading level of grade 6. According to Willen et al. (43) for rheumatological disorders and Reynold et al. (40) for lupus, there were texts with readability levels above the suggested level that are difficult to understand for Internet users.

In our study, no significant relationship was found between popularity (Alexa, Compete, WebRank) and readability or typologies. Our findings were like those reported in the literature (45, 46). We found a significant difference between the top 10 websites and other websites based on their Alexa scores. More visits to the top ten websites can explain this significant difference.

According to the results of the content analysis, the most common content among the websites was pathophysiology, and then treatment. Between website typologies and topics, no statistically significant differences were detected. When the top 10 websites were compared to other websites, a significant difference was determined, which was linked to websites that contained risk factor content. This situation can be explained by the desire of individuals to first learn whether they have risk factors related to the disease when they seek information about BD. According to Bagcier et al. (39) for myofascial pain, websites primarily address treatment-related issues, whereas Basavakumar et al. (15) as for fibromyalgia, websites primarily address symptom-related issues. With these findings, it can be concluded that each disease occupies more space on websites devoted to its most popular themes.

The study has its own set of limitations. We only search for websites in English, used a single searched engine, only used "Behçet's disease" as a search keyword, and only detected Internet sites that use a single country's data network, to name a few limitations of our work. Although there is no complete consensus on which index is ideal for assessing the readability of Internet-based patient education materials, the indices we employed in our study are among the most widely used formulas. The websites were targeting an education level considerably over the appropriate one, according to all the metrics we analyzed.

In our study, we found that the readability of online information regarding BD was considerably greater than the National Health Institute's Grade 6 recommendation. The contents of the websites have been assessed to be partially reliable and of good quality. Our results showed that most of the highly reliable information may be found on academic websites. Early diagnosis and awareness are very important in a rheumatological disease such as BD that can cause serious mortality and morbidity. As a result, while creating health-related websites for the general audience, it is essential to examine the language used according to readability indexes. Furthermore, we believe that the information should be presented at a level of readability appropriate for the country or countries to which it is directed.

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Contributions

EÖ and VH designed the study, conducted the data analyses, drafted the initial manuscript, and had full access to all the data in the study and all authors reviewed and revised the manuscript and approved the final manuscript as submitted and agree to be accountable for all aspects of the work. Author Contributions are in line with the ICMJE 4 authorship criteria, and all co-authors take full responsibility for the integrity of all parts of the manuscript.

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Conflict of interest
The authors report no conflict of interest concerning this article.

Ethical approval
The study was approved by the ethics committee of Dokuz Eylül University (6494-GOA 2021/20-12). All study procedures were performed according to the ethical principles of the Declaration of Helsinki and Good Clinical Practice.

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