KTO Karatay Üniversitesi Sağlık Bilimleri Dergisi ISSN: 2717-8501 KTO Karatay University Journal of Health Sciences
Geliş Tarihi:17/01/2025 Kabul Tarihi:04/03/2025
Yıl 2025 | Cilt 6 | Sayı 1 **Araştırma Makalesi/ Research Article** DOI: 10.59244/ktokusbd.1622151

Investigation of the Content, Quality and Readability of Online Information on Exercise in Cardiovascular Diseases

Kardiyovasküler Hastalıklarda Egzersizle İlgili Çevrimiçi Bilgilerin İçerik, Kalite ve Okunabilirliğinin İncelenmesi

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ÖZET

Amaç: Kardiyovasküler hastalıklar (KVH) toplumda önde gelen ölüm nedenidir. KVH için kesin bir tedavi olmasa da egzersiz KVH'nin ilerlemesini ve komplikasyonlarını azaltabilir. Teknolojik gelişmelerle birlikte bireylerin internet üzerinden KVH ve egzersiz hakkında bilgiye erişimi artmaktadır. İnternet bilgilerinin doğruluğu ve güvenilirliği önem kazanmaktadır. Çalışmamızın amacı KVH egzersizleri hakkındaki çevrimiçi bilgilerin içeriğini, kalitesini ve okunabilirliğini değerlendirmektir. **Gereç ve Yöntemler:** 12 Ocak 2025'te Google'da kardiyovasküler hastalıklarda egzersiz anlamına gelen Türkçe 'kardiyovasküler hastalıklarda egzersiz' anahtar kelimesiyle arama yapıldı. 39 web sitesi belirlendi. Web siteleri sahiplerine göre hastane, klinik, sağlık sayfaları, tıp doktoru ve genel olmak üzere beş kategoriye ayrıldı. Web sitelerinin güvenilirliği ve kalitesi Journal of the American Medical Association (JAMA) ve DISCERN skorlamaları kullanılarak değerlendirildi. Okunabilirlik düzeyi Atesman skorlaması kullanılarak değerlendirildi. **Sonuçlar**: Bu platformlardaki çevrimiçi bilgiler JAMA puanlamasına göre genel olarak orta düzeyde güvenilirdi ve kategoriler arasında anlamlı bir fark yoktu (p>0,05). Sayfalar DISCERN puanlamasına göre genel olarak iyi kalitedeydi ve kategoriler arasında anlamlı bir fark yoktu (p>0,05). Atesman puanlamasına göre okunabilirlik düzeyleri orta düzeyde zorluktaydı ve kategoriler arasında anlamlı bir fark yoktu (p>0,05).

Sonuç: Kardiyovasküler hastalıklarda egzersizle ilgili web sitelerinin içerikleri okunabilirlik, kalite ve güvenilirlik açısından iyileştirilmeli ve yetkin kişiler tarafından hazırlanmalıdır. Ayrıca bu konuda bir kontrol mekanizması ve standardizasyon oluşturulmalıdır.

Anahtar Kelimeler: Kardiyovasküler Hastalıklar; Egzersiz; Internet; Kalite; Okunabilirlik

ABSTRACT

Objective: Cardiovascular diseases (CVD) are the leading cause of death in the population. Although there is no definitive treatment for CVD, exercise may reduce the progression and complications of CVD. With technological developments, individuals accessing information about CVD and exercise from the internet is increasing. The accuracy and reliability of internet information is gaining importance. The aim of our study was to evaluate the content, quality, and readability of online information on CVD exercises. **Materials and Methods:** On 12 January 2025, Google was searched with the Turkish keyword 'kardiyovasküler hastalıklarda egzersiz,' which means exercise in cardiovascular diseases. 39 websites were identified. Websites were categorized into five according to their owners: hospital, clinic, health pages, medical doctor, and general. The reliability and quality of the websites were assessed using the Journal of the American Medical Association (JAMA) and DISCERN scores, and readability was assessed using the Atesman score. **Results**: Online information on these platforms was generally moderately reliable according to JAMA scoring, with no significant difference between categories (p>0.05). Pages were generally of good quality according to DISCERN scoring, with no significant difference between categories (p>0.05). According to Atesman scoring, readability levels were of moderate difficulty, and there was no significant difference between the categories (p>0.05).

Conclusion: The content of websites related to exercise in cardiovascular diseases should be improved in terms of readability, quality, and reliability and should be prepared by competent people. In addition, a control mechanism and standardization should be established in this regard.

Keywords: Cardiovascular Diseases; Exercise; Internet; Quality; Readability

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INTRODUCTION

Cardiovascular diseases (CVD) are a class of diseases related to the heart or blood vessels. It includes stroke, heart failure, hypertension, coronary heart disease, arrhythmias, peripheral artery disease and atherosclerosis (Yong et al., 2017). With the advancement of technology, diagnosis and treatment of CVD are improving. Despite these advances, CVD remains among the leading causes of death worldwide (Roth et al., 2018). Lifestyle-related behaviours such as physical inactivity, obesity, unhealthy diet, diabetes and smoking have been shown to contribute to the development of CVD (Briffa et al., 2009; Yusuf et al., 2004). Regular exercise is an important step in the prevention and management of CVD (Tighe et al., 2022). In general, exercise programs should be customized to an individual's exercise capacity, comorbidities, and risk profile. However, 30–60 minutes of aerobic exercise per day, ideally 7 days per week, is recommended, along with resistance training, flexibility, and daily balance exercises 2–3 times per week (Perez-Terzic, 2012; Vanhees et al., 2012). Due to its low cost, low risk and drug-free nature, the European Society of Cardiology recommended that cardiac rehabilitation programmes should include exercise training (Roffi et al., 2016; Tian & Meng, 2019).

Turkey is among the countries with the highest mortality rate from cardiovascular disease in Europe (Kayikcioglu & Oto, 2020). CVDs cause cognitive impairments such as dementia (Johansen et al., 2020). The prevalence of hypertension, a CVD, has been reported as 31.8% by age and gender (Altun et al., 2005). Hypertension is the most widely recognized risk factor for dementia and it is well known that exposure to moderately high blood pressure is particularly important in subsequent adverse treatment regimens and the risk of dementia (Gottesman et al., 2017; Gottesman et al., 2014). The presence of heart failure, another CVD, is associated with a higher incidence of mild cognitive impairment and dementia (Bressler et al., 2017). Reading difficulties are observed in patients with dementia (Noble et al., 2000). The incidence of dementia in illiterate/low-literate individuals is almost three times higher than in literate individuals (Contador et al., 2017). This information suggests that literacy capacity may vary with CVDs and CVD-related dementia.

Over the last years, the primary sources of health-related information worldwide have been online platforms and there has been an increase in trust in these platforms (Unuvar & Ozmen, 2023). Thus, the accuracy, quality and reliability of online sources of information on therapeutic exercises are of great importance in the health sector (Otu & Karagozoglu, 2022). Internet resources are important tools that provide patients and health researchers with easily accessible information. However, one of the most important challenges for patients doing research on the Internet is to access accurate and reliable information and to be able to distinguish misleading online information (Ozturk, 2021; Powell & Clarke, 2006).

Therefore, the aim of this study was to evaluate the information provided by Turkish online platforms on exercise therapies for CVD and to analyse the readability, reliability, quality and effectiveness of these resources. This evaluation aims to provide patients with access to accurate and reliable information so that they can make informed decisions about their treatment options. It emphasizes the need to provide understandable content about CVD, especially to individuals with low health literacy. It will also provide valuable insights to healthcare professionals and researchers on how to best provide exercise-based treatments for CVD online.

MATERIALS AND METHODS

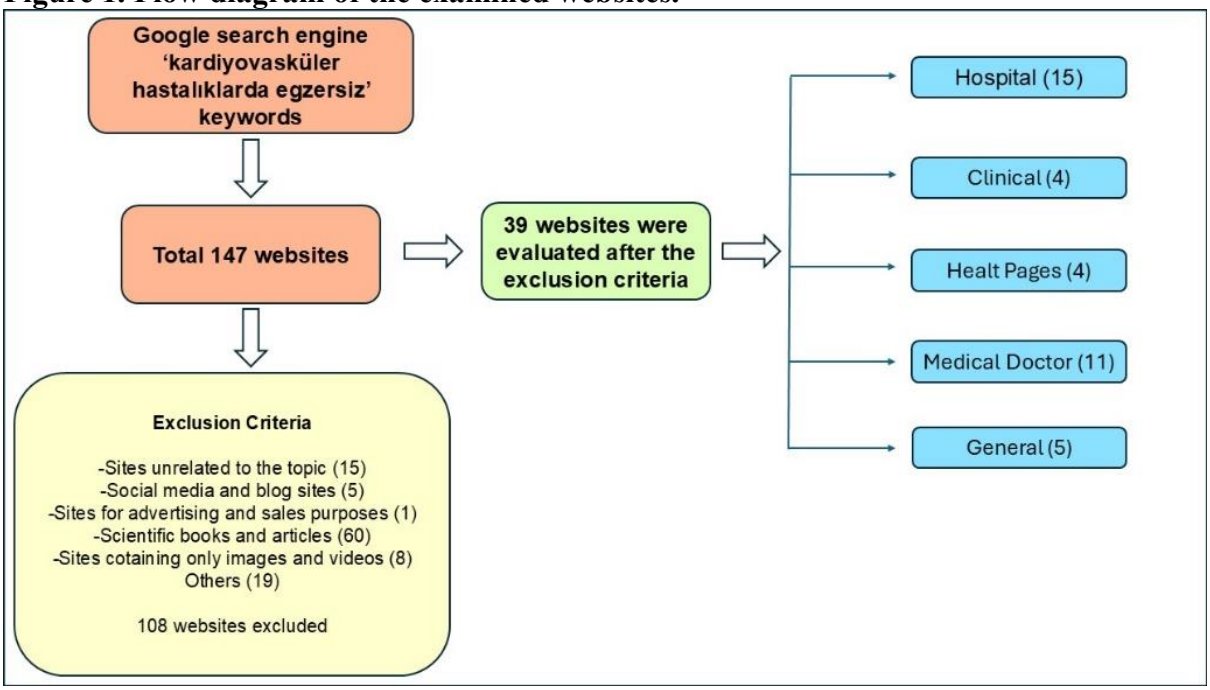
Ethical Compliance

Our study was planned as a cross-sectional study. This study does not require ethical approval as it is based on the analysis of publicly available online content and uses a descriptive content analysis method. However, it was conducted in accordance with ethical research principles (Pirincci & Cihan, 2024; Unuvar et al., 2024).

Research Design and Data Collection

This study used a descriptive content analysis method to assess the readability of online content related to CVD. The Internet has become a major source of health-related information: Google is the world's most popular search engine (StatCounter, 2019). The data were obtained by using the keyword 'kardiyovasküler hastalıklarda egzersiz', which means exercise on cardiovascular diseases in Turkish medical terminology, in the Google search engine (https://www.google.com/) 12 January 2025. In order to determine the sample of the study, a total of 147 online pages, which were determined to be only online web pages listed in the Google search engine, were selected. The 39 online resources that met the inclusion criteria were included in the study by scanning among 147 pages. Websites that met the inclusion criteria were included in the study, while websites that met the exclusion criteria were not included in the study. The websites are divided into five categories according to their owners: hospital, clinic, health pages, medical doctor and general (Fig.1).

Figure 1. Flow diagram of the examined websites.



Inclusion and Exclusion Criteria

The inclusion criteria for the study were online web pages that explained the causes of CVD, offered advice on treating or managing CVD through exercise. Additionally, it focused on mentioning precautions to be taken during exercise, duration and frequency of exercise. Sites that were advertising or sales sites, contained only images or videos, were social media extensions, or were chat or forum sites were excluded from the study. Additionally, news sites and academic articles were excluded from the study.

Analysed Text Features and Parameters

Journal of the American Medical Association Reliability Assessment (JAMA)

The reliability of the reviewed websites was analysed using the JAMA, which evaluates internet-based information in terms of authorship, citation, conflict of interest and timeliness. According to JAMA, when each item is scored with 0 or 1, a score of four indicates the maximum reliability and quality. According to the results of JAMA, 0-1 score indicates low 2-3 score indicates medium reliability and 4 score indicates that the information contains completely sufficient information and is reliable (Silberg et al., 1997).

Quality Criteria for Consumer Health Information

Online information resources were evaluated using the DISCERN scale, which examines the information content for the purpose of the site, the resources used, objectivity and clarity of treatments.

This 16-question instrument is divided into three sections:

DISCERN I - Score for general confidence questions about the information source (questions 1-8).

DISCERN II - Score for questions about the quality of treatment options (questions 9-15).

DISCERN III - Overall evaluation score of the information source (question 16).

The total DISCERN score is the total score for the 16 questions.

Each question is scored from 1 to 5. The scoring is based on the ratings given to these questions, and the quality of the source is determined. According to the score results, 63-80 is considered “excellent”, 51-62 is “good”, 39-50 is “average”, 28-38 is “weak” and 16-27 is “very weak” (Charnock et al., 1999).

Atesman Readability Scale

The readability levels of the texts were analyzed using Atesman readability indexes, which are suitable for Turkish texts. Atesman created his own formula index by adapting the variables of the Flesch formula to Turkish sentence and word lengths.

Readability Score = 198.825 - 40.175 × (total syllables/total words) - 2.610 × (total words/total sentences).

In accordance with this formula, as the score approaches 100, the text becomes easier to read. The Atesman Readability Score (Atesman value) is categorised as very easy if it is within 90-100, easy if it is within 70-89, moderately difficult if it is within 50-69, difficult if it is within 30-49 and very difficult if it is within 1-29 (Atesman, 1997; Kalyoncu & Memis, 2024).

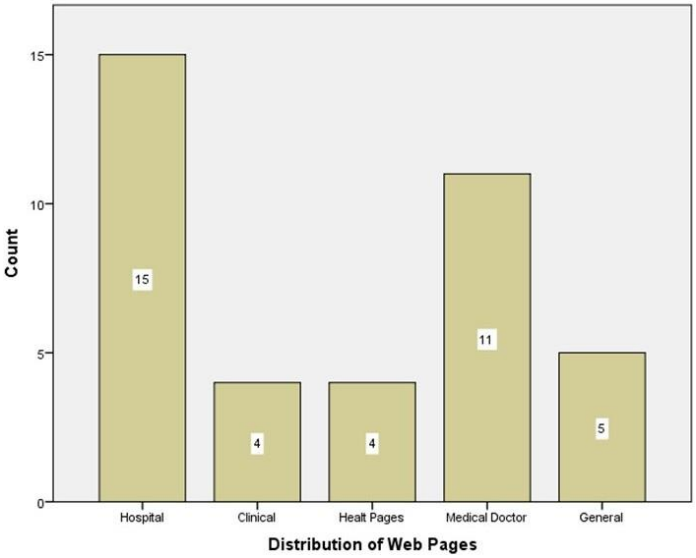
Statistical Analysis

Descriptive statistics are shown as median (min-max), frequency and percentage. Analyses were performed with Kruskal-Wallis test and Fisher Freeman Halton test. The significance level is set as $\alpha=0.05$. Analyses were performed with IBM SPSS Statistics 22.0 software.

RESULTS

Among the 39 websites analysed, 15 were hospitals, 4 were clinics, 4 were health pages, 11 were doctors and 5 were general information websites (Fig. 2).

Figure 2. Distribution of online resources by areas of expertise.



In order to determine the quality of the web pages, the content of the websites was evaluated in detail with questions. There was no significant difference between the categories in terms of the question parameters of the websites we evaluated ($p>0.05$). As a result of the percentage evaluation, it was determined that all of the hospitals provided expert evaluation, mentioned the benefits of exercise and recommended physical activity (100%). It was found that all of the clinic websites provided physical activity recommendations (100%). It was found that all of the health websites mentioned the benefits of exercise, diversified exercise and physical activity recommendations (100%).

It was determined that all of the doctor websites mentioned exercise intensity (100%). Almost all of the websites mentioned the benefits of exercise (92.3%) and recommended physical activity (94.3%). The proportion of websites providing information about the duration (71.8%), intensity (79.5%) and considerations (66.6%) of exercise was lower than the other content responses (Table 1).

Table 1. Exercise-Related Contents of Web Pages

		Hospital n (%)	Clinical n (%)	Health Pages n (%)	Medical Doctor n (%)	General n (%)	Total n (%)	p values
Has a cardiovascular evaluation by a specialist been recommended?	Yes	15 (100%)	3 (75%)	3 (75%)	8 (72.7%)	3 (60%)	32 (82.1%)	0.073
	No	0 (0%)	1 (25%)	1 (25%)	3 (27.3%)	2 (40%)	7 (17.9%)	
Is it supported by visuals?	Yes	10 (66.7%)	3 (75%)	1 (25%)	9 (81.8%)	3 (60%)	26 (66.7%)	0.364
	No	5 (33.3%)	1 (25%)	3 (75%)	2 (40%)	2 (40%)	13 (33.3%)	
Have the benefits of exercise been mentioned?	Yes	15 (100%)	3 (75%)	4 (100%)	10 (90.1%)	4 (80%)	36 (92.3%)	0.227
	No	0 (0%)	1 (25%)	0 (0%)	1 (0.9%)	1 (20%)	3 (7.7%)	
Is the duration of the exercise specified?	Yes	11 (73.3%)	2 (50%)	2 (50%)	10 (91.1%)	3 (60%)	28 (71.8%)	0.274
	No	4 (26.7%)	2 (50%)	2 (50%)	1 (0.9%)	2 (40%)	11 (28.2%)	
Is the intensity of the exercise specified?	Yes	11 (73.3%)	2 (50%)	3 (75%)	11 (100%)	4 (80%)	31 (79.5%)	0.138
	No	4 (26.7%)	2 (50%)	1 (25%)	0 (0%)	1 (20%)	8 (20.5%)	
Is the exercise varied?	Yes	12 (80%)	1 (25%)	4 (100%)	8 (72.7%)	3 (60%)	28 (71.8%)	0.179
	No	3 (20%)	3 (75%)	0 (0%)	3 (27.3%)	2 (40%)	11 (28.2%)	
Is physical activity recommended?	Yes	15 (100%)	4 (100%)	4 (100%)	10 (90.9%)	4 (80%)	37 (94.9%)	0.372
	No	0 (0%)	0 (0%)	0 (0%)	1 (9.1%)	1 (20%)	2 (5.1%)	
Are precautions to be taken while exercising mentioned?	Yes	13 (86.7%)	1 (25%)	2 (50%)	7 (63.6%)	3 (60%)	26 (66.6%)	0.115
	No	2 (13.3%)	3 (75%)	2 (50%)	4 (36.4%)	2 (40%)	13 (33.3%)	

*n, number of online websites; %, percentage.

JAMA scoring was used to assess the methodological quality and reliability of health-related websites. The mean JAMA scores of the web pages analysed are given in Table 2. No significant difference was found between the websites in terms of JAMA score ($p>0.05$). According to the JAMA scores, the websites were determined to have moderate reliability. Among the websites, the scores of general and hospital websites tended to increase compared to physician websites ($p>0.05$, Table 2).

Table 2. JAMA Scores for Websites

	JAMA score Median (Min-Max values)	Scores results	p value
Hospital	3 (0-4)	medium reliability	0.879
Clinical	2.5 (2-3)	medium reliability	
Health Pages	2.5 (0-3)	medium reliability	
Medical Doctor	2 (2-3)	medium reliability	
General	3 (1-4)	medium reliability	

*JAMA: Journal of the American Medical Association; max, maximum value; minimum, minimum value.

DISCERN scoring was used to assess the methodological quality and reliability of health-related websites. When the DISCERN scores of the web pages were compared, it was found that there was no significant difference between the websites (p>0.05). According to the DISCERN total score, it was determined that the reliability and quality of the websites of the clinics were at a moderate level, while the reliability and quality of the other websites were at a good level (Table 3).

Table 3. DISCERN Scores for Websites

	DISCERN Score I Median (min-max values)	p value	DISCERN Score II Median (min-max values)	p value	DISCERN Total Score Median (min-max values)	Scores results	p value
Hospital	26 (22-34)	0.671	27 (16-35)	0.662	57 (43-74)	good	0.649
Clinical	24 (18-32)		17 (16-35)		43.5 (36-72)	average	
Health Pages	29.5 (23-35)		27.5 (23-31)		59.5 (52-71)	good	
Medical Doctor	25 (21-37)		24 (18-35)		53 (41-71)	good	
General	29 (19-38)		26 (7-34)		59 (34-74)	good	

*max, maximum value; minimum, minimum value.

There was no significant difference between the categories in terms of the parameters in the Atesman scale (p>0.05). The highest average number of words, letters, sentences, difficult words, unique words, short words and paragraphs was found in clinic websites, while the highest word length was found in medical health pages websites and the highest sentence length was found in medical doctor websites. According to the Atesman Readability Level, the readability of web pages in all karatogories was moderately difficult (Table 4).

Table 4. Distribution of Atesman readability scale parameters according to the examined websites

	Hospital (Median (min-max))	Clinical (Median (min-max))	Health Pages (Median (min-max))	Medical Doctor (Median (min-max))	General (Median (min-max))	p values
Number of Words	838 (241-1858)	1695.5 (429-3497)	422 (269-650)	632 (345-1565)	517 (259-905)	0.149
Number of Characters	6554 (1953-14839)	13653.5 (3563-28703)	3545 (2262-4953)	5194 (2786-12571)	4113 (2110-7301)	0.160
Number of Difficult Words	821 (241-1842)	1675.5 (429-3411)	415.5 (266-648)	626 (339-1549)	495 (257-851)	0.161
Number of Unique Words	541 (165-879)	871 (225-1745)	374.5 (299-2088)	419 (234-824)	331 8161-566)	0.669
Number of Short Words	129 (286-996)	266 (71-6779	54.5 (35-109)	77 (49-248)	78 (44-190)	0.236
Number of Characters without Spaces	5730 (1709-12917)	11918 (3123-24943)	3113.5 (1981-4299)	4508 (2426-10980)	3588 81845-6253)	0.170
Number of Sentences	56 (22-195)	174.5 (44-414)	42 (28-54)	59 (21-151)	43 (40-139)	0.314
Number of Paragraphs	32 (2-91)	99 (18-355)	19 (13-27)	27 (6-83)	26 (9-99)	0.500
Average Word Length	2.85 (2.68-3.09)	2.91 (2.85-2.97)	2.99 (2.68-3.01)	2.85 (2.68-2.93)	2.8 (2.8-2.93)	0.193
Average Sentence Length	11 (8.9-17.1)	9.65 (8.4-10.8)	10.4 (9-12)	12 (8.7-16.4)	9.7 (6.2-12.9)	0.261
Atesman Readability Index	54 (43.1-61.8)	56.7 (52.9-60.8)	54.4 (48.7-59.8)	58.2 (40.9-68.4)	61 (52.7-69.4)	0.557
Readability Level	moderately difficult	moderately difficult	moderately difficult	moderately difficult	moderately difficult	

*max, maximum value; minimum, minimum value.

DISCUSSION

This study, which we conducted to evaluate the reliability, effectiveness and readability of information on online platforms regarding exercise in cardiovascular diseases, showed that the web pages on the subject were at a moderate level and needed improvement. It was observed that 39 of the 147 web pages examined met the inclusion criteria. It was determined that the readability of the pages was of medium difficulty and the exercise content was at a moderate level.

With the advent of technology, access to health information via websites has increased. Especially in recent years, with the COVID-19 pandemic, most of the information obtained by internet users has been provided by Google (Cuan-Baltazar et al., 2020). The number of adults conducting health-related research online is high (Bujnowska-Fedak & Węgierek, 2020). This situation shows the dominance of the internet, and especially search engines, in obtaining current health information. However, it is important to emphasise that internet users are responsible for the quality and accuracy of the information they obtain from online websites. Therefore, the quality of health information scanned from websites needs to be evaluated.

The websites examined within the scope of the study were shaped in five categories (Fig.1). A distribution was made in the form of pages belonging to hospitals, clinics, health

sites, doctors and general information. It is normal for information sources related to exercise to be shaped in this way. However, it is surprising that there are few general health sites that mention cardiovascular exercise. Therefore, it is thought that there should be more web pages about exercise for those interested in the subject and exercise should be explained in detail.

The frequent inclusion of benefits of exercise and physical activity recommendations in the content of the websites we examined may increase the interest of CVD patients in exercise. The fact that the frequency, variety of exercise and the points to be considered while exercising are rarely mentioned is a situation that needs to be corrected for websites. In addition, the presence of visuals makes the text easy to read and understand (Dogan, 2015). It may facilitate the understanding of the recommended exercises. The visuality rate should be increased in the websites we examined that share information about CVD and exercises.

In websites that have become almost the basic source of information, the accuracy of the information and the source are important (Ozduran, 2022). In addition, the adequacy of the correct information and the source of the information must be presented to the reader. In our study, the JAMA and DISCERN scores, where we tested the accuracy, adequacy and source of information, were similar. The sites we examined were in medium reliability according to the JAMA score. Our results were similar to the study on oral ulcers and recurrent aphthous stomatitis (Yılancı et al., 2023). Interestingly, the JAMA score in medical doctor sites tended to decrease. In particular, there were few medical doctor websites that provided information sources. This may be due to the fact that doctors prioritise advertising and personal branding. In the DISCERN scale, where information quality is evaluated, the websites were generally at a good level in terms of content. The quality and variety of information in the clinic sites were at an average level. In our study, we found that websites related to exercise in cardiovascular diseases have medium reliability according to JAMA scoring; and generally good reliability according to DISCERN scoring.

The Atesman score applied to determine reading difficulty calculated in our study shows that texts on exercise in cardiovascular diseases have a moderate level of reading difficulty. Our study results are similar to similar screenings in different diseases (Keskin et al., 2024). There are also studies in our country that report that the readability levels of health-related websites are generally low (Otu & Karagozoglu, 2022; Unuvar & Ozmen, 2023). We also found in our study that the average word and sentence length evaluated in the Atesman scale is high. On the contrary, short and concise sentences contribute to better assimilation of texts. In internet patient information texts, sentence length of 8-10 words is an important step to increase the understandability of the text (Jackson et al., 1991). Therefore, the average number of words on Turkish websites related to the subject can be reduced.

We think that having sufficient information about the subject of exercise in cardiovascular diseases, which is frequently observed in the society, writing in a more understandable and easy language, and especially presenting the source of information to the reader may be a better guide for individuals doing research on this subject.

There are two main limitations in the study. The first one is that the study only evaluated Turkish content, and 39 websites were included in the study. This may make it difficult for the results in the study to represent all online content. Second, the study was conducted using

Google search engine only, which may not fully reflect the distribution of online content on different platforms. Future research could conduct a more comprehensive analysis using different search engines and platforms.

CONCLUSION

As a result, we found that the information about exercises for cardiovascular diseases on online platforms is of moderate quality and incomplete. Individuals who post information on the subject on the website should take into account the literacy of the public and use an easy-to-understand language that everyone can understand. For this reason, the content of websites on 'exercise in cardiovascular diseases' should be evaluated in terms of readability, quality and reliability and should be prepared by competent people.

Conflict of Interest

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

Financial Support Statement

The research did not receive financial support from any organization.

Authors Contributions

Research Idea/Concept: YAC
Research Design: YAC
Supervision/Consultancy: YAC
Data Collection and/or Processing: YAC
Analysis and/or Interpretation of Data: YAC
Literature Review: YAC
Article Writing: YAC
Critical Review: YAC

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