

## ORIGINAL ARTICLE

# Evaluation of the quality and content of YouTube videos as a source of aerobic exercise training for diabetic individuals

*Diyabetik bireylere yönelik aerobik egzersiz eğitimi kaynağı olarak YouTube videolarının kalitesinin ve içeriğinin değerlendirilmesi*

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**Abstract** **Purpose:** This study aimed to examine the quality and characteristics of aerobic exercise training videos for diabetic individuals published on YouTube.

**Methods:** In this study, 57 videos were included by searching with the keywords "aerobics, exercise, diabetes". For the reliability assessment, the modified DISCERN scale and Journal of the American Medical Association (JAMA) criteria were used and for the quality and usefulness assessment, the Global Quality Scale (GQS) was used.

**Results:** It was observed that most of the videos (64.9%, n=37) we analyzed (n=57) were produced by non-health video sources in this study. Although DISCERN scores of videos produced by healthcare professionals showed a statistically significant difference compared to videos produced by non-health video producers, they were found to be more reliable (p<0.05). When evaluated with JAMA and GQS quality scores, there was no statistical difference (p=0.773; p=0.797, respectively).

**Conclusion:** It was demonstrated that videos produced by health professionals were of higher quality and more reliable. In order to increase the quality and reliability of YouTube as a source of aerobic exercise training information for diabetic individuals, there is a need for more video content produced by health professionals, enriched with exercise variety and practical demonstrations.

**Keywords:** Diabetes mellitus, Aerobic exercise, YouTube videos.

**Öz** **Amaç:** Bu çalışmanın amacı YouTube'da yayınlanan diyabetik bireylere yönelik aerobik egzersiz eğitimi videolarının kalite ve özelliklerini incelemektir.

**Yöntem:** YouTube web sitesinde "aerobic, exercise, diabetes" anahtar kelimesi kullanılarak video taramaları yapıldı. Güvenilirlik değerlendirmesi için modifiye edilmiş DISCERN ölçeği ve Journal of the American Medical Association (JAMA) kriterleri, kalite ve yararlılığının değerlendirilmesi için ise Küresel Kalite Ölçeği (GQS) kullanıldı.

**Bulgular:** Çalışmada incelenen videoların (n=57) büyük kısmının (%64,9, n=37) sağlık dışı video kaynakları tarafından üretildiği görüldü. Sağlık profesyonellerinin ürettiği videoların sağlık dışı video üreticilerine ait videolara göre DISCERN puanları istatistiksel açıdan anlamlı fark göstermekle birlikte daha güvenilir olduğu bulundu (p<0,05). JAMA ve GQS kalite skorları ile değerlendirildiğinde ise istatistiksel açıdan fark olmadığı bulundu (sırasıyla; p=0,773; p=0,797).

**Sonuç:** Sağlık profesyonellerinin hazırlanmış olduğu videoların daha kaliteli ve güvenilir olduğu açık bir şekilde ortaya konmuştur. YouTube'un diyabetik bireylere yönelik aerobik egzersiz eğitimi bilgi kaynağı olarak kalite ve güvenilirliğinin artırılması için sağlık profesyonelleri tarafından üretilmiş daha çok sayıda, egzersiz çeşitliliği ve uygulamalı gösterimler ile zenginleştirilmiş video içeriğine ihtiyaç vardır.

**Anahtar kelimeler:** Diyabetes mellitus, Aerobik egzersiz, YouTube videoları.

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## INTRODUCTION

Common use of the Internet in society has created major changes in the ways of communication and information gathering. The use of the internet for obtaining health-related information is increasing rapidly. It was reported that 75% of individuals with chronic diseases were affected by internet-based information and directed their treatment with this information.<sup>1</sup> Based on the literature, the internet is the first source of medical information for patients who are concerned about their health problems. Patients use the internet to get more information about their health problems, to see people who share the same problems and even to buy medical treatment.<sup>2</sup> On the internet, media resources or platforms increase the awareness of patients on topics such as symptoms of the disease, treatment methods, and preventive approaches.<sup>3</sup> Nowadays, YouTube, which is one of the preferred databases to consult information about the field of health, is the largest media sharing site with 30 million daily and 1 billion monthly active users. The daily number of YouTube videos watched is 5 billion. Moreover, 300 hours of videos are added to YouTube in a minute.<sup>2</sup>

YouTube contains many videos about pathogenesis, diagnosis, treatment and prevention methods of health problems. Nevertheless, obtaining health-related information from online sources is a matter of concern. There is no any mechanism that analyses the quality of videos uploaded on YouTube. Everyone can easily upload videos to YouTube and these videos may contain inaccurate and incomplete information about health.<sup>1</sup> The systematic review, which analyzed eighteen studies, found that YouTube contains high quality videos as well as videos providing contradictory and misleading information.<sup>4</sup> However, it is also reported that the videos are beneficial for patients to learn and practice the exercises as they consist of visual components.<sup>1</sup>

Diabetes mellitus (DM) is a chronic metabolic disease characterized by hyperglycaemia due to insulin deficiency or insufficient insulin production, which leads to substantial health problems.<sup>5</sup> Exercise results in lower plasma glucose and HbA1C levels, decreases basal and postprandial insulin levels,

increases insulin sensitivity and regulates plasma lipid profile.<sup>6</sup> Because of its effects on blood glucose levels in diabetic patients, regular exercise is now accepted as an essential component in addition to the planned diet and medication in the prevention and treatment of DM.<sup>7</sup> In these patients, regular aerobic exercises including large muscle groups and rhythmic body movements have an effective role in glycemic control. At the same time, guidelines also emphasize the importance of training diabetic individuals to self-monitor and manage their disease. Hence, diabetic patients tend to seek information both to learn about appropriate and different treatment options (diet, exercise, lifestyle modifications) and to have adequate knowledge about the disease.<sup>5,6</sup>

In the literature, studies evaluating videos for diabetic individuals on YouTube, such as self-management in type 2 diabetes, diabetes-related polycystic ovary syndrome, and diabetic foot, show that quality and reliability are low.<sup>8-10</sup> When we review the literature, we revealed the lack of researches examining the content and quality of aerobic exercise videos for diabetic individuals. The aim of our study is to evaluate the quality, reliability, and characteristics of YouTube videos that discuss aerobic exercise training for individuals living with diabetes.

## METHODS

In this descriptive study, YouTube™ (<https://www.youtube.com>) website was used to examine the quality, reliability and content of the videos about aerobic exercise training for diabetic individuals. Video searching was conducted using the keywords "aerobic and exercise and diabetes" that can be used by diabetic individuals (October 20, 2023).

Consent and ethical approval for the study was obtained from Hasan Kalyoncu University Health Sciences Non-Interventional Ethics Committee with the decision numbered 2023/64 and dated October 12, 2023. Previous studies revealed that YouTube users prefer to watch the first 100 videos. We based our search on the methods used in similar studies and identified 150 most watched videos considering that it would be sufficient for an adequate power of statistical analysis.<sup>11,12</sup> Before starting the research, the browser search history was deleted

in order to minimize the effect of past internet use on the search results for our study. As the search results may vary on different days, the internet addresses (URLs) that are resource locators were backed up on a word file. Videos with poor image and sound quality, videos lasting less than 30 seconds, videos with duplication, videos without audio narration, videos on unrelated topics and videos not in English were excluded from the study. Among the duplicated videos, only one was included in the study. Additionally, videos categorized as 'shorts' were excluded from the study due to their mandatory time limitation of less than one minute. The videos were evaluated simultaneously on the same day in different locations to avoid potential bias. The independent researchers, one of whom was a physiotherapist with a PhD. and a physiotherapist with a MSc, for their features, resources, and content richness. In cases of disagreement between the evaluations of the two researchers, the videos were reviewed by a senior physiotherapist with a PhD. specialized in physiotherapy and rehabilitation who was unaware of the previous evaluation scores, and the final decision was recorded.<sup>13</sup> Intraobserver reliability was 0.90 (for the Discern score, 0,80 for JAMA score, and 0.86 for the GQS. We categorized the videos based on video sources as health professionals (doctors, physiotherapists, nurses, etc.) and non-health video producers (TV programs, yoga instructors, life coaches, sports trainers, etc.). We also classified the videos according to their content as rich content and poor content.

#### **Evaluation method**

We collected the data of the videos using an evaluation form that included the link address, the person who evaluated the video, and video descriptive findings (duration of the videos, the number of views, the number of days since upload, the number of likes, the number of comments made, the video source, and the date the video was published, view rating are recorded). For reliability assessment, we used the modified DISCERN scale and Journal of the American Medical Association (JAMA) criteria, and for quality and usefulness assessment we used the Global Quality Scale (GQS). Also, video content characteristics were questioned.

**View rating:** To calculate the view rate of the video, the formula (total number of views /

number of days since upload × 100 %) was used.<sup>14</sup>

**Reliability of the video:** The modified DISCERN scale and JAMA criteria were used to measure the reliability of the video. Modified DISCERN is a five-question scale which is used to determine the reliability of the videos. Every question includes yes and no answers. The researchers give a score of '1' for a yes answer and a score of '0' for a no answer. The scores of the five questions in the scale are summed and a total score ranging from 0 to 5 is obtained. A high total score obtained as a result of the evaluation according to the scale indicates the reliability of the video.<sup>15</sup> JAMA evaluates the reliability and accuracy of videos with four items: authorship (authors and contributors), bibliographic references and list of information sources, patent (website, sponsor, advertisement, commercial financing, conflict of interest), and timeliness (published and updated dates). If the video content fulfils the relevant criteria from these headings, it is evaluated by giving a score of '1', if not, '0'. Overall score varies between 0-4 and higher scores indicate that the video source is more reliable and accurate.<sup>16</sup>

**Quality of the video:** GQS was used to assess the quality of the videos. GQS is a scoring system developed by Bernard et al. to measure the quality of information obtained from the Internet. With this scale, researchers evaluate the flow, usefulness and quality of the video. The highest score that can be scored in GQS is five and the lowest score is one. A score of five indicates that the video has a high level of quality and contains clear information, whereas a score of one indicates that most of the information is missing in the video and its quality is quite inadequate.<sup>17</sup> If the total score obtained in the scale is  $\leq 2$ , it is classified as a "low quality" video, 3 as a "medium quality" video, and  $\geq 4$  as a "high quality" video.<sup>1</sup>

**Content of the video:** To assess the YouTube videos content we create 8 items checklist based on The American Association of Clinical Endocrinology, Clinical Practice Guideline for diabetes mellitus patients.<sup>18</sup> Regarding whether or not the relevant topics were mentioned by the researchers; 1 point was given if they were mentioned, and 0 point was given if they were not mentioned. If the average score for the video was 4 and above as a result of the evaluations of

the two researchers, the video evaluated was classified as 'rich content', and those below 4 points were classified as 'poor content' videos.<sup>19</sup> The use of checklists as an assessment tool for content on YouTube, in accordance to guidelines and recommendations, has been previously documented in the literature.<sup>2</sup> For the content analysis, YouTube videos were categorized into eight different categories:

- (1) Including aerobic exercise examples,
- (2) Using respiration during exercise
- (3) Exercise protocol (warm-up, cool-down),
- (4) Necessity to have water and sugar during exercise,
- (5) Exercise termination situations (sweating, shivering, palpitations, feeling of extreme hunger, confusion),
- (6) Vary exercises based on difficulty level,
- (7) The benefits of aerobic exercise for the diabetic individuals,
- (8) The necessity to consult a specialist when an unexpected situation develops during aerobic exercise training.

#### Statistical analysis

In this study, descriptive statistics were given as mean  $\pm$  standard deviation. Shapiro-Wilk test was used to check whether the data were normally distributed. Mann-Whitney U test was used to compare the data that did not show normal distribution, and Kruskal-Wallis test was used to compare the data. The correlation between the numerical variables was evaluated by Spearman correlation analysis. In the evaluation of the correlation coefficient,  $r=0-0.24$  weak,  $r=0.25-0.49$  medium,  $r=0.50-0.74$  strong and  $r=0.75-1.0$  was considered very strong. Statistical analysis was performed with SPSS for windows version 26.0 (IBM Corp. Armonk, NY IBM Corp.) was used for statistical analysis. The significance value was considered as 0.05.

## RESULTS

A total of 150 videos were initially listed and 10 duplicate videos were excluded. The remaining 140 videos were screened according to the exclusion criteria and 57 videos that met the inclusion criteria were evaluated. Based on the content analysis, it was determined that 30 of these videos had 'poor content', while 27 of them had 'rich content' (Figure 1). The average standard deviation, minimum and maximum

values of video length, time passed since uploading, number of views, view rate, number of likes, number of comments and content analysis parameters of the evaluated videos are given in Table 1.

The characteristics of YouTube videos by video source are summarized in Table 2. When the descriptive characteristics of the videos were compared by video source, it was found that videos prepared by non-health video producers were significantly higher than the videos prepared by health professionals in terms of video length, number of views, view rate, number of likes and number of comments ( $p<0.05$ ) (Table 2).

Comparing the video quality scores according to the video source, it was found that the DISCERN scores of the videos produced by health professionals (median (min-max): 3 (1-5)) were higher than the videos produced by non-health video producers (2 (1-4)) and were found to be more reliable with a statistically significant difference ( $p<0.05$ ). Although there was no statistically significant difference when evaluated according to JAMA (3 (2-4), 3 (2-4),  $p=0.773$ ), and GQS (3 (2-5), 3 (2-5),  $p=0.797$ ) quality scores, it was found that videos produced by health professionals had higher scale values compared to videos produced by non-health video producers (Table 2).

Analyzing the distribution of video sources according to content, it was found that 33.3% ( $n=10$ ) of the videos with poor content were produced by health professionals and 66.7% ( $n=20$ ) were produced by non-health resource producers. On the other hand, 37% ( $n=10$ ) of the videos with rich content were produced by health professionals and 63% were produced by non-health video producers. It was observed that the majority (64.9%,  $n=37$ ) of the aerobic exercise videos for diabetic individuals analyzed in our study were produced by non-health video sources (Table 3).

In the evaluation parameters compared according to video content, there was a statistically significant difference between poor and rich video content in the parameters of video length, number of views, view rate, number of comments, DISCERN, JAMA, GQS ( $p<0.001$ ,  $p=0.029$ ,  $p=0.042$ ,  $p=0.041$ ,  $p<0.001$ ,  $p=0.001$ ,  $p=0.012$ ,  $p<0.001$ , respectively) and these parameters were higher in rich content videos. In the parameter of the number of likes,

although there was no statistically significant difference, the mean standard deviation value was found to be higher in rich content videos ( $7847.91 \pm 16417.35$ ) than in poor content videos ( $4640.17 \pm 9088.87$ ) ( $p=0.086$ ) (Table 4).

When the correlation between the scales that we used as quality scores in video evaluations in our study was analyzed, it was found that there was a strong statistically significant positive correlation between DISCERN and JAMA ( $r=0.642$ ) and DISCERN and GQS ( $r=0.648$ ) scales, and when the correlation between JAMA and GQS ( $r=0.544$ ) was analyzed, it was similarly found that there was a strong statistically significant positive correlation (Table 5).

## DISCUSSION

The aim of the current study was to analyze the content, quality, reliability and features of aerobic exercise education videos for diabetic individuals on YouTube. As a result of our study, it was observed that the majority of video sources with aerobic exercise education content prepared for diabetic individuals on YouTube were non-health producers. It was also found that videos produced by non-health video producers received more engagement. However, our study also revealed that videos produced by healthcare professionals were of higher quality and more reliable. When the videos were evaluated in terms of content, it was found that the rate of patients watching videos with rich content was significantly higher and interaction with patients watching videos was higher than videos with poor content.

In our study, when the aerobic exercise training videos prepared for diabetic individuals were examined, it was observed that the number of views, view rate, number of likes and number of comments in the content presented by non-health video producers were higher than the videos presented by health professionals. On the basis of these findings, we believe that the accessibility of the videos of non-health video producers to the public is higher. We believe that when the videos of non-health video producers are analyzed, the higher number of likes and comment interactions compared to health professionals may be due to the higher number of views and viewership rates in these

videos.

In a systematic review of the literature, which included a significant number of YouTube videos related to health services, it was revealed that sources other than health professionals produced more content in terms of sources.<sup>20</sup> Agلاميş et al. conducted an evaluation using the GQS scale in their study to examine the quality of YouTube videos on vulvodynia. When the videos were classified according to the GQS score, it was reported that 58% of the videos had a low quality level, but 56.3% of the videos whose source was non-profit universities, professional organizations and physicians were of good quality.<sup>21</sup> In the present study, when the videos were evaluated with the DISCERN scale, which examines the accuracy and objectivity of the information, it was found that the video content produced by health professionals was more reliable than that of non-health video producers. In order to access accurate information, we think that it would be more beneficial to prefer videos produced by health professionals. However, when the videos analyzed in our study were evaluated with JAMA and GQS according to their quality and reliability, there was no statistical difference although the mean standard deviation values of the scale scores of the videos produced by health professionals were higher, similar to the literature.<sup>21,22</sup> This is thought to be due to the fact that non-health sources were more than health professionals in our study. We are of the opinion that the reason why the majority of the video sources in our study were from non-health professionals is that our keywords are a subject that may be of interest to many professional groups.

Even though it has been observed in many studies that health professionals are the ones who upload videos, videos related to health on the YouTube platform need a higher quality. Since it is not possible to remove or edit the uploaded videos, the videos to be uploaded in the future should be prepared by utilizing medical and academic sources and more health professionals should be encouraged to be involved in the videos.<sup>23,24</sup> It is our opinion that it is important for health professionals to produce more videos on this subject in order to reach unbiased and accurate information for those who apply to these videos. Based on our

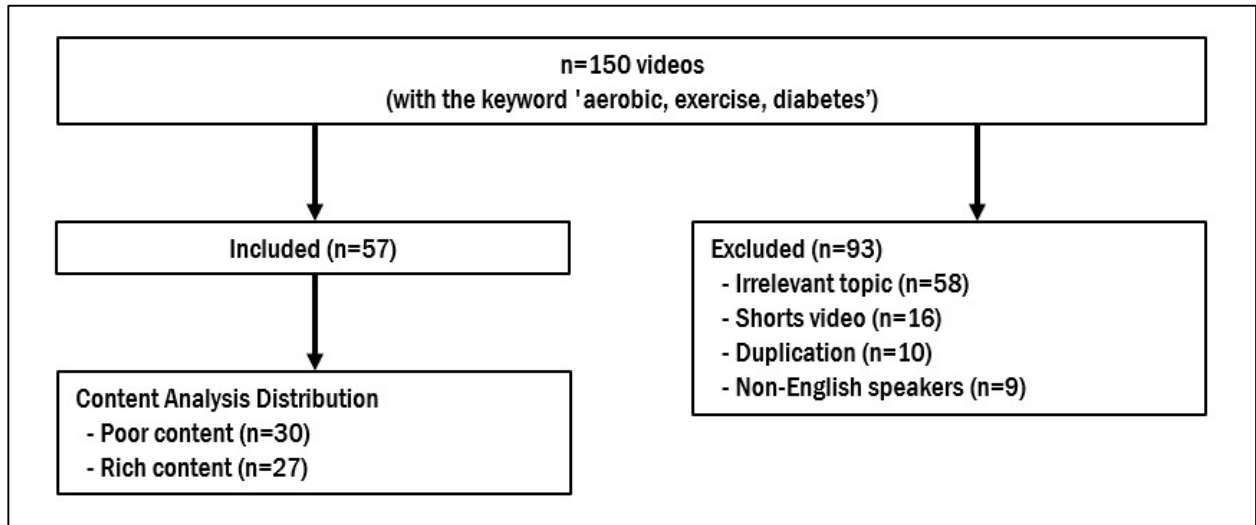


Figure 1. Selection of YouTube videos for the study.

Table 1. Descriptive findings of the videos.

	Median (Min-Max)
Video Length (min)	9.5 (0.5-850.0)
Passing Time Since Loading (days)	1375 (48-5802)
Number of Views	123865 (121-4013525)
View Rate (%)	9973 (1.5-280470)
Number of Likes	1900 (0-76000)
Number of Comments	116 (0-3863)
Content Analysis	3 (1-8)

Table 2. Comparison of parameters according to source.

	Health Professionals (n=20)	Non-Health (n=37)	p
	Median (Min-Max)	Median (Min-Max)	
Video Length (min)	4.7 (0.5-35.4)	12.0 (0.5-850.0)	0.021*
Number of Views	20448 (121-1301504)	239440 (419-4013525)	0.003*
View Rate (%)	1527 (1.5-136679)	26064 (11-280470)	0.004*
Number of Likes	199 (0-48000)	3100 (1-76000)	0.003*
Number of Comment	19 (0-2309)	185 (0-3863)	0.011*
<b>Quality Scores</b>			
DISCERN	3 (2-5)	2 (1-4)	0.009*
JAMA	3 (2-4)	3 (2-4)	0.773
GQS	3 (2-5)	3 (2-5)	0.797

\*p<0.05. DISCERN: Criteria for Consumer Health Information. JAMA: Journal of the Medical Association. GQS: Global Quality Scale.

Table 3. Video source distribution according to content.

	Poor Content	Rich Content	Total
	n (%)	n (%)	n (%)
Health Professionals	10 (33.3%)	10 (37%)	20 (35.1%)
Non-Health	20 (66.7%)	17 (63%)	37 (64.9%)

Table 4. Comparison of parameters according to content.

	Poor Content (n=30)	Rich content (n=27)	p
	Median (Min-Max)	Median (Min-Max)	
Video Length (min)	5.7 (0.5-42.4)	14.0 (2.1-850)	<0.001
Number of Views	53287 (121-2001205)	250199 (296-4013525)	0.029*
View Rate (%)	5111 (5.6-159332)	26645 (1.5-280470)	0.042*
Number of Likes	779 (0-38000)	3100 (1-76000)	0.086
Number of Comment	31 (0-2309)	186 (0-3863)	0.041*
Quality Scores			
DISCERN	2 (1-4)	3 (2-5)	<0.001
JAMA	3 (2-4)	3 (2-4)	0.012*
GQS	3 (2-4)	4 (2-5)	<0.001

\*p<0.05. DISCERN: Criteria for Consumer Health Information. JAMA: Journal of the Medical Association. GQS: Global Quality Scale.

Table 5. Correlation of video quality scores.

	DISCERN	JAMA	GQS
	rho	rho	rho
DISCERN	-	0.642*	0.648*
JAMA	0.642*	-	0.544*
GQS	0.648*	0.544*	-

\* p<0.01. rho: Spearman rank correlation coefficient. DISCERN: Criteria for Consumer Health Information. JAMA: Journal of the Medical Association. GQS: Global Quality Scale.

video content analysis and researchers' professionalism in rehabilitation, we have determined that exercise diversification is high in the video of non-health resources that classified as poor content. But people preferred these videos more than others. Hence, we think that creating videos with rich content prepared by health professionals and showing exercise diversification practically in the videos can increase the public's preference for these videos and thus provide the public with access to

accurate information.

Besides, when the time passed since video uploading was analyzed in our study, median: 1375 (48-5802) days also covers the COVID-19 pandemic process. As a result of this process, there have been compulsory changes in the exercise habits of individuals and individuals have increased their tendency towards exercises that can be performed in the home environment. Thus, we think that diabetic individuals may also prefer videos showing aerobic exercise types

in practice when they search for videos about aerobic exercises on YouTube.<sup>25,26</sup>

In order to protect content producers from 'dislike attacks', YouTube has removed the visibility of the number of dislikes.<sup>27</sup> This resulted in the inability to evaluate the like rate and Video Power Index (VPI) parameters used to assess video popularity.<sup>28</sup> When the number of likes was compared, although it was higher in rich content videos compared to poor content videos, no statistical difference was found. But in this case, since we could not reach the number of likes versus dislikes and could not compare the liking rate, we believe that the evaluation of the number of likes alone may give misleading results.

In another study in which the quality of web-based information sources was investigated, it was shown that the number of participants who believed that the health-related information on popular web sites was accurate was 33%.<sup>29</sup> Moreover, in another study planned for a similar purpose in the literature, it was shown that 86% of the people who used internet resources to access medical information thought that the information they accessed was reliable and accurate.<sup>30</sup> Nevertheless, considering that our study, in which we examined the video quality and reliability of aerobic exercise training contents prepared for diabetic individuals on YouTube, a web-based platform, revealed that the quality and reliability of the video contents produced by sources other than health professionals were insufficient, it is of great importance that the videos to be produced in the field of health are reliable and accurate when we consider that a significant part of the people who apply to such health-related information put forward in the literature will trust and apply these contents.

#### **Limitations**

This study has some limitations. Primarily, it is a cross-sectional study, which provides immediate insight into the views, comments, and likes of diabetic individuals on YouTube videos featuring aerobic exercise. However, it is important to note that the numbers associated with views, comments, and likes on the YouTube platform can fluctuate over time. Additionally, there is a possibility of bias, including selection bias, which could influence the representativeness of the 150 most-watched videos analyzed in relation to all videos related

to aerobic exercise for diabetic individuals. The third limitation of this study is that we only analyzed English language videos. It is difficult to generalize the results of our study because of the language selection of the videos. However, English is accepted as the dominant language among users on the web. Although we thought so, our findings were consistent when compared with other studies. With the dominance and popularity of YouTube as a web-based video streaming platform, it has become an important and publicly available source of information.<sup>31</sup> Furthermore, the results may not be applicable to other social media platforms, as we only analyzed YouTube videos.

#### **Conclusion**

As a result of our study, it was observed that the majority of the sources that prepared videos on YouTube with aerobic exercise education content prepared for diabetic individuals were non-health video producers. In addition, it was found that videos produced by non-health video producers were watched more than videos produced by health professionals and received more likes and comment interactions. In spite of this, the results of our study clearly showed that the videos prepared by health professionals are of better quality and more reliable. When the videos were evaluated in terms of content, it was observed that the viewing rates of the videos with rich content were significantly higher and the interaction with the patients watching the videos was higher than the videos with poor content. In the light of this information, health professionals should produce more videos with aerobic exercise training content for diabetic individuals on the YouTube platform, which is frequently used by patients, will enable patients to access accurate and reliable information. Additionally, we believe that enriching the videos produced by health professionals with a variety of exercises and practical demonstrations will increase the preference of patients.

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data analysis/interpretation, literature research, critical review. **ENÖ:** Methodology, data collection, data analysis/interpretation, literature research.

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