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Is YouTube a Reliable Online Platform for Scoliosis Exercises?: A Cross-Sectional Study

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Abstract **Objective:** YouTube is an important platform for sharing information. There is no study that evaluates scoliosis exercise videos on YouTube as technical and content yet. The aim of this study was to evaluate the quality and reliability of scoliosis exercises videos on YouTube. **Methods:** This was a cross-sectional study. To access the videos about scoliosis exercise, an online search on Youtube was performed using the term‘’scoliosis exercise”on the 5th of April,2022. The popularity of videos was assessed with Video Power Index (VPI),the technical and educational quality, and the reliability of videos were measured using the Global Quality Scale(GQS),the Journal of American Medical Association(JAMA) benchmark criteria, and modified DISCERN instrument. **Results:** Fifty-three exercise videos were included in the study. Twenty-seven videos(50.9%) included general spinal stretching and strengthening exercises, six(11.3%) included Schroth therapy, twelve(22.6%) were yoga exercises, and eight(15.1%) were pilates exercises. When the videos were divided into two groups according to uploaders as medical(n=24) and non-medical professionals(n=29),no significant difference was determined between both groups in terms of the number of likes/dislikes, total/daily views, VPI, and GQS scores($p > 0.05$). On the other hand, the JAMA and modified DISCERN instrument scores were found significantly higher in medical professionals ($p=0.011$,and 0.022, respectively). Also, a significant difference was found in terms of uploader profile($p=0.021$), the modified DISCERN($p<0.001$),and JAMA scores($p<0.001$) between three educational quality levels. **Conclusion:** The YouTube videos on scoliosis exercises had poor quality.High-quality and reliable videos were mainly sourced from medical professionals.Additionally, the technical characteristics of the videos have not related to the reliability and quality of them.

Key Words exercise, quality, reliability, scoliosis, YouTube

1. Introduction

Scoliosis is a three-dimensional spinal deformity [1], [2]. The etiology of scoliosis has not been clarified yet. In 80% of cases, the cause of the deformity cannot be determined and it is called idiopathic scoliosis. It is classified chronologically as infantile, juvenile, adolescent, and adult idiopathic scoliosis [1]. The treatment options for scoliosis are observation, scoliosis-specific exercises, bracing, and surgery [1], [3].

Exercise treatment in scoliosis is decided according to the magnitude of the spinal deformity [4]. Scoliosis-specific exercises are used in mild curves, for moderate curves (in combination with brace therapy), and in adulthood [4]. The exercise program is always created individually and according to the location and direction of the curvature [1], [4].

The Internet is a popular source for obtaining and sharing information on health issues. Especially for learning exercises, visual information are more effective than readable materials [5]. YouTube is the largest online sharing site, and this site is considered to be used as an educational tool on health issues [6], [7]. Although users are viewing and uploading videos about health topics on Youtube, there is not an editorial process and the quality of the videos is not known well. This situation requires the evaluation of health-related videos [8]. Therefore, the purposes of this study were to assess the technical and educational quality, and relability of the scoliosis exercise videos on YouTube.

2. Methods

A. Data collection

To access the videos about scoliosis exercises, an online search on Youtube was performed using the term ‘’scoliosis exercise”. The search was conducted on the 5th of April 2022. Before entering the keyword, the search history was cleared. Videos were listed by ‘’Relevance-Based ranking”.

The first 169 eligible videos were evaluated; videos not related to scoliosis exercises, in languages other than English, and sharing patient experiences were excluded. Selected videos were ranked by an Orthopedic surgeon and a Physical Medicine and Rehabilitation specialist with more than five years of experience in scoliosis and other spinal deformities.

B. Video parameters

The number of likes/dislikes, daily and total number of views, the length of the videos, the upload date, and the uploader profiles were noted. It was also noted whether exercise was specified according to the location of the curvature, and whether scoliosis- specific exercise were mentioned.

Video Power Index (VPI) was used for assessing the popularity of the exercise videos [9]. It is calculated as ‘’like ratio * view ratio/ 100 ‘’ [the like ratio = like * 100/ (like+ dislike), and the view ratio = number of total views/ days] [10]. The videos were categorized under two groups according to video uploaders: 1) medical professionals (physician, physiotherapist, chiropractor, and osteopath); 2) non-medical professionals (yoga instructor, pilates instructor, exercise trainer).

C. Evaluation of quality, educational quality, and reliability of videos

For evaluating the quality of information in the exercise videos, The Journal of American Medical Association(JAMA) benchmark criteria were used. The score is determined by four criteria: ‘source, ’authorship, currency, and disclosure”. Each criterion was scored from 0 to 4, and the total score was calculated [11].

The Global Quality Score(GQS) was performed to determine the educational quality of videos. The scale is created as a tool for the evaluation of internet-based resources. It is scored from 1 to 5: 1-2 = poor – generally poor quality, not helpful for the patients; 3= moderate quality; 4-5 = good-excellent quality, highly useful for the patients [12]. The modified DISCERN instrument was performed to examine the reliability of videos [13]. It is a reliable tool for evaluating YouTube videos [10], [14], [15]. The modified DISCERN instrument consists of 5 ‘’yes-no” questions. 1 point is received for each ‘yes’ answer, and the total score is summed [10].

D. Ethical considerations

Ethics committee approval is not required as the present study was conducted by evaluating only accessible YouTube videos, as in similar studies in the literature [10], [16]. Also, no animals or human participants were included in the trial.

E. Data analysis

Data analysis was performed using SPSS version 23.0 (MacOs, IBM Corp., Armonk, NY, USA). Shapiro-Wilk test and histogram were used for the distribution of variables. For the descriptive statistics, mean (standard deviation), minimum and maximum values, median values and percentages were presented. Independent Samples t-test was used to compare the quantitative data, and the chi-square test was used to compare the categorical data. Correlation of quantitative data was evaluated with Spearman or Pearson correlation analysis. A correlation coefficient below 0.25 was accepted as a little or no relationship, between 0.26 and 0.49 as fair relationship, between 0.50 and 0.69 as moderate, between 0.7 and 0.89 high, and above 0.9 as an excellent relationship. Kappa coefficient was used to assess inter-observer agreement.

3. Results

A total of 53 videos uploaded between 28/09/2009 and 16/03/2022 were met the inclusion criteria, and 116 videos were excluded. Three of them were prepared in other languages than English or had no subtitles in English, twenty-one videos contained patient experiences, fifty-two were repetitive videos, and fourty were unrelated to scoliosis exercises. Cohen’s kappa score for interobserver agreement was 0.707, 0.847, and 0.861 for the JAMA, GQS, and modified DISCERN, respectively.

Three of the uploaders (5.7%) were physicians, sixteen (30.2%) were physiotherapists, eight of them (15.1%) were pilates instructors, fourteen (26.4%) were yoga instructors, five (9.4%) were chiropractors or osteopaths, and seven (13.2%) were exercise trainers. The uploaders of the first three videos with the highest ratio of daily views were physiotherapist (5307.7), pilates instructor (952.6), and yoga instructor (868.3). The mean VPI score of the videos was 231.8 (730.6). The technical characteristics of Youtube videos on scoliosis exercises were shown in Table 1. ’The most viewed (number of total view: 6671826) and liked (number of likes: 153000) video was uploaded by a physiotherapist. The video has poor reliability and quality (The DISCERN score: 1; JAMA score: 0; GQS score: 1).

Regarding the type of exercises in the videos: twenty-seven videos (50.9%) included general stretching and strengthening exercises of the spine, six (11.3%) included Schroth therapy, twelve (22.6%) were yoga exercises, and eight of them (15.1%) were pilates exercises. Scoliosis-specific exercises other than Schroth therapy were not mentioned in the videos. In about half of the videos (49.1%; n=26), exercise suggestions were made by specifying the location and direction of the curvature.

When the exercise videos were divided into two groups according to uploaders as medical (n=24) and non-medical professionals (n=29), no significant difference was shown between both groups in terms of number of likes/dislikes, daily and total number of views, GQS, and VPI scores ($p> 0.05$). On the other hand, the JAMA scores and the modified DISCERN instrument were significantly higher in medical professionals ($p= 0.011$, and 0.022, respectively) (Table 2).

The relationship between the reliability and quality scores with each other and the technical parameters of videos were evaluated. There was a high correlation between DISCERN score and JAMA score ($p< 0.001$, $r= 0.746$), and between DISCERN score and GQS score ($p< 0.001$, $r= 0.732$). The GQS score was moderately correlated with the JAMA score ($p< 0.001$, $r= 0.659$). There was no relationship between

	Min	Max	Mean (SD)	Median	Percentiles		
					25	50	75
Likes	1	153000	6113.9 (21566.5)	1000	259	1000	3600
Dislikes	0	2200	127.7 (331.7)	16	6	16	92.5
Daily view rate	1.1	5307.7	237.1 (741.5)	48.7	16.2	48.7	136.8
Number of total views	17	6671826	357021.7 (10002095.1)	47178	12571	47178	201187
Duration(minute)	1.3	102.9	12.4 (14.4)	9.2	5.9	9.2	13.4
VPI	1.1	5233.4	231.8 (730.6)	46.9	15.6	46.9	134.6

Table 1: Technical characteristics of the Youtube videos

		Mean (SD)	Mean difference	95% CI for difference		p
				Lower bound	Upper bound	
Number of Likes	Medical Prof. Nonmedical Prof.	9647.4 (30770.5) 3189.6 (8153.3)	6457.8	-5469.1	18384.8	0.282
Number of Dislikes	Medical Prof. Nonmedical Prof.	191.3 (451.8) 74.9 (174.1)	116.4	-66.3	299.0	0.207
Number of total views	Medical Prof. Nonmedical Prof.	513216.7 (1361800.9) 227756.8 (550794.1)	285459.9	-269339.9	840259.7	0.306
Daily view rate (view ratio)	Medical Prof. Nonmedical Prof.	390.3 (1064.0) 110.3 (232.9)	280.1	-127.2	687.3	0.173
mDISCERN instrument	Medical Prof. Nonmedical Prof.	2.6 (0.9) 1.9 (0.7)	0.6	0.1	1.1	0.011*
JAMA score	Medical Prof. Nonmedical Prof.	1.9 (1.0) 1.4 (0.6)	0.5	0.1	1.0	0.022*
GQS	Medical Prof. Nonmedical Prof.	2.9 (1.0) 2.5 (0.7)	0.4	-0.1	0.9	0.156
VPI	Medical Prof. Nonmedical Prof.	382.1 (1049.0) 107.4 (227.9)	274.7	-126.6	676.0	0.175

Table 2: Between group analysis of the quantitative data according to the uploader profile

reliability/ quality scores and technical parameters of the videos (Table 3).

When the data was analyzed according to the level of educational quality, there was a significant difference in terms of uploader profile($p= 0.021$), modified DISCERN instrument ($p< 0.001$), and JAMA scores ($p< 0.001$). It was found medical professionals had more educational videos than nonmedical professionals. In addition, there were significant differences in modified DISCERN and JAMA scores between all three quality levels (Table 4).

4. Discussion

Although the Internet is a large network with the potential for ease of access to information, there is no editorial process to assess the educational quality, and reliability of most shared information [8], [11]. The purpose of this study was to examine the technical and educational quality, and reliability of the scoliosis exercise videos available on YouTube. Based on the present study results, it was found that the technical characteristics of the videos (number of like, dislike, daily view rate, total views, and popularity of the videos) were not found to be related to the technical quality, educational quality, and reliability of the video contents. The reliability and quality of medical professionals' videos were higher than non-medical professionals. Additionally, when the videos were classified according to their educational quality levels, it was determined that the reliability and quality of the videos increased as the educational quality increased.

To our knowledge, this is the first study to assess the quality and reliability of educational Youtube videos on scoliosis exercises. Scoliosis is a 3-dimensional spinal deformity that reduces the quality of life of patients, causes functional limitations, and increases cosmetic deformities. Since the deformity has a progressive nature, patients are treated as early as possible after diagnosis [4]. There are several treatment methods according to the curve magnitude and bone maturity of the patients. Physical exercises are one of the treatment options for scoliosis and many studies comprise the positive effects of exercise treatment in idiopathic scoliosis [1], [17], [18].

Scoliosis exercise therapy is always individualized and performed regularly to achieve the best results. It is also recommended therapists evaluate the quality of exercises performed by the patients with scoliosis [1]. A patient's exercise program is created according to the location of the curvature. Also, the direction of the lateral rotation and deviation are important for customizing the exercises [19]. In the current study, the exercises were shown according to the location and direction of curvature in about half of the videos. The remaining videos had exercise recommendations without describing the curvatures. This result showed that patients with scoliosis accessing these videos could perform inappropriate exercises.

There are so many specific types of scoliosis exercises mentioned in the literature. Some of these methods are the Schroth method, the Scientific Exercise Approach to Scoliosis(SEAS), the Side-shift program, and Dobosiewicz technique [20]. Also, there are several poor-quality studies evaluated the effect of Yoga and Pilates exercises for scoliosis [21], [22]. In the present study, it was only mentioned general

	DISCERN	JAMA score	GQS
Number of likes r p	-0.131 0.349	-0.203 0.144	-0.192 0.169
Number of dislikes r p	-0.60 0.671	-0.130 0.353	-0.129 0.359
Daily view rate r p	-0.104 0.458	-0.177 0.205	-0.169 0.226
mDISCERN r p	1	0.746* <0.001	0.732* <0.001
JAMA score r p	0.746* <0.001	1	0.659* <0.001
GQS r p	0.732* <0.001	0.659* <0.001	1
VPI r p	-0.106 0.452	-0.178 0.201	-0.171 0.222

Table 3: Correlation between parameters and reliability/quality scores of the videos in the study

	Low quality (n=20)	Medium quality (n=22)	High quality (n=11)	p
Medical Professional (n(%))	8 (33.3%)	7 (29.2%)	9 (37.5%)	0.021a*
Non-medical Professional (n(%))	12 (41.4%)	15 (51.7%)	2 (6.9%)	
mDISCERN Median(min-max)	1 (1-2)	2 (1-3)	3 (2-4)	<0.001b* Low-Med: <0.001c** Med-High: 0.001c** Low-High:<0.001c**
JAMA Median(min-max)	1 (0-3)	2 (1-3)	2 (2-4)	<0.001b* Low-Med: 0.001c** Med-High: 0.009c** Low-High:<0.001c**
VPI Median(min-max)	38.8 (1.1-5233.4)	38.45(3.6-930.7)	121.5(3.6-607.5)	0.156b
Number of likes Median(min-max)	652 (1-153000)	1050 (49-36000)	1700 (142-12000)	0.273b
Number of dislikes Median(min-max)	14 (0-2200)	16 (0-841)	43 (0-289)	0.318b
Daily view rate Median(min-max)	39.7 (1.1-5307.7)	39.1 (3.6-952.6)	131.6 (3.7-622.4)	0.154b

Table 4: The analysis of the study data according to the educational quality levels

strengthening and stretching exercises, the Schroth method, yoga, and pilates exercises. Most of the videos (50.9%) included general exercises.

Küçükakkaş et al. [10] found a positive correlation between educational quality and viewing rates of the videos. Bahar-Ozdemir et al. [16] also determined a positive correlation between the accuracy, quality, reliability scores and number of views. In another study, it was demonstrated a positive relationship between the JAMA score and the total number of views [8]. Unlike these, no relationship was found between the number of views and the quality/reliability of the videos in the current study. Also, other technical parameters were not correlated with the reliability and quality of the videos. These results should be considered in terms of providing easy access to unreliable information on YouTube in patients with scoliosis who were suggested exercise therapy by their physicians and revealing the risk of progression of the curvature by performing the exercises in these videos. According to the present study results, it was shown that high-quality videos were also found to have greater reliability levels. However, it was considered that no correlation was determined between the number of likes/dslikes, total and daily views, popularity and reliability/quality of the videos. These results were similar to the study of Kocyigit et al. [6] The results of both studies showed YouTube users may not be very experienced in assessing the reliability and quality of videos.

According to the GQS scores, 37.5% videos were low, 41.5% were intermediate, and 20.8% of them were high quality. Similar to the present study, Rittberg et al. [23], and Hawryluk et al. [12] demonstrated that high-quality video ratios were 19.6%, and 23%, respectively. On the other hand, several studies showed that most videos were of high-quality [13], [14]. These conflicting results may be related to evaluating videos with a subjective scale, and investigators examined the videos about different diseases and situations.

Additionally, the primary uploaders of the low-quality videos were non-medical professionals, while high-quality and reliable videos were mainly sourced from medical professionals. Similarly, one study demonstrated higher quality and reliability scores in the videos for health professionals [10].

The present study has also some limitations. First, videos were listed using the keyword ''scoliosis exercise'' only. Specific exercise terms (such as ''Schroth method'', ''SEAS method'', etc.) could be searched for, but a general term was used as it was assumed that patients would not know the specific terms. The second limitation is the relatively small sample size. However, in most studies, it was evaluated a similar number of videos [16], [24]. Also, most YouTube users generally consider the first two pages of search results [25]. Additionally, the fact that YouTube does not provide information about whether patients or parents watch the videos can also be considered as a limitation.

5. Conclusion

Based on the results, it was demonstrated the YouTube videos on scoliosis exercises had poor quality, and high-quality and reliable videos were mainly sourced from medical professionals. Additionally, the technical characteristics of videos have not related to the technical quality, educational quality, and reliability of videos. Also, it was found the quality and reliability of exercise videos were increased as their educational quality increased.

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Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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