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Educational quality of YouTube videos on scapular dyskinesis: a cross-sectional analysis

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Background: YouTube is a widely accessible platform that facilitates the rapid dissemination of both evidence-based and potentially misleading health-related information. This study assesses the educational quality, reliability, and comprehensiveness of the most-viewed YouTube videos about scapular dyskinesis.

Methods: A systematic search was conducted on YouTube using the keywords "scapular dyskinesia" and "scapular dyskinesis." The top 100 videos for each keyword were screened for inclusion, and the metrics, sources, and content of the included videos were analyzed. Video quality and reliability were assessed using the Global Quality Scale and the modified DISCERN scale, respectively. In addition, a newly developed, non-validated tool, Scapular Dyskinesis Specific Scoring, was used to provide a condition-specific content assessment.

Results: The analysis revealed that 48.1% of the videos were low quality, and 62.0% lacked reliability. Videos produced by health-related websites exhibited superior quality. Content focusing on treatment and diagnostic approaches demonstrated significantly higher quality than other content categories (P<0.001). A correlation analysis indicated that the Video Power Index did not correlate significantly with reliability, quality, or comprehensiveness scores. Additionally, a simple regression analysis revealed that the video upload time negatively affected the quality, reliability, and comprehensiveness metrics.

Conclusions: Most YouTube videos on scapular dyskinesis were of low quality, lacked reliability, and failed to provide comprehensive and accurate information. Furthermore, high-quality and reliable content tended to receive relatively low engagement and user preference scores. These findings underscore the urgent need for well-structured, evidence-based, and regularly updated YouTube content about scapular dyskinesis.

Level of evidence: IV.

Keywords: YouTube; Quality; Reliability; Patient education; Scapular dyskinesis

INTRODUCTION

Shoulder injuries are the third most common musculoskeletal disorders globally and significantly limit physical activity. Shoulder pain has a point prevalence of 26% and a lifetime prevalence of up to 67% [1]. These injuries have a multifactorial etiology, including biomechanical, anatomical, environmental, and individual factors [2]. A key biomechanical factor is scapular dyskinesis, seen in 60% of those with shoulder pain and 48% of asymptomatic individuals [3]. Scapular dyskinesis is not a diagnosis but a clinical sign that can cause, worsen, or result from shoulder pathology [4,5]. Because no universal diagnostic criteria exist, thor-

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ough clinical evaluation is essential [6,7]. Early detection and targeted intervention can allow those with repetitive upper limb use to maintain shoulder function and prevent long-term issues [8,9].

Online platforms have become increasingly popular sources of health information, especially among patients seeking guidance about musculoskeletal conditions such as scapular dyskinesis [10,11]. Although they can offer educational value, these platforms, particularly YouTube, lack standardized mechanisms to ensure content accuracy, quality, and reliability [10,12]. Additionally, outdated or unverified videos can continue to receive high engagement, posing potential risks to viewers [13]. This issue is especially concerning for scapular dyskinesis, a condition without universally accepted diagnostic criteria or therapeutic consensus.

Several studies have investigated the content quality and accuracy of YouTube videos that address other shoulder pathologies, including shoulder instability [10], superior labrum anterior to posterior tears [11], shoulder replacement [14], shoulder dislocation [15], reverse shoulder arthroplasty [12], adhesive capsulitis [16], rotator cuff disease [17], and subacromial impingement syndrome [18]. However, to the best of our knowledge, this study is the first to examine videos about scapular dyskinesis. Therefore, the primary objective of this study is to assess the quality, reliability, and comprehensiveness of YouTube videos about scapular dyskinesis, which is recognized as a potential risk factor for shoulder injury.

METHODS

Because this study reviews publicly available YouTube videos without involving patient data or materials, approval from an institutional review board or ethics committee was deemed unnecessary. All authors endorse the study content and provided explicit consent for its submission.

Selection of Videos

In the preliminary phase of this descriptive study, a systematic YouTube (www.youtube.com) search was conducted on April 30, 2024, using the keywords "scapular dyskinesia" and "scapular dyskinesis." The video selection was limited to English-language content and sorted using YouTube's default 'most viewed' option. This approach might have introduced selection bias by overrepresenting content from English-speaking regions and underrepresenting cultural diversity. The URLs of 200 videos, 100 videos per keyword, were systematically recorded for subsequent analysis.

Videos were excluded if they were duplicates, irrelevant, non-English, audio-only, visual-only, YouTube short videos, or of inadequate audiovisual quality (Fig. 1). In total, 79 eligible videos were independently evaluated by two academic physiotherapists (US and IHA), each with more than 10 years of experience in shoulder and scapular pathologies. When consensus could not be reached, a third reviewer, an orthopedic surgeon (UK) with more than 20 years of experience in shoulder surgery, was included. The videos were then re-evaluated, and final decisions were made based on the majority vote.

Video Metrics, Sources, and Content

For each video, the following quantitative attributes were recorded: length (seconds), number of views, comments, subscribers, likes, dislikes, and days since upload. Additionally, the like ratio was calculated as (likes×100)/(likes+dislikes), the view ratio as (number of views/days since upload), and the Video Power Index (VPI) as (like ratio×view ratio)/100. Each video was classified based on its source and content. Video sources were categorized into five groups: (1) physicians, (2) physiotherapists, (3) physical trainers, (4) health-related websites, and (5) chiropractors. Video content was classified into three categories: (1) treatment (physical therapy, surgery, etc.), (2) diagnosis (symptoms, special tests, etc.), and (3) treatment & diagnosis.

Assessment of Educational Quality, Reliability, and Content

Educational quality was assessed using the Global Quality Scale (GQS), a tool comprising five criteria designed to measure the educational value of online resources. A higher GQS score corre-

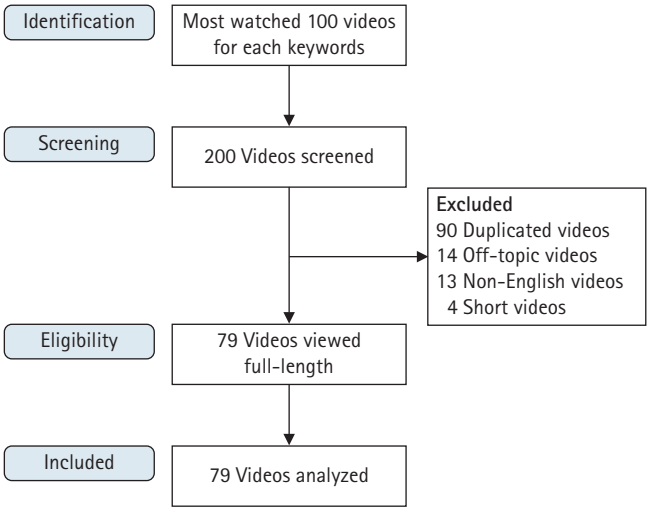


Fig. 1. Flowchart of the study. The figure illustrates the study design, including the process for selecting YouTube videos related to scapular dyskinesis, screening criteria, inclusion and exclusion steps, and final categorization for analysis.

sponds to greater academic quality, with a maximum score of 5 indicating excellent information flow. Based on their GQS scores, videos were categorized into three groups: low quality (GQS score 0–2), medium quality (GQS score 3), and high quality (GQS score 4–5) [17] (Table 1).

Video reliability was evaluated using the modified DISCERN (mDISCERN) tool, originally developed by Charnock et al. This instrument consists of five questions, with a score of 3 or higher indicating high reliability [19]. The mDISCERN tool has been widely used in studies assessing the reliability of YouTube content. However, both mDISCERN and GQS were considered insufficient to provide a specialized evaluation of videos related to scapular dyskinesis. To address that limitation, we developed the Scapular Dyskinesia Specific Score (SDSS) criteria through an extensive literature review and expert consultations [3,5,6,20] (Table 1).

The SDSS enables a targeted and comprehensive evaluation of educational video content. It consists of seven items organized into three thematic categories: (1) anatomical and biomechanical foundations, (2) pathophysiology and clinical presentation, and (3) functional impact and management. Each item is rated on a scale from 0 to 4, with the following criteria: 0 = not covered or all information was incorrect; 1 = partially covered with some incorrect information; 2 = fully covered but with some incorrect information; 3 = partially covered with all information correct; and 4 = fully covered with all information correct. The maximum attainable SDSS score per video was 28 points (Table 1). The SDSS scoring system was developed based on expert consensus and a comprehensive review of the relevant literature [4,5,7]; however, it has not yet been formally validated. The use of a non-validated tool is a methodological limitation that should be considered when interpreting the results. Nevertheless, similar disease-specific scoring systems have been applied in previous studies, supporting their practical applicability in evaluating online video content [12,17].

Statistical Analysis

The statistical analysis was conducted using the SPSS version 27.0 (IBM Corp.). Descriptive data are presented as medians (ranges), frequencies, and percentages. The Shapiro-Wilk test was applied to assess the normality of each data distribution. For comparisons of continuous variables, the Kruskal-Wallis test was used. Pairwise comparisons were performed using the Bonferroni-corrected Mann-Whitney U-test. Correlations between GQS, mDISCERN, and SDSS scores and the various video metrics were analyzed using Spearman's correlation coefficients, with

Table 1. Scapular dyskinesia specific, reliability, and quality assessment tools for YouTube videos about scapular dyskinesia

Scapular Dyskinesia Specific Score
Section 1: Anatomical and biomechanical foundations
1.1. Explain the gross anatomy of the scapula
1.2. Describe movements of the shoulder in the presence of scapular dyskinesia
Section 2: Pathophysiology and clinical presentation
2.1. Describe the causes of scapular dyskinesia
2.2. Explain the clinical assessment of scapular dyskinesia (e.g., observation, special tests)
2.3. Explain the relationship between scapular dyskinesia and shoulder injuries (e.g., impingement, rotator cuff tears)
Section 3: Functional impact and management
3.1. Mention the impact of scapular dyskinesia on sports participation
3.2. Describe treatment options for scapular dyskinesia (e.g., exercise, surgery, taping)
Reliability (mDISCERN tool) (1 point per question answered yes)
1. Are the explanations given in the video clear and understandable?
2. Are useful reference sources given? (publication cited, from valid studies)
3. Is the information in the video balanced and neutral?
4. Are additional sources of information given from which the reviewer can benefit?
5. Does the video evaluate areas that are controversial or uncertain?
Quality (Global Quality Scale) (1–5 points)
1. Poor quality, poor flow, most information missing, not helpful for patients
2. Generally poor, some information given but of limited use to patients
3. Moderate quality, some important information is adequately discussed
4. Good quality good flow, most relevant information is covered, useful for patients
5. Excellent quality and excellent flow, very useful for patients

mDISCERN: modified DISCERN.

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the following interpretation: good, at least 0.9; high, 0.7 to 0.89; moderate, 0.50 to 0.69; fair, 0.26 to 0.49; and little or no association, less than 0.25. The kappa coefficient was calculated to evaluate interobserver agreement. A simple linear regression analysis was conducted to examine the effect of independent variables on the dependent variable. The accuracy of the regression model was assessed using t-testing, beta (β) coefficients, and R^2 values. Model suitability was evaluated using the F-value, and explanatory power was determined through the R^2 statistic, which quantifies the proportion of variance in the dependent variable explained by the independent variable. A P-value of <0.05 was considered statistically significant.

RESULTS

Of the 200 videos initially screened, 79 met the inclusion criteria and were included in the study. Inter-investigator agreement was evaluated through a Cohen's kappa analysis, yielding values of 0.752 ($P<0.001$) for the GQS, 0.707 ($P<0.001$) for mDISCERN, and 0.857 ($P<0.001$) for SDSS. These values indicate substantial to almost perfect agreement between the evaluators. All variables showed non-normal distribution according to the Shapiro–Wilk test ($P<0.05$).

Video Characteristics

The characteristics of the analyzed videos are presented in Table 2. The median values for GQS, mDISCERN, and SDSS were 3, 2, and 8, respectively. Physiotherapists emerged as the primary source of the videos, accounting for 41.8% (n=33) of the analyzed content. They were followed by physical trainers, who contributed 19% (n=15) of the videos, and physicians, who accounted for 16.5% (n=13). Health-related websites and chiropractors provided 12.7% (n=10) and 10% (n=8) of the videos, respectively. The largest proportion of the videos, 38% (n=30), covered

Table 2. Characteristics of the analyzed videos

	Mean±SD/No. (%)	Median (range)
Video feature		
Length (sec)	789±1,110	389 (23–5,358)
No. of views	247,759±1,179,626	27,968 (957–9,000,542)
No. of comments	147±544	19 (0–4,559)
No. of subscribers	519,433±1,664,719	43,300 (8–13,700,583)
No. of likes	4,253±21,361	451 (2–185,000)
No. of dislikes	67±335	10 (0–2,985)
No. days since upload	1,802±1,298	1,460 (365–6,205)
Like ratio	94.74±8.89	97.61 (42.86–99.69)
View ratio	199.92±942.70	16.04 (0.23–7,671.23)
VPI	196.59±972.61	15.84 (0.17–7,546.71)
GQS	2.6±0.9	3 (1–5)
Low-quality videos	38 (48.1)	-
Medium-quality videos	29 (36.7)	-
High-quality videos	12 (15.2)	-
mDISCERN	2.3±1	2 (1–5)
Reliable videos	30 (38.0)	-
Unreliable videos	49 (62.0)	-
SDSS total score	9.6±6.2	8 (2–27)
Video sources		
Physician	13 (16.5)	-
Physiotherapists	33 (41.8)	-
Physical trainers	15 (19)	-
Health-related website	10 (12.7)	-
Chiropractors	8 (10)	-
Video content		
Treatment (physical therapy, surgery, etc.)	23 (29.1)	-
Diagnosis (symptoms, special tests, etc.)	26 (32.9)	-
Treatment & diagnosis	30 (38.0)	-

SD: standard deviation, VPI: Video Power Index, GQS: Global Quality Scale, mDISCERN: modified DISCERN, SDSS: Scapular Dyskinesia Specific Score.

both treatment and diagnosis. Diagnosis-focused videos made up 32.9% (n=26), and treatment-only videos accounted for 29.1% (n=23) (Table 2).

The distribution of video content by source revealed that physiotherapists contributed equally to all three content categories, with 11 videos in each. Physicians predominantly produced diagnosis-focused content, contributing seven such videos; their treatment-related content was comparatively limited, with only five videos. Physical trainers primarily created videos addressing both treatment and diagnosis (n=8), producing only three diagnosis-focused videos. These distributions are visually represented in Fig. 2.

Video Sources and Content

Statistically significant differences ($P<0.05$) were observed among the five different video sources in terms of video duration, number of views, number of comments, number of subscribers, number of likes, like and view ratios, VPI, and mDISCERN scores. A significant difference in video duration was found only between videos produced by physiotherapists and those from health-related websites ($P=0.031$). Regarding the numbers of views and subscribers, health-related websites exhibited lower values than physiotherapists and physical trainers ($P=0.003$). Additionally, videos from health-related websites received fewer comments than those produced by physiotherapists, physical trainers, and chiropractors ($P<0.001$). Physiotherapists' videos garnered more likes ($P=0.019$), achieved higher like ratios ($P=0.001$), and attained greater VPI scores ($P<0.001$) than videos from physicians and health-related websites. Finally, videos from health-related websites were found to be more reliable than those produced by physical trainers ($P<0.001$) (Table 3).

Video Quality

A comprehensive evaluation of video quality revealed statistically significant differences ($P<0.05$) across all parameters related to video characteristics, sources, and content. Subgroup analyses indicate that high-quality videos were longer, more reliable, and more comprehensive ($P<0.001$) than the others. Medium-quality videos had higher view counts ($P=0.004$), received more comments ($P<0.001$), had more subscribers ($P<0.001$), garnered more likes ($P<0.001$), and accumulated more dislikes ($P=0.036$) than the other videos. Additionally, those videos exhibited a higher view rate ($P=0.001$) and higher VPI scores ($P=0.001$). In contrast, low-quality videos demonstrated lower like ratios ($P<0.001$) than other videos. Physicians, physical trainers, and chiropractors were more likely than physiotherapists or

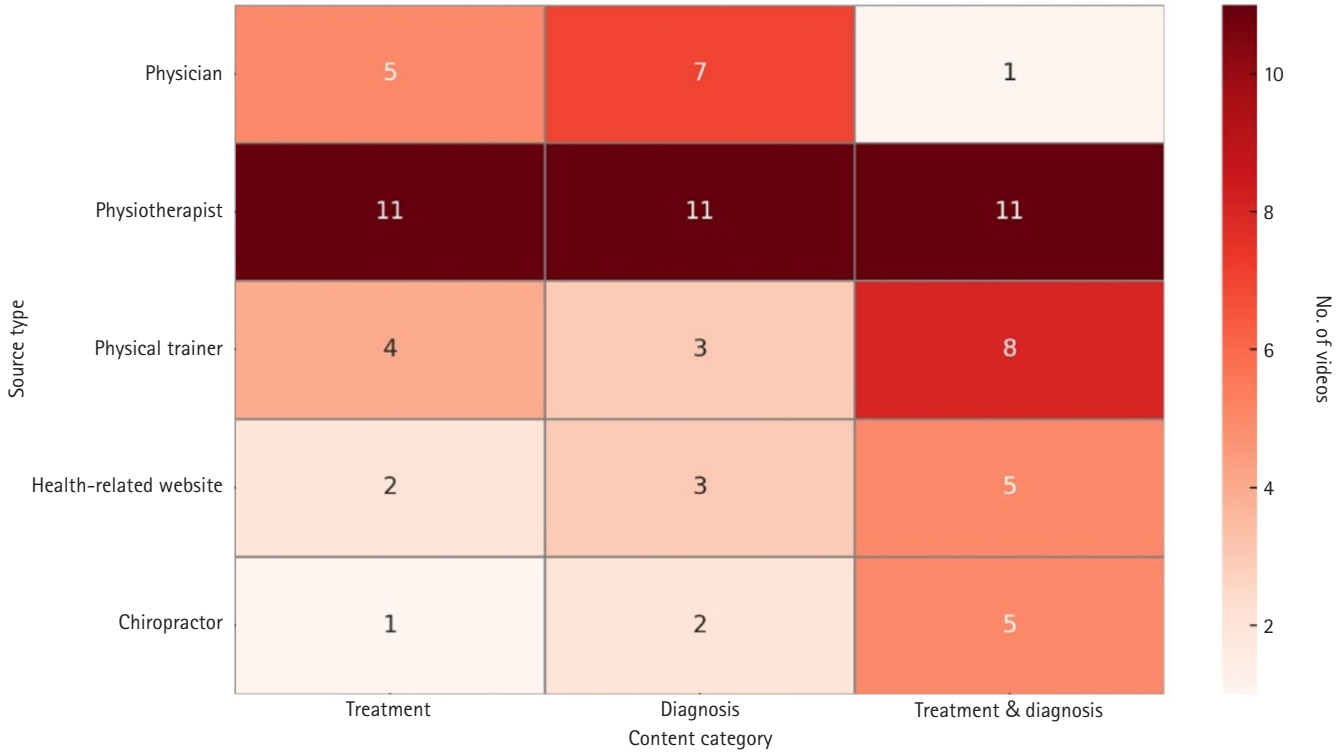


Fig. 2. Distribution of video content categories by source type. Heatmap showing the number of YouTube videos by the different source types across three content categories: treatment, diagnosis, and both.

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Table 3. Analyses of video characteristics by source

Video features	(1) Physicians (13, 16.5%)	(2) Physiotherapists (33, 41.8%)	(3) Physical trainers (15, 19%)	(4) Health-related websites (10, 12.7%)	(5) Chiropractors (8, 10%)	P-value[a]	Significant pairwise comparisons[b]
Length (sec)	388 (10–2,161)	376 (35–5,358)	274 (20–1,693)	1,205 (150–5,345)	320 (83–4,322)	0.031[c]	1–4
No. of views	8,700 (1,100–176,000)	68,000 (957–537,000)	21,000 (4,200–9,000,542)	1,900 (1,000–179,000)	29,500 (1,500–5,600,000)	0.003[c]	2–4, 3–4
No. of comments	8 (1–134)	36 (0–873)	57 (1–4,559)	0.5 (0–15)	15 (3–1,398)	< 0.001[c]	2–4, 3–4, 4–5
No. of subscribers	10,300 (65–1,170,000)	244,000 (9–4,060,000)	22,600 (8–13,700,583)	12,005 (49–44,000)	12,250 (690–3,610,000)	0.009[c]	2–4
No. of likes	74 (3–3,700)	820 (2–14,000)	477 (4–185,000)	47 (19–451)	151 (33–46,000)	0.001[c]	2–4, 3–4
No. of dislikes	5 (0–73)	16 (0–194)	10 (0–2,985)	1 (0–19)	15 (0–759)	0.052	-
No. of days since upload	1,460 (368–5,475)	1,460 (365–6,205)	2,190 (374–3,650)	1,643 (730–5,110)	1,278 (365–3,650)	0.609	-
Like ratio	95 (43–99)	98 (67–99)	98 (67–99)	96 (91–98)	98 (70–99)	0.019[c]	1–2, 2–4
View ratio	10 (0.2–161)	48 (0.4–568)	16 (3–3,523)	2 (1–35)	16 (2–7671)	< 0.001[c]	1–2, 2–4, 3–4
VPI	10 (0.1–158)	46 (0.3–563)	15 (2–3,468)	2 (1–34)	14 (2–7547)	< 0.001[c]	1–2, 2–4, 3–4
mDISCERN	2 (1–4)	2 (1–4)	2 (1–2)	3 (2–5)	2 (1–4)	0.003[c]	3–4
GQS	2 (1–4)	3 (1–5)	2 (2–3)	3 (2–4)	2.5 (2–4)	0.103	-
SDSS	3 (2–19)	6 (2–22)	8 (4–20)	17 (5–27)	11 (5–17)	0.070	-

Values are presented as median (range).
VPI: Video Power Index, mDISCERN: modified DISCERN, GQS: Global Quality Scale, SDSS: Scapular Dyskinesia Specific Score.
[a]Indicates overall group differences; [b]Indicates significant pairwise comparisons based on post-hoc tests (1 = physicians, 2 = physiotherapists, 3 = physical trainers, 4 = health-related websites, 5 = chiropractors); [c]Indicates significant differences.

health-related websites to upload low-quality videos (P = 0.013, P < 0.001, and P = 0.030, respectively), and physiotherapists predominantly uploaded medium-quality videos (P < 0.001). Conversely, health-related websites featuring physicians and physiotherapists as narrators were more likely than others to provide high-quality content (P = 0.011). The content analysis indicated that videos focusing solely on treatment or diagnosis were predominantly low quality, whereas most videos covering both treatment and diagnosis were of medium quality (P < 0.001) (Table 4).

Predictors of Video Popularity, Reliability, and Educational Quality

The correlation analysis demonstrated positive and significant relationships of varying degrees among the SDSS, GQS, and mDISCERN scores (P < 0.01). However, none of those scores exhibited a statistically significant association with the VPI (Table 5). The regression analysis identified several factors that directly influenced the VPI score, including the number of views (β = 0.83, P < 0.001), likes (β = 0.61, P < 0.001), dislikes (β = 0.62, P < 0.001), subscribers (β = 0.40, P < 0.001), and comments (β = 0.64, P < 0.001). The view rate had the strongest influence on the VPI (β = 1.00, P < 0.001). Upload time exhibited a negative effect on SDSS scores (β = −0.37, P = 0.001), indicating that newer videos tended to be more comprehensive than older ones. Similarly, GQS scores were negatively influenced by upload time (β = −0.40, P < 0.001), but the like ratio had a positive effect (β = 0.31, P = 0.006), suggesting that user engagement played a role in perceived educational quality. Finally, mDISCERN scores were negatively affected only by upload time (β = −0.24, P = 0.031), with no significant associations with the other variables (Table 6). These findings suggest that older videos tend to be less reliable and of lower quality than newer ones, highlighting the importance of regularly updating health-related content on YouTube.

DISCUSSION

This study has systematically analyzed the reliability, quality, and educational content of YouTube videos about scapular dyskinesis. The findings show that many top-viewed YouTube videos on this topic lack quality and reliable information. Overall, 79 eligible videos were analyzed, comprising 40 hours of content and nearly 20 million views. These findings underscore the need for greater oversight and the promotion of evidence-based content to ensure the propagation of accurate medical information.

Table 4. Comparison of YouTube video characteristics by GQS level

	GQS			P-value[a]	Significant pairwise comparisons[b]
	(1) Low quality (38, 48.1%)	(2) Medium quality (29, 36.7%)	(3) High quality (12, 15.2%)		
Video characteristics					
Length (sec)	184 (10–2,293)	550 (91–5,358)	1,029 (322–5,346)	<0.001[c]	1–2, 1–3, 2–3
No. of views	19,052 (957–5,620,002)	68,523 (1,250–9,000,542)	4,302 (1,100–129,032)	0.004[c]	1–2, 2–3
No. of comments	11 (0–1,398)	74 (0–4,559)	4 (0–157)	<0.001[c]	1–2, 2–3
No. of subscribers	18,502 (8–844,020)	244,201 (2,740–13,700,583)	9,940 (49–828,007)	<0.001[c]	1–2, 2–3
No. of likes	228 (2–46,020)	1,400 (28–185,000)	83 (19–3,700)	<0.001[c]	1–2, 2–3
No. of dislikes	6 (0–759)	17 (0–2,985)	2 (0–62)	0.036[c]	1–2, 2–3
No. of days since upload	2,190 (365–6,205)	1,095 (365–3,620)	1,095 (365–2,555)	0.003[c]	1–2, 2–3
Like ratio	96 (43–99)	99 (93–99)	97 (90–99)	<0.001[c]	1–2
View ratio	12 (0.2–7,671)	58 (1–3,523)	4 (1–118)	0.001[c]	1–2, 2–3
VPI	11 (0.1–7,547)	57 (1–3,468)	4 (1–115)	0.001[c]	1–2, 2–3
mDISCERN	2 (1–4)	2 (2–4)	4 (3–5)	<0.001[c]	1–2, 1–3, 2–3
SDSS	4.5 (2–19)	12 (3–22)	17 (15–27)	<0.001[c]	1–2, 1–3, 2–3
Video sources					
Physicians	9 (69.2)/1 (1–2)	2 (15.4)/3 (3–3)	2 (15.4)/4 (4–4)	0.013[c]	1–2, 1–3
Physiotherapists	14 (42.4)/2 (1–2)	15 (45.5)/3 (3–3)	4 (12.1)/4.5 (4–5)	<0.001[c]	1–2, 1–3, 2–3
Physical trainers	8 (53.3)/2 (2–2)	7 (46.7)/3 (3–3)	-	<0.001[c]	-
Health-related websites	3 (30)/2 (2–2)	3 (30)/3 (3–3)	4 (40)/4 (4–4)	0.011[c]	1–3, 2–3
Chiropractors	4 (50)/2 (2–2)	2 (25)/3 (3–3)	2 (25)/4 (4–4)	0.030[c]	1–2, 1–3
Video contents					
Treatment (e.g., physical therapy, surgery)	13 (56.5)/2 (1–2)	7 (30.4)/3 (3–3)	3 (13)/5 (4–5)	<0.001[c]	1–2, 1–3, 2–3
Diagnosis (e.g., symptoms, special tests)	22 (84.6)/2 (1–2)	4 (15.4)/3 (3–3)	-	<0.001[c]	-
Treatment/diagnosis	3 (10)/2 (2–2)	18 (60)/3 (3–3)	9 (30)/4 (4–4)	<0.001[c]	1–2, 1–3, 2–3

Values are presented as median (range) or number (%), as appropriate.
GQS: Global Quality Scale, VPI: Video Power Index, mDISCERN: modified DISCERN, SDSS: Scapular Dyskinesia Specific Score.
[a]Indicates overall group differences; [b]Indicates significant pairwise comparisons based on post-hoc tests (1 = low quality, 2 = medium quality, 3 = high quality); [c]Indicates statistically significant differences.

Table 5. Correlation analysis among VPI, mDISCERN, GQS, and SDSS scores

	VPI	mDISCERN	GQS	SDSS
VPI	1			
mDISCERN	–0.069	1		
GQS	0.126	0.638[a]	1	
SDSS	–0.046	0.624[a]	0.770[a]	1

VPI: Video Power Index, mDISCERN: modified DISCERN, GQS: Global Quality Scale, SDSS: Scapular Dyskinesia Specific Score.
[a]Indicates statistically significant differences.

YouTube is the most visited video-sharing platform, and it offers easily accessible health information worldwide [17]. However, the absence of peer-review mechanisms allows low-quality or misleading videos to spread, potentially affecting patient understanding and treatment decisions [10]. Young and tech-savvy individuals are increasingly turning to YouTube as a source of health information. However, it is evident that video popularity does not always align with content quality [11,13]. Simple, visually appealing videos tend to drive higher engagement, and content with a lower cognitive load is generally preferred [13,21]. Therefore, healthcare professionals should produce concise, visually supported videos, and verified content should be prioritized to improve access to reliable information.

In this study, the median (min–max) GQS and mDISCERN scores for the analyzed videos were 3 (1–5) and 2 (1–5), respectively. These findings indicate that the quality and reliability of YouTube videos about scapular dyskinesis are inadequate. Additionally, this study used the SDSS, a novel scoring tool specifical-

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Table 6. Linear regression analysis of correlations between video characteristics and VPI, mDISCERN, GQS, and SDSS scores

Dependent variable	Independent variable	Unstandardized β	SE	Standardized β	95% CI	R^2	P-value
VPI	No. of days since upload	–0.07	0.08	–0.09	–0.23 to 0.10	0.01	0.412
	No. of views	0.00	0.00	0.83	0.00 to 0.00	0.68	0.000[a]
	No. of likes	0.03	0.00	0.61	0.02 to 0.03	0.38	0.000[a]
	No. of dislikes	1.72	0.25	0.62	1.22 to 2.21	0.38	0.000[a]
	No. of subscribers	0.00	0.00	0.40	0.00 to 0.00	0.16	0.000[a]
	No. of comments	1.10	0.15	0.64	0.80 to 1.40	0.41	0.000[a]
	Like ratio	9.09	11.84	0.09	–14.49 to 32.66	0.01	0.445
	View ratio	0.98	0.00	1.00	0.98 to 0.98	1.00	0.000[a]
mDISCERN	Length (sec)	0.00	0.00	0.02	0.00 to 0.00	0.00	0.876
	No. of days since upload	0.00	0.00	–0.24	0.00 to 0.00	0.06	0.031[a]
	No. of likes	0.00	0.00	–0.08	0.00 to 0.00	0.01	0.501
GQS	Length (sec)	0.00	0.00	0.11	0.00 to 0.00	0.01	0.359
	No. of days since upload	0.00	0.00	–0.40	0.00 to 0.00	0.16	0.000[a]
	No. of likes	0.00	0.00	0.06	0.00 to 0.00	0.00	0.629
	Like ratio	0.03	0.01	0.31	0.01 to 0.05	0.09	0.006[a]
SDSS	Length (sec)	0.00	0.00	0.00	0.00 to 0.00	0.00	0.976
	No. of days since upload	0.00	0.00	–0.37	0.00 to 0.00	0.14	0.001[a]

VPI: Video Power Index, mDISCERN: modified DISCERN, GQS: Global Quality Scale, SDSS: Scapular Dyskinesia Specific Score, SE: standard error.
[a]Indicates statistically significant differences.

ly developed for scapular dyskinesis, to rate each video. This tool aims to fill a significant gap in health education by providing a comprehensive evaluation of video content specific to scapular dyskinesis. The median SDSS score obtained in this study was 8 (2–27), indicating that most videos covered only some of the educational content deemed essential. The findings of this study suggest that both healthcare professionals and patients who search for scapular dyskinesis information on YouTube face a high risk. They are likely to encounter content that is incomplete, inaccurate, or misleading. To the best of our knowledge, no prior study has specifically assessed the quality and reliability of YouTube videos about scapular dyskinesis. However, our results align with previous research evaluating the quality of video content about other shoulder pathologies. For instance, Etzel et al. [10] examined the accuracy and quality of YouTube videos on shoulder instability and reported a mean GQS score of 2.68, a *Journal of the American Medical Association* reliability score of 2.84, and a shoulder-specific score of 5.30. Those authors concluded that the video content was of low quality and reliability [10]. Similarly, Matzko et al. [11] investigated YouTube videos on SLAP tears and reported average scores of 2.5 for the JAMA score, 2.66 for the GQS, and 7.13 for the shoulder specific score. Other studies have yielded comparable findings [12,15,16]. In conclusion, most YouTube content about shoulder pathologies appears to lack sufficient scientific reliability and educational quality. These findings highlight YouTube's potential for health education but also emphasize the need for strict oversight to ensure scientific accuracy.

In this study, the largest proportion of YouTube content creators on scapular dyskinesis were physiotherapists (n = 33, 41.8%), followed by physical trainers (n = 15, 19%) and physicians (n = 13, 16.5%). This distribution underscores the dominant role of healthcare professionals in the production of YouTube content on scapular dyskinesis. However, the substantial contribution of physical trainers should not be overlooked. Healthcare professionals are typically the main contributors to medical content [11,16]. However, studies also highlight the significant role of non-health professionals, such as physical trainers, in sharing health information [10]. Because scapular dyskinesis is a movement disorder requiring structured rehabilitation, physiotherapists and other healthcare professionals are expected to be the main providers of educational content in this area. The content analysis revealed that physiotherapists contributed evenly across all categories, whereas physicians primarily focused on diagnostic content. In contrast, other sources covered both diagnosis and treatment. This aligns with literature showing that physicians focus on diagnosis, whereas physiotherapists are more involved in conservative management and exercise-based rehabilitation [12,18].

This study found that physicians, physical trainers, and chiropractors were more likely than others to upload low-quality videos, whereas physiotherapists generally produced medium-quality content. Health-related websites offered the highest-quality content, aligning with previous research indicating that academic

or institutional sources tend to provide more accurate and reliable information than other sources [22]. Another notable result of this study is that videos created by physiotherapists received the highest number of views, likes, and subscribers. This suggests that physiotherapists effectively engage with their audience and play a crucial role in online health education. This outcome likely reflects the practicality and applicability of topics such as exercise and pain management, which tend to attract high viewer interest. Despite high engagement with physiotherapist-generated videos, the most reliable and comprehensive content was provided by health-related YouTube channels. However, those videos exhibited significantly lower viewership and engagement. This finding supports prior studies suggesting that scientific and academic content generally attracts less attention from broad audiences than more accessible but potentially less accurate content [14,21]. The lower reliability and comprehensiveness of physiotherapist-generated content might stem from efforts to keep the videos short and engaging. Similarly, academically rigorous content might receive fewer views because most viewers prefer quick, practical solutions over detailed scientific explanations.

According to the GQS scores, 52% (n = 38) of the analyzed videos were low quality, 29% (n = 21) were medium quality, and 19% (n = 12) were high quality. When categorized by quality level, the high-quality videos were longer, more reliable, and more comprehensive than the low-quality content. However, medium-quality videos attracted more views, received more comments and likes, gained more subscribers, and achieved higher VPI scores than high-quality videos, suggesting that viewers tend to favor moderately high-quality content with high engagement over content that prioritizes quality alone. This finding aligns with existing literature showing that scientific content receives less attention than sensational or highly engaging titles, which attract more views and interactions [11,17]. This observation has important implications for individuals and healthcare professionals seeking credible health-related content.

In this study, positive correlations were identified among the GQS, mDISCERN, and SDSS scores, a finding consistent with the existing literature [23,24]. Additionally, high-quality and reliable videos tended to receive lower levels of user engagement than videos with lower quality and reliability. Perhaps, viewers have limited access to or insufficient interest in high-quality content about scapular dyskinesis. These findings also align with previous research indicating that the relationship between the VPI and video quality is complex and that the VPI is not a direct indicator of reliability [25,26]. This situation could be attributable to various factors that influence user preferences on digital platforms. First, users tend to favor content that is visually appealing, short, and entertaining. In contrast, academic and evidence-based videos are often longer and more technical, which might make them less visually engaging and thus reduce their number of views [13]. Additionally, clickbait titles and thumbnails can significantly increase engagement, regardless of content accuracy or quality [13,27]. Finally, as explained in theories such as the Elaboration Likelihood Model and Cognitive Load Theory, users can be disinclined to engage with complex and mentally demanding content [27].

To address challenges related to viewer preferences, the Social Cognitive Theory and Narrative Communication Models, which incorporate techniques such as storytelling and peer modeling, can be used [28]. These models emphasize the need to support high-quality content with strategies such visual cues, simplified language, and narrative structure [13,29]. Integrating those techniques into evidence-based content can enhance viewer engagement without compromising accuracy and might, in turn, improve the accessibility of high-quality videos. Additionally, involving healthcare professionals in content creation and labeling videos approved by professional associations as "reliable information" can improve content credibility. Prioritizing information quality in YouTube's algorithms could further enhance access to accurate and trustworthy information. Finally, including scientific references in video titles and descriptions might help users more easily assess the reliability of the information presented.

A regression analysis identified the key determinants influencing video popularity, quality, and reliability. View rate emerged as the strongest predictor of the VPI, indicating that a video's appeal and viewing efficiency directly affect its visibility on YouTube. Similarly, Kunze et al. emphasized that user engagement metrics, such as views and likes, are significant determinants of VPI [17]. In terms of content quality, more recently uploaded videos were more comprehensive, of higher quality, and more reliable than older videos. Consistently, Matzko et al. [11] reported that newer videos demonstrated higher educational quality and reliability scores than older videos. These findings suggest that the quality standards of video content related to scapular dyskinesis have improved over time. Moreover, evolving user expectations and the increasing sensitivity of platform algorithms to content quality could also contribute to this trend. Ensuring that both clinicians and patients have access to up-to-date information is essential, so the delivery of high-quality, reliable content should be prioritized.

The primary limitation of this study is the potential selection bias introduced by the use of the most viewed filter and the inclusion of only English-language videos. These inclusion criteria might have led to the underrepresentation of content from

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non-English-speaking regions, thereby affecting the cultural and linguistic diversity of the sample. As a result, the generalizability of the findings could be limited. Future research should explore how cultural and linguistic variations influence the reliability and quality of such videos. Additionally, YouTube's algorithm prioritizes engagement over content quality, which might have prevented some high-quality clinical videos from appearing in the most viewed list and thereby limited the representativeness of the sample. Another limitation stems from the dynamicity of YouTube. Because new videos are uploaded continuously, interaction metrics can change rapidly. Consequently, the findings of this study reflect a specific time point and cannot capture long-term trends related to video quality and viewer engagement. In addition, the SDSS tool, which has not yet undergone formal validation, was applied to information about scapular dyskinesis, a condition that lacks standardized diagnostic and therapeutic criteria. This limitation might have compromised the reliability of the video assessments. Therefore, future research should focus on establishing the psychometric validity of this tool to enhance the reliability and standardization of video quality evaluations in this context. Finally, although all evaluators had specialized expertise in shoulder disorders, the lack of a broader multidisciplinary review panel is a notable limitation that should be addressed in future studies.

CONCLUSIONS

YouTube videos on scapular dyskinesis are generally of low quality and reliability. Most high-quality content originates from health-related websites featuring physicians and physiotherapists. However, those videos tend to receive lower user engagement than videos of lower quality, and they are often quite recent. Directing individuals to up-to-date videos by healthcare professionals might improve access to moderately reliable information. Additionally, there is a clear need for healthcare professionals to produce high-quality, engaging content in this field to enhance accessibility and reliability.

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Conflict of interest

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Data availability

Contact the corresponding author for data availability.

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