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Assesment of the quality and reliability of achilles tendon rupture videos on YouTube

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Abstract
Aim: The aim of the study is to evaluate the quality and reliability of videos about Achilles tendon ruptures on YouTube.
Material and Methods: The first 50 videos were included in the study by typing the keyword 'achilles tendon rupture' in the YouTube search tab. The videos were analyzed by two orthopedic surgeons. All videos were analyzed by length, number of views, number of likes, dislikes and source of the video. Global Quality score (score range: 1-5), Journal of the American Medical Association (0-4) and DISCERN (15-75) scoring systems were used to evaluate the quality of the videos. The data obtained were analyzed statistically according to these scoring systems. The Video Power Index (VPI) was used to evaluate the popularity of videos.
Results: In this study, 50 videos were evaluated. According to the DISCERN score, five (10%) videos were excellent, ten (20%) videos were good, eight (16%) videos were medium, ten (20%) videos were poor and seventeen (34%) videos were observed to be very poor. Average DISCERN, JAMA and GQS of all videos evaluated were 38.85 ± 16.2 (16.5-66), 2.52 ± 0.64 (2-4), and 2.47 ± 1.34 (1-5), respectively. Avarage like ratio was 91.68 ± 14.79, view ratio was 59.99 ± 117 and Video Power Index was 56.98 ± 11.66 (0.01-736.79). There was a weak correlation between Video Power Index, DISCERN and Global Quality Scores, but not with the Journal of the American Medical Association score. ($P = 0.22, 0.030, 0.940, cc = 0.330, 0.313, 0.11$, respectively).
Conclusion: The quality of YouTube videos related to Achilles tendon rupture is poor. Physicians can take online patient education to higher levels by highlighting less discussed topics in these videos.

Keywords: Internet, youtube, achilles, tendon, video, quality

Introduction

The Internet is widely used by everyone, and 80% of users prefer the Internet to access health-related information [1, 2]. YouTube® has become the largest open-access video sharing website with 300 hours of video uploaded per minute, and videos are much more preferred as a source of information in recent years [3, 4]. YouTube is one of the most popular websites for information exchange, with more than 1 billion views each month [4]. Patients can access YouTube® to access information about their health status, but may experience poor, misleading, and/or miscommunication due to the lack of a peer-review process. It has been seen in some studies that many health sites contain misleading and inappropriate information [4, 5].

The importance of online information is increasing in orthopedics [5]. What patients see and read online can affect their perception of their diagnosis and their expectations of treatment outcomes. Videos on YouTube are not subject to review and therefore the quality of this information is unknown. The information on YouTube has the capacity to influence the patient-clinician relationship and potentially even outcomes; Therefore, knowledge of this content is very important for orthopedists [5].

The Achilles tendon is the largest and strongest tendon in the human body [6]. Despite this fact, the Achilles tendon is the most frequently injured tendon in the lower limb [8], with an incidence of about 18 per 100,000 [7].

The increase in the number of acute Achilles ruptures is thought to be due to the increase in the population participating in sports activities and the increase in the elderly population engaged in sports.

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Acute ruptures usually increase rapidly after the age of 25, and male patients predominate in the fourth or fifth decades. Another peak occurs between the sixth and eighth decades, which is due to chronic ongoing degeneration of the tendon. The male / female ratio is between 1.7: 1 and 30: 1 [9].

Uploading videos to YouTube is simple and free, and therefore video quality and reliability are a matter of debate. Health-related resources such as YouTube are increasingly accessible by patients. Physicians should be aware of the quality of the resources available on YouTube, as these resources can influence patients' decision-making. By understanding to what extent the information acquired by patients affects patients, doctors can better adapt their training to the needs of the patient.

This study aims to evaluate the quality of information available on YouTube regarding the diagnosis and treatment of Achilles tendon rupture, including surgical reconstruction.

Materıal and Methods
Study Design
On March 26, 2021, a search was carried out on YouTube in Tekirdağ, Turkey using the keyword "Achilles tendon rupture". The search was performed using a history-cleared web browser and "cookies", without changing the YouTube search options. Search results are limited to the top 50 videos. The exclusion criteria were: videos without audio, non-English videos, unrelated/duplicate videos of less than 1 minute, and advertisement videos. Fifty videos were included and then evaluated. To evaluate the popularity of the video, the number of views, the time since the upload date, the view rate, the number of comments, the number of likes and dislikes were recorded. In addition, Video Power index (VPI) values (like ratio x view rate / 100) were calculated to determine user engagement. While calculating the like ratio, a formula (like × 100 / (like + dislike)) was used.

While calculating the view rate, the formula for the number of views/time elapsed after the video was uploaded (days) was calculated. In particular, we used VPI to evaluate view-video interaction and avoid YouTube's ranking algorithm parameters that could involve commercial concerns. Video length (sec), video source, and video content were also noted. Video resources were classified as physicians, private clinics, associate professionals (medical professionals such as physical therapists or alternative medicine providers), patients, and government health organizations. Video quality was independently evaluated by two orthopedic surgeons using the DISCERN, Journal of the American Medical Association (JAMA score), and the General Quality Score (GQS) scoring systems. The DISCERN scoring system consists of 16 questions in total and 3 parts. The DISCERN scoring system results in a total score between 16 and 80, with 1-5 points for each question. Scores are accepted as excellent between 63-75 points, good between 51-62 points, moderate between 39-50 points, bad between 27-38 points, and very poor between 16-26 points (Figure 1). The JAMA scoring system consists of 4 criteria (Authorship, Attribution, Clarity, Currency), with 1 point for each and a maximum of 4 points. 1 point indicates the lowest quality information and 4 points the highest quality information (Table 1). The GQS consists of 5 questions and scores 1 for poor quality and 5 points for excellent quality (Table 2). This article does not contain any studies with human participants or animals performed by any of the authors.

Q1. Are the aims clear?
Q2. Does it achieve its aims?
Q3. Is it relevant?
Q4. Is it clear what sources of information were used to compile the publication (other than the author or producer)?
Q5. Is it clear when the information used or reported in the publication was produced?
Q6. Is it balanced and unbiased?
Q7. Does it provide details of additional sources of support and information?
Q8. Does it refer to areas of uncertainty?
Q9. Does it describe how each treatment works?
Q10. Does it describe the benefits of each treatment?
Q11. Does it describe the risks of each treatment?
Q12. Does it describe what would happen if no treatment is used?
Q13. Does it describe how the treatment choices aVect overall quality of life?
Q14. Is it clear that there may be more than one possible treatment choice?
Q15. Does it provide support for shared decision-making?
Q16. Based on the answers to all of the above questions, rate the overall quality of the publication as a source of information about treatment choices:

Fig 1: DISCERN scoring system

Table 1: JAMA scoring system

Authorship Authors and contributors, their affiliations, and relevant credentials should be provided
Attribution References and sources for all content should be listed clearly, and all relevant copyright information noted
Disclosure Web site "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding
Currency Dates that content was posted and updated should be indicated
Assessments were made by giving 1 point to each item meeting these criteria. The lowest score that can be obtained in JAMA criteria is "0" and the highest score is 4.

Table 2: GQS consists of 5 questions and scores 1 for poor quality and 5 points for excellent quality

1	Poor quality, poor flow of the site, most information missing, not at all useful for patients
2	Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients
3	Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients
4	Good quality and generally good flow. Most of the relevant information is listed, but some topics not covered, useful for patients
5	Excellent quality and flow, very useful for patients

Statistical analysis
IBM SPSS Statistics Version 25 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. The relationships between various parameters were analyzed statistically, including: 1. VPI and DISCERN, JAMA and GQS scores, 2. VPI and video source, 3. video length and DISCERN, JAMA and GQS scores, 4. view ratio and DISCERN, JAMA, and GQS scores, 5th view rate and video source and 6th video source and DISCERN, JAMA and GQS scores. To avoid misinterpretation due to the age of the videos, the view rate (total number of views/time after upload) was preferred in the statistical analysis rather than the number of views. Descriptive data were used to describe the variables.

The Shapiro-Wilk test was used to evaluate whether the variables showed normal distribution. Since the parameters did not show a normal distribution, the Kruskal-Wallis test was used for comparisons between groups, and the Mann-

Whitney U test was used to determine the group that caused the difference. The statistical significance level was set at 0.05. Spearman test was used for correlation between groups. Intraclass Correlation Coefficient was used to evaluate inter-observation agreement.

In this study, 50 videos were evaluated. According to the DISCERN score, five (10%) videos were excellent, ten (20%) videos were good, eight (16%) videos were medium, ten (20%) videos were poor and seventeen (34%) videos were observed to be very poor. Average DISCERN, JAMA and GQS of all videos evaluated were 38.85 ± 16.2 (16.5-66), 2.52 ± 0.64 (2-4), and 2.47 ± 1.34 (1-5), respectively. Average like ratio was 91.68 ± 14.79, the view ratio was 59.99 ± 117 and Video Power Index was 56.98 ± 11.66 (0.01-736.79). Mean duration was 6.83 ± 4.97 (1.2-23.4), the number of views was 81851.14 ± 139 149.36 (45-854530), average like number was 541.54 ± 798.13 (1, 360) and the average dislike was found to be 29.63 ± 56.90 (0-350). The mean number of comments was 65.91 ± 116.51 (0-548). Descriptive statistics are given in Table 3.

Table 3: Descriptive statistics

	Minimum Value	Maximum Value	Mean	Standart Deviation
DISCERN	16,50	66,00	38,8500	16,25067
JAMA	2,00	4,00	2,5200	0,64650
GQS	1,00	5,00	2,4700	1,34548
Like Rate	1,000000	100,000000	91,68782482	14,792350866
View Rate	0,041096	780,392694	59,99106988	117,936541955
VPI	0,016975	736,798767	56,98873520	111,668420300
Duration	1,23	23,41	6,8324	4,97054
Number of View	45,00	854530,00	81851,1400	139149,36953
Number of Likes	1,00	3601,00	541,5400	798,13338
Number of Dislikes	0,00	350,00	29,6300	56,90942
Comments	0,00	548,00	65,9100	116,51818

There was a weak correlation between Video Power Index, DISCERN, and Global Quality Scores, but not with the Journal of the American Medical Association score. (P = 0.22, 0.030, 0.940, cc = 0.330, 0.313, 0.11, respectively).

Although not significant, a weak correlation was observed between VPI and video source, with the highest VPI value seen in videos uploaded by doctors. (p = 0.118, cc = -0.228)

There was a weak relationship, although not significant, between the view rate and the video source. The highest view rate was seen in videos uploaded by doctors. (p = 0.075)

There was a weak correlation between the video source DISCERN and GQS scores, but not with the JAMA score. (*p* <0.05, cc = -0.350, -0.322, -0.81)

There was very strong correlation was found between DISCERN and GCS scores (*p* <0.05, cc = 0.937). A moderate correlation was found between DISCERN, JAMA (*p* <0.05, cc = 0.567) and GCS JAMA scores (*p* <0.05, cc = 0.547).

Intraclass Correlation Coefficient was used to evaluate the inter-observer agreement and no significant difference was found. (*p* <0.001, ICA = 0.93).

Discussion

The main finding of this study is that YouTube® videos do not provide enough information for Achilles tendon rupture. The mean DISCERN, GCS, and JAMA score were 38.85, 2.52, and 2.47, respectively. These low scores reflected poor quality. Our results are similar to the results of previous studies. Keelan *et al*. [10] first evaluated the quality of videos about vaccination on YouTube® and found low-quality scores for different medical conditions [11, 12]. A study evaluating the quality of disc herniation videos showed that JAMA and DISCERN scores were 1.8 [1-3] and 30.7 (14-68), respectively [8]. Similarly, studies on hip arthritis and lumbar surgery have shown poor results [3, 12]. MacLeod *et al*. rated the videos for femoroacetabular impingement and none of the videos were scored as "perfect" [4]. In the literature, Youtube videos were scanned for Anterior Cruciate Ligament Tears and Rotator Cuff Tears, and similar results were obtained [13, 14]. Although the videos in the research showed bad results on average, different findings were obtained when the sources were evaluated separately. Erdem *et al*. stated that the most important factor in obtaining sufficient information is the video source [5]. In their study, physicians (48%) were the main source and patients (24%) were the second most common category. In our study, videos belonging to doctors (32%) and videos of non-physician healthcare professionals were in second place with 26%. Although the quality scores of the videos uploaded by the doctors among all the videos were higher than the other groups, these videos still did not contain sufficient quality information. Our results were consistent with previous studies showing that the video source is the indicative quality of the video and doctor-sourced videos provide better information quality (Table 4) [14, 15].

Erdem *et al*. study investigating the quality of YouTube videos on kyphosis [16], Loeb *et al*. [17] study investigating the quality of YouTube videos on prostate cancer, and Ferhatoglu *et al*. [15] study investigating the quality of YouTube videos about gastrectomy. showed that it was shared.

Table 4: Showing that the video source is the indicative quality of the video and doctor-sourced videos provide better information quality

	Source	N	Mean
DISCERN	Private Clinic	10	28,30
	Doctor	16	35,00
	OMP*	13	17,50
	Patient	7	9,29
	HI**	4	34,88
	Total	50	
JAMA	Private Clinic	10	21,40
	Doctor	16	33,81
	OHP*	13	18,88
	Patient	7	21,07
	HI**	4	31,75
	Total	50	
GKS	Private Clinic	10	26,95
	Doctor	16	34,72
	OHP*	13	18,88
	Patient	7	10,93
	HI**	4	32,00
	Total	50	

*OMP = Other Health Professionals
**HI= Health Institutions

We also compared animated and non-animated videos in terms of quality and popularity. As expected, animated videos

had higher VPI scores than non-animated videos. However, their quality scores were low, as animated videos were often uploaded by commercial websites. Cassidy *et al*. also reported similar results with the lowest scores for animated videos [5]. Instead of long, intense technical videos, it can be thought that the necessary information can be provided briefly by using animation to make it easier to watch.

In our study, among the groups, the highest scores among the videos evaluated using VPI scores belonged to physicians and healthcare professionals other than physicians. In contrast, YouTube videos on medical topics have seen a decline in popularity if the videos were sourced by academics or doctors. [5, 12, 18, 19]. Despite this opposite tendency shown in the literature, our results show that patients are more interested in videos prepared by healthcare professionals for Achilles tendon rupture. Again, in our study, the highest imaging rate is seen in the videos of the doctors.

This study has some limitations. Firstly, YouTube is a growing platform and different results may be obtained if the search is done later. Also, this data only provides a snapshot of the information available at a given time in a single day. The Internet is a vast resource, and individuals can constantly upload or remove media from open source forums such as YouTube, resulting in a steady stream of quality and quantity [12, 20]. Second, we evaluated the top 50 videos found only on YouTube in response to a search for Achilles tendon rupture. Although this is a limitation, there is a study in the literature showing that internet users consider the first two pages they obtain when searching for a keyword [21]. Third, in order not to mislead our study, we evaluated YouTube videos only search results for the term "Achilles tendon rupture" (Achilles Tendon Rupture). Finally, we evaluated videos that are in English only.

Videos about Achilles tendon rupture on YouTube were often of poor quality, which means that information patients obtain from YouTube can be misleading, which can be challenging for doctors. Patients have the right to access free and easily accessible information about medical conditions on the Internet and YouTube. Therefore, we recommend that international health societies should create their own training videos for patients and other healthcare professionals to maintain an optimal patient-doctor relationship. Videos from appropriate sources with high-quality information can be translated into multiple languages to reach more people.

Conclusıon
Information on Achilles tendon rupture is increasingly being accessed by patients on YouTube. Although the videos uploaded by most physicians had relatively higher quality scores, it was observed that the videos were generally of low quality and other videos on this topic lacked educational quality. Physicians can take online patient education to higher levels by highlighting less discussed topics in these videos. Instructions can even be published for higher-quality educational videos. Universities and other public health institutions can be expected to lead the way for better quality videos to ensure this trust and to be in an education effort in this direction to increase the physician-patient trust relationship.

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