



Evaluation of YouTube Videos as a Patient Education Source for Inguinal Hernias

Kasık Fıtıkları için Hasta Eğitim Kaynağı Olarak YouTube Videolarının Değerlendirilmesi

Bahadır Kartal¹, Mehmethan Cihan²

¹Hitit University, Erol Olcok Training and Research Hospital, Department of General Surgery, Corum, Turkey
²Acıbadem Altunizade Hospital, Istanbul

Abstract

Aim: Patients frequently use YouTube to obtain information about their conditions and possible treatment options. Inguinal hernia is one of the most common surgical diseases among the general population. This study aims to evaluate the quality of videos about groin hernia on YouTube.

Material and Method: The videos are sorted according to the number of views after searching for "groin hernia" on YouTube on 8.12.2021. The study was performed on the videos selected from the top 50 most-watched videos. Two independent reviewers reviewed all videos for relevance and content. In addition, the descriptive characteristics of each video (upload date, number of views, likes and dislikes, and comments below the video) were recorded in the dataset. DISCERN, GQS, and JAMA rating scales were used to evaluate the quality of the videos.

Results: A statistically significant difference was found in DISCERN scores in the videos uploaded by doctors and non-physicians ($p<0.001$). Similarly, when the two groups were compared, the videos uploaded by the doctors were statistically higher in quality in JAMA and GQS scores ($p<0.001$, $p:039$, respectively).

Conclusion: The quality of information about groin hernia on YouTube is variable. Helpful and misleading videos have no difference in terms of views and popularity. It is more appropriate for patients to prefer videos uploaded by physicians as a source of information. It is essential to pay attention to the person who uploads the content rather than the popularity, duration, or number of comments of a video.

Keywords: YouTube, video, inguinal hernia

Öz

Giriş: Hastalar, durumları ve olası tedavi seçenekleri hakkında bilgi almak için sıklıkla YouTube'u kullanır. Kasık fıtığı, genel popülasyonda en yaygın cerrahi hastalıklardan biridir. Bu çalışma YouTube'da kasık fıtığı ile ilgili videoların kalitesini değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntem: 8.12.2021 tarihinde YouTube'da "kasık fıtığı" araması yapıldıktan sonra videolar izlenme sayısına göre sıralanmıştır. Çalışma en çok izlenen ilk 50 video arasından seçilen videolar üzerinden yapılmıştır. İki bağımsız yorumcu, alaka düzeyi ve içerik açısından tüm videoları inceledi. Ayrıca her bir videonun tanımlayıcı özellikleri (yükleme tarihi, izlenme sayısı, beğenilenler ve beğenilmeyenler, videonun altına yapılan yorumlar) veri setine kaydedilmiştir. Videoların kalitesini değerlendirmek için DISCERN, GQS ve JAMA derecelendirme ölçekleri kullanıldı.

Bulgular: Doktor ve hekim olmayan kişiler tarafından yüklenen videolarda DISCERN puanlarında istatistiksel olarak anlamlı fark bulundu ($p<0.001$). Benzer şekilde iki grup karşılaştırıldığında, doktorların yüklediği videoların kalitesi JAMA ve GQS puanlarında istatistiksel olarak daha yüksekti (sırasıyla $p<0.001$, $p:039$).

Sonuç: YouTube'da kasık fıtığı ile ilgili bilgilerin kalitesi değişkendir. Yararlı ve yanıltıcı videoların izlenme ve popülerlik açısından hiçbir farkı yoktur. Hastaların bilgi kaynağı olarak hekimler tarafından yüklenen videoları tercih etmesi daha uygundur. Bir videonun popülaritesinden, süresinden veya yorum sayısından çok içeriği yükleyen kişiye dikkat etmek esastır.

Anahtar kelimeler: YouTube, video, inguinal herni



INTRODUCTION

British scientist Tim Berners-Lee invented the World Wide Web (www) while working at CERN in 1989.^[1] After the internet network was provided for the first time in 1987, the relationship of the world population with the Internet has increased rapidly until today. Today, approximately 65.6 percent of the world's population is thought to have access to the Internet. Between 2000-2021, internet access increased by about 1.331%, and it is evident that this increase will continue.^[2]

Abdominal wall hernias are common, with a prevalence of 1.7% at any age and 4% over 45. Inguinal hernias, which make up 75% of abdominal wall hernias, carry a lifetime risk of 27% in men and 3% in women.^[3] Inguinal hernias are the most common surgery performed by general surgeons in daily surgical practice. In recent years, it has been frequently preferred by both patients and surgeons for education and information purposes due to the Internet and especially YouTube videos rich in visual content. While doctors generally use youtube for educational purposes, patients use it for informational purposes.^[4] Recently, with the popularity of laparoscopic and robotic surgeries, there has been a significant increase in the number and resolution quality of laparoscopic and robotic surgery videos on YouTube.^[5,6] However, the accuracy of the content and the quality of the information are essential, and the lack of a mechanism to control the accuracy of the content creates the possibility of misleading the users.

After YouTube was founded on February 14, 2005, it has become a free and easily accessible video-sharing platform. It is thought that more than a quarter of the world's population uses this platform every month, and the number of daily active users is 122 million.^[7] Therefore, it is inevitable that such a popular website is used in health-related searches and used as a source of information.

Due to the impact of the current pandemic period, difficulties in accessing health services, and their general social phobia, patients searched for information about their illness on the YouTube video platform. Unfortunately, because this platform is public and anyone can upload videos, data can often be misleading, deceptive, or incomplete, and many studies about this topic have shown that.

This study aims to evaluate the quality of videos about groin hernia on YouTube. To the best of our knowledge, this is the first study in the literature to investigate this issue with objective data.

MATERIALS AND METHODS

In this study, data from YouTube videos that are open and available to everyone were used. The study was inspired by a systematic review of similar research.^[8-11] The videos are sorted according to the number of views after searching for "groin hernia" in the YouTube search bar on 8.12.2021.

The study was performed on the videos selected from the top 50 most-watched videos. Repetitive videos, videos with non-English language, videos not related to inguinal hernia, videos shorter than one minute, and videos for advertising purposes were excluded from the study. Therefore, the work consisted of 50 videos with the most views and met the requirements.

Two independent reviewers reviewed all videos for relevance and content. In addition, the descriptive characteristics of each video (upload date, number of views, likes and dislikes, and comments below the video) were recorded in the dataset.

DISCERN, GQS, and JAMA rating scales were used to evaluate the quality of the videos. The DISCERN scoring system is an evaluation criterion consisting of two different groups with 16 questions.^[5] According to this assessment, the first section is concerned with safety, while the second section focuses on the quality of information regarding treatment options. Grading for the sixteenth question is done independently of the rating given for the previous 15 questions. Accordingly, 16-26 points indicate extremely low quality, 27-38 points indicate low quality, 39-50 points indicate medium quality, 51-62 points indicate acceptable quality and 63-75 points indicate exceptional quality (**Table 1**).^[12,13]

Table 1. DISCERN Scoring System

Section	Questions	No	Partly	Yes		
Reliability	1. Explicit aims	1	2	3	4	5
	2. Aims achieved	1	2	3	4	5
	3. Relevance to patients	1	2	3	4	5
	4. Source of information	1	2	3	4	5
	5. Currency (date) of information	1	2	3	4	5
	6. Bias and balance	1	2	3	4	5
	7. Additional sources of information	1	2	3	4	5
	8. Reference to areas of uncertainty	1	2	3	4	5
Quality	9. How treatment works	1	2	3	4	5
	10. Benefits of treatment	1	2	3	4	5
	11. Risks of treatment	1	2	3	4	5
	12. No treatment options	1	2	3	4	5
	13. Quality of life	1	2	3	4	5
	14. Other treatment options	1	2	3	4	5
	15. Shared decision making	1	2	3	4	5
	16. Based on the answers to all of these questions, rate the overall quality of the publication as a source of information about treatment choices	1	2	3	4	5

The overall quality of all videos reviewed was assessed using the global quality scale (GQS), a 5-point scale. This scale includes the accessibility of the information in the video, the quality of that information, the overall flow of information, and how practical the reviewer thinks the particular video will be to a patient (**Table 2**).^[14]

Table 2. GQS

Score	Description
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 excellent flow, very useful for patients

*GQS: Global quality score

Data were also evaluated using the Journal of the American Medical Association (JAMA) scoring system. This scoring system considers the quality of videos in terms of authorship, attribution, description, and validity. Each item is evaluated as 0 and 1 points. In the JAMA evaluation, 1 point represents insufficient knowledge, 2-3 points partially sufficient information, and 4 points quality information (Table 3).^[15]

Table 3. 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 should be noted
Disclosure	Website "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest
Currency	Dates when content was posted and updated should be indicated

*JAMA: Journal of the American Medical Association

The popularity of the videos was evaluated by the video power index (VPI: $\text{like} \times 100 / [\text{like} + \text{dislike}]$). In addition, view rate (total view/time since upload) was used to avoid the bias that a video on YouTube would get more views because it was uploaded earlier.^[16,17]

The videos were divided into two groups according to whether the content producers were physicians or not. Video duration 5, 5-10, > 10 minutes, release date before five years (new videos) and after five years (old videos), first and second 25 videos as views, daily views, daily views below 177 and above, VPI below 93 VPI above 93 and comment/year > 50 and below 50 groups were also evaluated. Video quality and interaction between groups were assessed. The videos are grouped by who made them: doctor, medical, patient, and other. In addition, the videos are divided into categories according to whether they contain animation or not.

In March 2021, YouTube decided to hide the number of dislikes. We needed this to calculate the VPI score in our study. This information has been accessed with a program developer's "return youtube dislikes" program.

Institutional ethics review board approval was not required for the study.

Statistical analysis

IBM SPSS 22 for Windows program was used to analyze the data. Median, IQR, minimum-maximum values, and $\text{mean} \pm \text{standard deviation}$ were used to describe the data. The conformity of all data to the normal distribution within the group was tested using the Shapiro-Wilk test. Relationships between variables were determined by Spearman correlation. Regression of quality indicators with data was done by multiple regression analysis. Mann-Whitney U test was used to see a significant difference between the groups. A p-value less than 0.05 was considered statistically significant.

RESULTS

When the first 50 videos with the most clicks were examined, there were 31,721,281 total clicks. The average video length was 595.04 ± 464.64 seconds, with a minimum of 71 seconds and a maximum of 2266 seconds. The most-watched video was watched 3,064,908 times. While the number of daily views was 249/day at the most, the average daily viewing was 355.56 ± 437.35 . Other descriptive statistics are shown in Table 4. The mean VPI, DISCERN, JAMA, and QRS values between the videos were 92.66 ± 3.96 , 55.16 ± 13.4 , 2.4 ± 0.8 , and 2.7 ± 1.05 , respectively.

Table 4 . Data of 50 most clicked videos on the YouTube platform

	Mean±Std	Median [IQR(25-75)]	Min-Max
Video length (sec)	595.04±464.64	443 (263.75-726)	71-2266
View count	634425.62±741342.5	355719.5 (215715.75-611134.75)	174256-3064908
View count Daily	355.56±437.35	177.12 (105.33-432.74)	45.77-249.05
Like	3887.4±4617.63	2550 (80-251)	324-22500
Dislike	225.46±218.33	136.5 (80-251)	25-872
Comment/year	128.19±343.43	27.5 (8.9-110.7)	0-2300
VPI	92.66±3.96	93 (90.1-95.7)	80-98.8
DISCERN	55.16±13.4	60 (43.5-65)	20-72
JAMA	2.4±0.8	3(2-3)	0-3
GQS	2.7±1.05	3(2-3)	1-5

*JAMA: Journal of the American Medical Association, GQS: global quality scale, VPI: Popularity power index of videos, IQR: Interquartile range (25 to 75)

While 31 of those who uploaded videos to the YouTube platform were doctors, 19 were not. According to the DISCERN score, 15 videos were of exceptional quality, while 18 videos were of acceptable quality. Eight videos were of medium quality, and nine were of poor quality. No videos uploaded by doctors were of poor quality, and all videos of exceptional quality were uploaded by doctors. A statistically significant difference was found in terms of DISCERN scores in the videos uploaded by doctors and non-physicians ($p < 0.001$). Similarly, when the two groups were compared, the videos uploaded by the doctors were statistically higher in quality in JAMA and GQS scores ($p < 0.001$, $p: 0.39$, respectively).

There was no difference in quality scores regarding videos uploaded in 5 years or videos older than five years. Similarly, the videos in the top 25 and the videos in the last 25 were evaluated according to the number of views of the videos. While there was no difference in DISCERN and JAMA scores ($p: 0.607$, $p: 0.461$, respectively), the GQS scores of the top 25 videos were significantly higher ($p: 0.04$).

Daily viewing numbers were evaluated as 177 or more. While there was no difference in DISCERN and JAMA scores between the groups ($p: 0.387$, $p: 0.149$, respectively), the GQS scores of videos watched more than 177 per day were significantly higher ($p: 0.031$). In addition, videos longer than 5 minutes had a higher DISCERN score than shorter ones, while JAMA and GQS scores were similar ($p: 0.38$, $p: 0.344$, respectively).

According to VPI values, there was no difference in quality between the videos below 93 and above and the annual comment number of videos below 25 and above (**Table 5**).

As a result of our study, a positive correlation was found between the quality scores ($p < 0.001$) (**Table 6**). In linear regression analysis, VPI and the number of clicks did not affect DISCERN scores. ($P: 0.447$, $p: 0.033$). However, DISCERN scores increased as the video length and daily views increased ($p < 0.001$, $p: 0.004$). A negative correlation was found between the annual number of comments and DISCERN scores ($p < 0.001$). There is a positive correlation between JAMA and the number of daily views and annual comments ($p: 0.008$, $p < 0.001$, respectively). There is a positive correlation between GQS and video duration only ($p < 0.001$, respectively).

Table 6: Correlation Between quality scores

	DISCERN	JAMA	GQS
DISCERN	1	0.779	0.657
JAMA	0.779	1	0.530
GQS	0.657	0.530	1

DISCUSSION

The YouTube algorithm developed to reach quality and relevant videos among the 4 billion videos on YouTube works very complexly and personalized.^[18] For this reason, when different users search for "groin hernia" the listed results will be different, so the top 50 most-watched videos related to our topic were examined.

In our research, JAMA, GQS, and DISCERN values were found to be high in the videos uploaded by the doctors. This result showed that YouTube might have accurate and reliable information about groin hernia, but only in videos uploaded by subject matter experts. Poor quality information accessed on YouTube can cause patients to access wrong information and make wrong decisions. It can also cause conflicts in the patient-physician relationship. Values other than this (Number of views, likes/dislikes, etc.) were not correlated with the video quality.

There is information pollution on the YouTube video platform as in the whole Internet. In our study, 62% of the videos were uploaded by doctors, and most of them were of high quality. However, this finding means that individuals or institutions uploaded the remaining 38% of the videos without medical expertise. This heterogeneous and uncontrolled information pollution on YouTube™ was previously reported by Roshan et al.^[19] and Keelan et al.^[20] In our study, videos uploaded by non-physicians were of poor quality, in line with the literature.^[9,21]

After it was founded in 2005, the YouTube platform has continued to develop and has now become a source of information for both patients and doctors. In their study, Celentano et al.^[22] concluded that most of the surgical residents watch the surgery videos on the YouTube platform. Unfortunately, algorithm-based search results are based on views and comments rather than quality.^[23] Furthermore, YouTube's heterogeneous upload sources

Table 5. Relationship between seven categoric variables and videos quality

Video source	n	DISCERN [Median(IQR)]	p	JAMA [Median(IQR)]	p	GQS [Median(IQR)]	p
Physicians	31	62(60 to 62)	<0,001*	3(3 to 3)	<0,001*	3(4 to 2)	<0,001*
Non-Physicians	19	42(35 to 52)					
Old videos(>5 years)	23	56(42 to 62)	0,335*	3 (2 to 3)	0,519*	3(2 to 3)	0,447
New videos (≤5 years)	27	61(45 to 65)		3 (2 to 3)		3(2 to 4)	
View count first 25	25	61(43 to 64.5)	0,607*	3 (2 to 3)	0,461*	3(3 to 4)	0,04*
View count second 25	25	56 (43.5 to 66.5)		2 (2 to 3)		2(2 to 3)	
View count daily (>177)	24	61(44.5 to 65)	0,387*	3 (2 to 3)	0,149*	3 (2.25 to 3)	0,152*
View count daily (≤177)	26	56(40 to 63.5)		2 (2 to 3)		2 (2 to 3)	
Video length(>5 minutes)	22	62(52 to 69)	0.01*	3 (2 to 4)	0,38	3(2 to 3)	0,344
Video lenght(≤5 minute)	28	52(36 to 62)		3 (2 to 3)		2 (2 to 3)	
VPI (≤93)	25	56 (43 to 65)	0,58	3 (2 to 3)	0,803	3 (2 to 3)	0,571
VPI (>93)	25	61 (43.5 to 66.5)		3 (2 to 3)		2 (2 to 4)	
Comment/year(≤25)	25	59(49.5 to 63.5)	0,946	3(3 to 2)	0,437	2 (2 to 3)	0,086
Comment/year(>25)	25	61(42 to 67)		3(2 to 4)		3 (1.5 to 3)	

*Mann-Whitney U test; Statistically significant data are marked in bold.

JAMA: Journal of the American Medical Association, GQS: global quality scale, VPI: Popularity power index of videos; IQR:interquartile range (25 to 75)

prevent standardization of video quality because of using Web 2.0 technology. In our study, no difference was found in DISCERN and JAMA scores between the first 25 most-watched videos and the last 25 videos. However, GQS was found to be higher in the first 25 videos.

It is a natural result that previously uploaded videos get more views over the years. Therefore, daily views were calculated to remove bias. There was no difference between the groups and quality scores regarding the number of daily viewings.

Although many studies have shown that the quality of videos uploaded by physicians is higher than those of non-physicians, the number of views was lower. This may be since patients may have difficulty understanding the physician's videos.^[24,25] Although there were many surgical videos in the first 50 videos in our study, the number of views was high. However, there was no difference between VPI rates in terms of interaction. Although there are reports of poor-quality videos that are more popular than quality ones, such a result was not found in our study.^[26]

The major limitation of our study is that there is no gold standard method for assessing the quality of YouTube videos. While JAMA, DISCERN, and GQS are not designed to evaluate the quality of youtube videos, they have been used in most studies.^[27] These systems have often been found valuable in examining video quality.^[15,16,28,29] Two different surgeons evaluated the scoring system. But two reviewers may be insufficient for validation. In addition, the YouTube platform is a platform where millions of videos are uploaded every day, and the evaluation may only be specific to the reviewed dates. Previously uploaded videos may have more views regardless of their quality. Therefore, the daily view count is calculated to eliminate this dilemma. Also, despite this fast rotation of uploaded content, the most popular videos list may not change that fast. Another limitation of the study can be considered the small number of included videos (n=50). Still, the total number of views is 31,721,281, which shows the effect of the videos and, therefore, the value of the study.

CONCLUSION

YouTube is the most popular website among doctors. Although the quality range of these videos is quite broad, the views of poor quality videos can be as high as quality videos. The quality of information about groin hernia on YouTube is variable. Helpful and misleading videos have no difference in terms of views and popularity. It is more appropriate for patients and doctors to prefer videos uploaded by doctors as a source of information. It is essential to pay attention to the person who uploads the content, rather than the popularity, duration, or number of comments of a video.

ETHICAL DECLARATIONS

Ethics Committee Approval: Institutional ethics review board approval was not required for the study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

Acknowledgment: We would like to thank the ED staff of Kayseri Training and Research Hospital.

REFERENCES

- Berners-Lee T, Cailliau R, Groff JF, Pollermann B. World-Wide Web: The information universe. Internet Research. 1992
- Internet World Stats. Usage and Population statistics. 2023, Available from: www.internetworldstats.com/stats.htm
- Nyhus LM, Klein MS, Rogers FB. Inguinal hernia. *Curr Probl Surg.* 1991;28(6):401-50.
- Farag M, Bolton D, Lawrentschuk N. Use of YouTube as a Resource for Surgical Education-Clarity or Confusion. *Eur Urol Focus.* 2020;6(3):445-9.
- Keskinkılıç Yağız B, Yalaza M, Sapmaz A. Is YouTube a potential training source for total extraperitoneal laparoscopic inguinal hernia repair? *Surg Endosc.* 2021;35(5):2014-20.
- Kanlıoğlu M, Ekici U. Reliability and Educational Features of YouTube Videos About Hernia Operations Performed Using Laparoscopic TEP Method. *Surg Laparosc Endosc Percutan Tech.* 2020;30(1):74-8.
- Chae J. YouTube makeup tutorials reinforce postfeminist beliefs through social comparison. *Med Psych.* 2021;24(2):167-89.
- Erdem H, Sisik A. The Reliability of Bariatric Surgery Videos in YouTube Platform. *Obes Surg.* 2018;28(3):712-6.
- Turhan VB, Ünsal A. Evaluation of the Quality of Videos on Hemorrhoidal Disease on YouTube™. *Turk J Colorectal Dis.* 2021;31:261-7.
- Cakmak G. Evaluation of Scientific Quality of YouTube Video Content Related to Umbilical Hernia. *Cureus.* 2021;13(4):e14675.
- Aydin MA, Akyol H. Quality of Information Available on YouTube Videos Pertaining to Thyroid Cancer. *J Cancer Educ.* 2020;35(3):599-605.
- Kaicker J, Borg Debono V, Dang W, Buckley N, Thabane L. Assessment of the quality and variability of health information on chronic pain websites using the DISCERN instrument. *BMC Med.* 2010;8:59.
- Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health.* 1999;53(2):105-11.
- Langille M, Bernard A, Rodgers C, Hughes S, Leddin D, van Zanten SV. Systematic review of the quality of patient information on the internet regarding inflammatory bowel disease treatments. *Clin Gastroenterol Hepatol.* 2010;8(4):322-8.
- Batar N, Kermen S, Sevdin S, Yıldız N, Güçlü D. Assessment of the Quality and Reliability of Information on Nutrition After Bariatric Surgery on YouTube. *Obes Surg.* 2020;30(12):4905-10.
- Erdem MN, Karaca S. Evaluating the Accuracy and Quality of the Information in Kyphosis Videos Shared on YouTube. *Spine (Phila Pa 1976).* 2018;43(22):1334-9
- Celik H, Polat O, Ozcan C, Camur S, Kilinc BE, Uzun M. Assessment of the Quality and Reliability of the Information on Rotator Cuff Repair on YouTube. *Orthop Traumatol Surg Res.* 2020;106(1):31-4
- Fyfield M, Henderson M, Phillips M. Navigating four billion videos: teacher search strategies and the YouTube algorithm. *Learn, Med and Techno.* 2021;46(1):47-59.
- Roshan A, Agarwal S, England RJ. Role of information available over the internet: what are the parents of children undergoing tonsillectomy likely to find? *Ann R Coll Surg Engl.* 2008;90(7):601-5
- Keelan J, Pavri-Garcia V, Tomlinson G, Wilson K. YouTube as a

- source of information on immunization: a content analysis. *JAMA*. 2007;298(21):2482-4
21. Kumar N, Pandey A, Venkatraman A, Garg N. Are video sharing web sites a useful source of information on hypertension? *J Am Soc Hypertens*. 2014;8(7):481-90
 22. Celentano V, Smart N, Cahill RA, McGrath JS, Gupta S, Griffith JP, Acheson AG, Cecil TD, Coleman MG. Use of laparoscopic videos amongst surgical trainees in the United Kingdom. *Surgeon*. 2019;17(6):334-9
 23. Lobato R. The cultural logic of digital intermediaries: YouTube multichannel networks. *Convergence*. 2016;22(4):348-60
 24. Yaradılmış YU, Evren AT, Okkaoğlu MC, Öztürk Ö, Haberal B, Özdemir M. Evaluation of quality and reliability of YouTube videos on spondylolisthesis. *Interdiscip Neurosurg*. 2020;22:100827
 25. Desai T, Shariff A, Dhingra V, Minhas D, Eure M, Kats M. Is content really king? An objective analysis of the public's response to medical videos on YouTube. *PLoS One*. 2013;8(12):e82469
 26. Tartaglione JP, Rosenbaum AJ, Abousayed M, Hushmندی SF, DiPrea JA. Evaluating the Quality, Accuracy, and Readability of Online Resources Pertaining to Hallux Valgus. *Foot Ankle Spec*. 2016;9(1):17-23
 27. Azer SA. Are DISCERN and JAMA Suitable Instruments for Assessing YouTube Videos on Thyroid Cancer? *Methodological Concerns*. *J Cancer Educ*. 2020;35(6):1267-77
 28. Kuru T, Erken HY. Evaluation of the Quality and Reliability of YouTube Videos on Rotator Cuff Tears. *Cureus*. 2020;12(2):e6852
 29. Ferhatoglu MF, Kartal A, Ekici U, Gurkan A. Evaluation of the Reliability, Utility, and Quality of the Information in Sleeve Gastrectomy Videos Shared on Open Access Video Sharing Platform YouTube. *Obes Surg*. 2019;29(5):1477-84