

Reliability and Usefulness of YouTube as a Source of Informative Media for Arthroscopic Tennis Elbow Surgery: A Systematic Review of the Published Videos

Abstract

Aims and Objectives: Over the last decade, YouTube has been extensively used as a learning tool for both physicians and patients, but the reliability of this information remains questionable. The purpose of this study was to look for the reliability and quality of videos on tennis elbow arthroscopy on YouTube. **Materials and Methods:** We used three search terms on YouTube “tennis elbow arthroscopic surgery,” “Arthroscopic ECRB release,” and “Arthroscopic debridement for tennis elbow,” and screened the first 50 videos according to popularity. The videos were included from 2009 to date. Only videos in the English language were included. Repeated videos and videos without sound were excluded. A total of 74 videos were selected for this study and reliability was checked with DISCERN and journal of the American medical association (JAMA) scores. The quality was assessed with the Global Quality Score Criteria (GQSC) score and TEARS (a novel score). Popularity was tested with the video power index (VPI). A pilot study was conducted using 20 videos to validate the TEARS score. **Results:** In the pilot study, TEARS showed results in accordance with other scores used. The average number of views was 41,644.97, and the average duration was 5.03 ± 3.39 years. The mean value of DISCERN and JAMA was found to be 21.47 ± 6.28 and 1.05 ± 0.92 , respectively. GQSC, TEARS, and VPI were found to be 1.70 ± 0.82 , 4.17 ± 2.62 , and $769,936.9 \pm 6,538,851.37$. **Conclusion:** Most of the videos were educational and physicians were targeted. The USA was the major contributor to such videos. The reliability and quality of these videos were found to be of poor quality. The video popularity was however found to be relatively high. The inter-observer reliability was good. Based on the findings, we conclude that the videos are not reliable and could not be used for learning.

Keywords: Arthroscopic elbow debridement, arthroscopic elbow release, ECRB debridement, ECRB release, elbow arthroscopy, lateral epicondylitis, tennis elbow

Introduction

Tennis elbow (TE) is one of the most common causes of chronic lateral elbow pain. It is also known as lateral epicondylitis as it involves the area of common extensor origin (CEO)—Extensor Carpi Radialis Brevis (ECRB).^[1] The repeated micro-ruptures at the lateral epicondyle due to overuse of extensor muscles result in this recurrent painful condition affecting regular daily activities. Diagnosis is made on clinical evaluation and is managed conservatively initially. However, surgery remains the management modality of choice in recalcitrant cases^[2] due to the failure of conservative therapies with oral anti-inflammatory medications, local infiltrations, and physical treatments significantly beyond 6 months. With advancements in technology and science, surgical technique has shifted

from open procedures to minimally invasive arthroscopic means. Although a steep learning curve is associated with arthroscopic surgeries, being minimally invasive procedures, they are less painful and allow quick postoperative rehabilitation.^[3] It also helps in complete visual inspection of the joint being investigated and promptly addresses any other forms of chronic lateral elbow pain like loose bodies or synovial plications. Elbow arthroscopy has been used consistently as a therapeutic modality for treating chronic TE as it is safe, more efficient, and helps in early postoperative recovery and rehabilitation.^[4]

Various online platforms have become a boon for learning and knowledge. Also, online education has gained a lot of recognition amongst surgeons worldwide, helping

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with quick short surgical procedures, which helps impart knowledge in much less time. YouTube is a central online platform that provides a significant source of information on medical conditions, catering to both patients and physicians.^[5] However, it is often questioned how much of these shared media are reliable and authentic, as the videos are not peer-reviewed before their online publication. It, hence, can often be misleading for the general mass as seen with earlier studies.^[6]

The hypothesis of this study is to test the reliability and quality of videos on tennis elbow arthroscopic surgery published on YouTube using various scoring systems and correlate them with their popularity indices. To the best of our knowledge, no previous studies have systematically studied the tennis elbow videos available on YouTube.

Materials and Methods

The review of the videos was done by two separate authors using three specific search terms on the YouTube search portal.

Search strategy

YouTube was searched on January 15, 2022, and all relevant videos were selected. Only videos published in English were recruited for further analysis. No restrictions were made to the year of publication. Precautions were taken to use a web browser for the search process without any pre-existing saved videos or web-based cookies.

S.B. and B.S.R. were responsible for the initial search. The authors screened the selected videos for all their relevant information addressing the research question of our interest. Disagreements were discussed and evaluated by the senior-most author taking part in this study (R.B.K.), and a provisional list including all the videos was prepared. The final list after the preliminary selection had 74 online videos for quality analysis [Figure 1].

Inclusion/exclusion criteria and selection strategy followed

Three search terms were used “tennis elbow arthroscopic surgery,” “Arthroscopic ECRB release,” and “Arthroscopic debridement for tennis elbow.” First, 50 videos against each search term were selected for the analysis after excluding any repetitions. Exclusions were also considered if the videos were not in the English language or there was no audio.

Pilot study

The study was conducted on 20 videos to validate a novel score used in this study (TEARS score). The main study was started only after the validation of this novel scoring system.

Outcomes of interest and definitions

The outcomes of interest for the systematic review of videos included the characteristics of all the videos available on YouTube, such as—the duration of the videos, type of videos, audience, and the various countries from which they were uploaded. The videos included were uploaded by

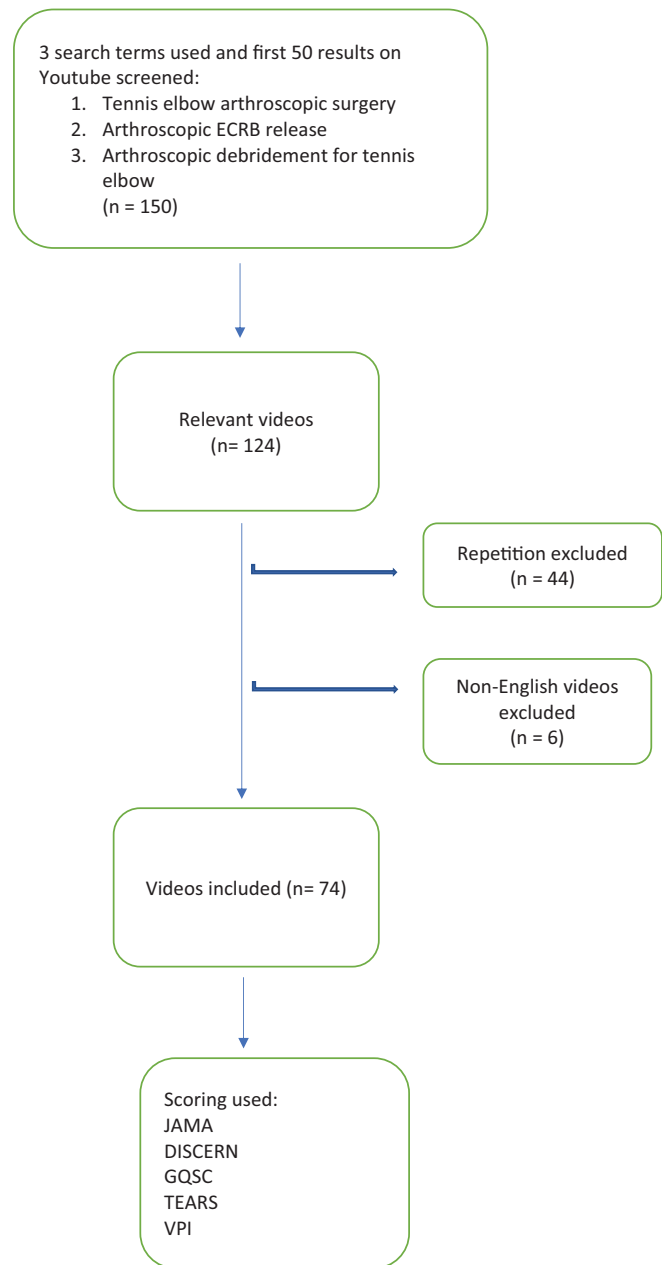


Figure 1: Preferred reporting items for systematic reviews and meta-analyses chart

practising surgeons or implant companies as promotional videos. We divided all the available videos based on the population of the targeted audience—physician-oriented or patient-oriented based on the scientific soundness of the videos. Primarily this review meticulously studies the reliability, popularity, and quality of the video content available on YouTube. The reliability of the video graphics information was analysed using the DISCERN and journal of the American medical association (JAMA) scores. The popularity of the videos was characterised by video power index (VPI) and the views ratio. The quality of the various videos was studied using Global Quality Score Criteria (GQSC),^[7,8] which included a 5-point rating system.

To increase the specificity of the study, each video was studied with a unique novel TEARS score (tennis elbow arthroscopy-related scoring system) [Table 1]. Based on the pilot studies done by Celik *et al.*,^[9] we developed a novel scoring system (Tennis elbow arthroscopy-related scoring system—TEARS) to assess the quality, reliability, and amount of information derived from each uploaded video. TEARS is similar to the novel Rotator Cuff surgery YouTube score used by Celik *et al.*^[9] Categories were allotted as per score, 0–5: very poor, 6–10: poor, 11–15: moderate, 16–20: good, and 21–25: excellent. Secondary data for each video were collected based on the number of views since upload, the number of likes, days since upload, views/day, likes/day, and likes/view as indirect measures of popularity. Correlation of the quality analysis scores with the likes, duration of the videos, and popularity scores like VPI and views ratio were also determined.

Data collection and abstraction

Two investigators (S.B. and S.C.) from India, independently extracted data related to the outcomes, as mentioned earlier, from the videos available on YouTube. The senior author (R.B.K.) decided on the data extraction in case of any disagreements. The data extracted for the review included the characteristics of all the videos based on the primary outcomes and secondary outcomes, as we have mentioned previously.

Statistical analysis

The data was collected in a Microsoft (MS) Excel spreadsheet. Various baseline parameters were checked at first. All continuous variables extracted from the data analysis were expressed as means and standard deviations (SD) with a 95% confidence interval (CI) and categorical variables in absolute numbers and percentages. All data were checked for their normality by the Shapiro–Wilk test. An intra-class correlation coefficient was calculated for

the inter-rater reliability against each scoring system. All scoring data were correlated with popularity indices by the Spearman correlation test. Correlation values (expressed in terms of Spearman's rho) were categorised as poor (0.21–0.40), fair (0.41–0.60), good (0.61–0.80), and excellent (0.81–1.00). Any difference in the video contents between the quality of the videos and the video information data was also compared by the Kruskal–Walis test. A *P*-value of less than 0.05 was considered statistically significant, whereas any overlap within the 95% CI or *P*-value more than 0.05 was considered statistically insignificant. SPSS version 25.0 (SPSS Inc., IBM, Chicago, Illinois) for MAC (Macbook version) was used for all statistical analyses.

Results

Each search term yielded 150 videos, out of which 124 relevant videos were selected first. Repetitions accounted for 40 videos, four without any audio or captions, and six videos were non-English, and they were eventually excluded from this review. The final list of 74 videos was selected and subjected to qualitative data analysis [Figure 1].

Pilot study

The novel score (TEARS score) showed results in accordance with other scores used in this study. The video showing poor results in TEARS score also showed poor DISCERN, JAMA, and GQSC scores.

Video content characteristics

Most of the videos available on arthroscopic management of tennis elbow were educational (96%) [Figure 2], and the majority were physician-directed (79%) [Figure 3]. Most of the videos were uploaded by surgeons/practitioners (>80%). A majority of the videos were uploaded from the USA ($n = 30$, 41%), followed by India ($n = 12$, 16%) [Figure 4 and Table 2]. The average duration of the videos was 361.27 s or 6.02 min (24–1400 s). The mean views and likes for each

Table 1: Tennis elbow arthroscopy-related YouTube Scoring System (TEARS)

Pre surgery (1 point for each)	During surgery and post-surgery (1 point for each except last)
Anatomy around lateral epicondyle	Position
Timing	Approach
Age	Presentation of tennis elbow
Gender	Technique
Characteristics of pain	implant type and description
Associated conditions	Biological agents
Clinical tests	Presentation after release of ECRB
Imaging	Additional procedures
Differential diagnosis	Description of immobilisation
Functional disability	Description of the rehabilitation
Initial management	Description of complications (relapse, infection, elbow pain, elbow stiffness, neurovascular damage, anaesthesia related problems) – 2 points max, 0.5 for each complication
Surgical indications	
Surgical contra-indications	

0–5: very poor; 6–10: poor; 11–15: moderate; 16–20: good; and 21–25: very good

video were 41,644.97 and 433.78. the average duration since upload was 1836 days or 5.03 years (170–4498 days). The views/day, likes/day, likes/view, and the view ratio were 34.34, 0.44, 0.0084, and 1156.66, respectively [Table 3].

Reliability

The reliability of the content of the videos available on arthroscopic TE management was determined using the DISCERN and JAMA scores, and they were, on average, 21.47 and 1.05, respectively [Table 4]. DISCERN consists of 16 questions under three sections considering how reliable a publication is, how good the quality of information on treatment choices and the overall rating of the publication.^[10] JAMA score consists of four headings such as author (authorship), date (currency), financial ownership (disclosure), and reference (attribution).^[11] The inter-rater reliability for these was determined to be good, with the DISCERN score having a weighted kappa being 0.848 (95% CI to be 0.885–0.877) and JAMA score having a weighted kappa of 0.862 (95% CI to be 0.816–0.883) [Table 5].

Quality

The quality analysis was done based on two scoring systems GQSC and the TEARS system, with the mean being 1.70 and 4.17, respectively [Table 4]. The inter-rater reliability

was noted to be good, with the weighted kappa value for GQSC being 0.820 (95% CI being 0.727–0.864) and TEARS being 0.894 (95% CI to be 0.774–0.952) [Table 5].

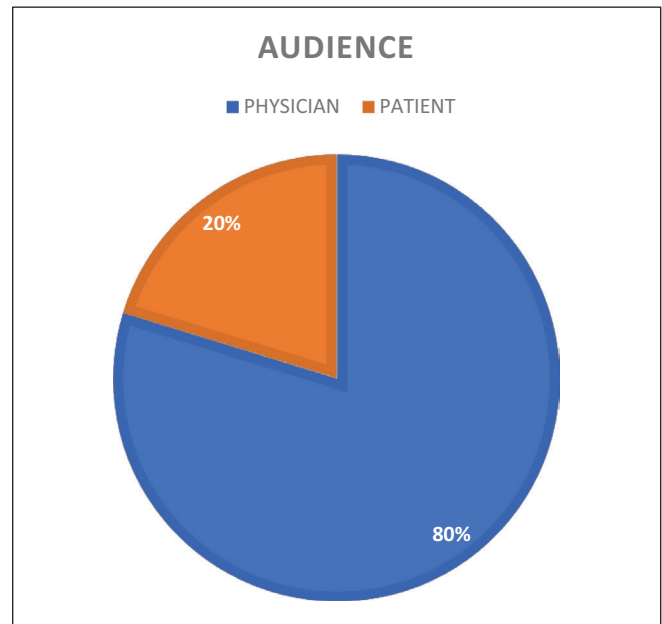


Figure 3: Targeted audience

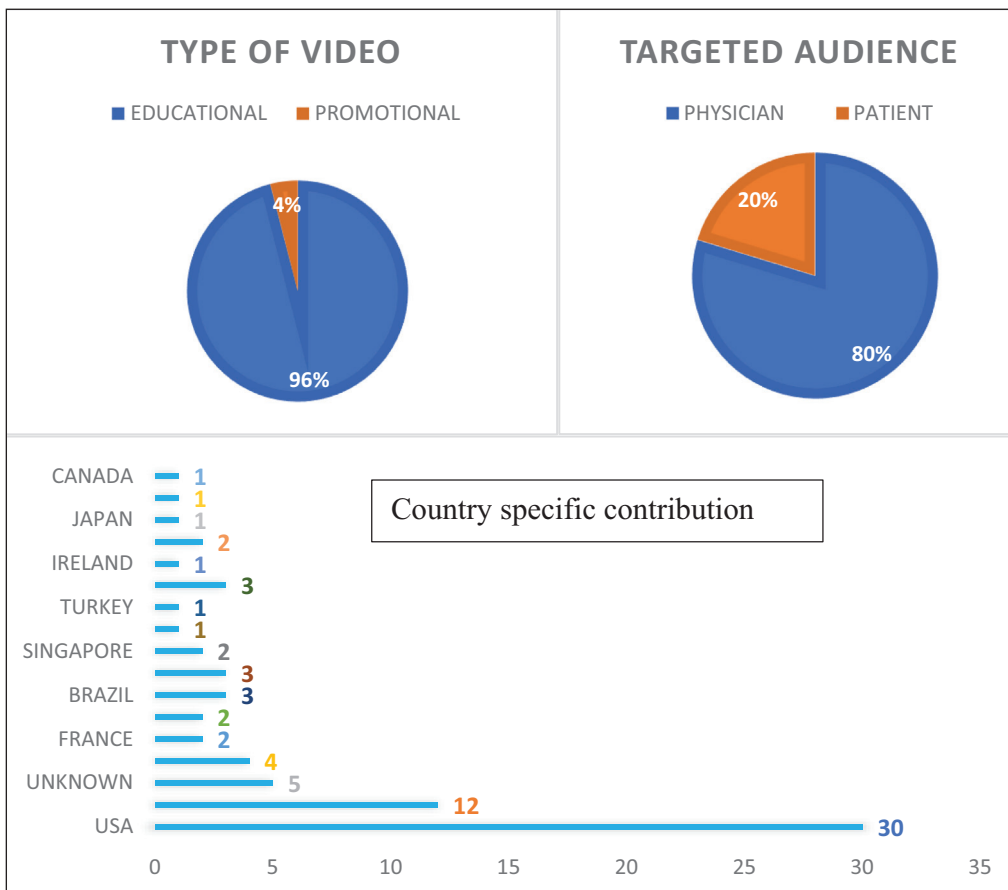


Figure 2: Baseline characteristics

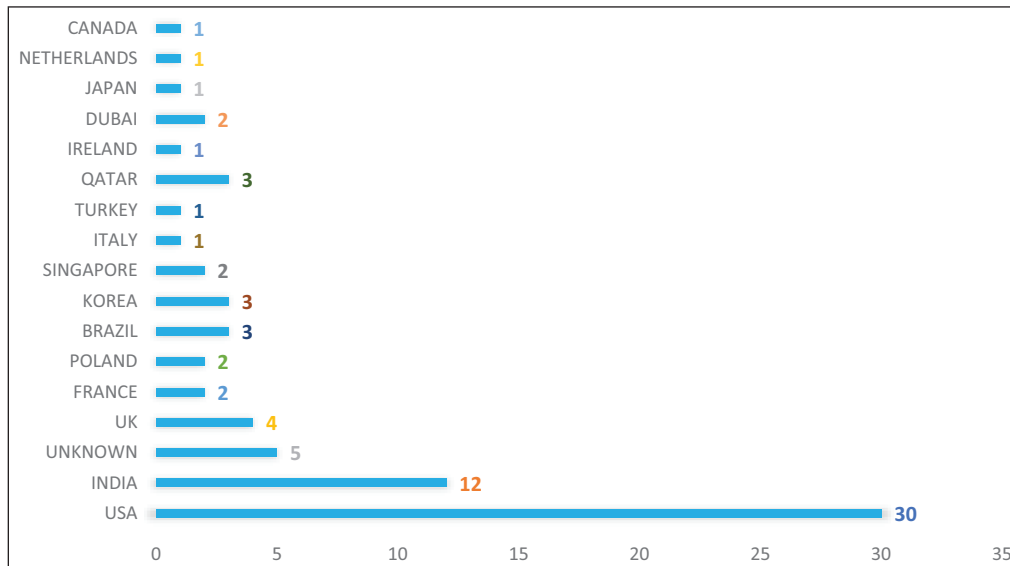


Figure 4: Country specific contribution

Table 2: Baseline characteristics of the video contents on arthroscopic TE surgery available on YouTube

Variables	Value
Duration of Video (seconds) (mean, SD, CI)	361.27, 306.17, 69.75 (mention range)
Type of video (%)	
Educational	96
Promotional	4
Audience (%)	
Physician	79
Patient	21
Country, number (%)	
1. USA	30, (41)
2. India	12, (16)
3. Unknown	5, (7)
4. UK	4, (5)
5. France	2, (3)
6. Poland	2, (3)
7. Brazil	3, (4)
8. Korea	3, (4)
9. Singapore	2, (3)
10. Italy	1, (1)
11. Turkey	1, (1)
12. Qatar	3, (4)
13. Ireland	1, (1)
14. Dubai	2, (1)
15. Japan	1, (1)
16. Netherlands	1, (1)
17. Canada	1, (1)

CI: confidence interval, SD: standard deviation

Popularity

The popularity index of the various videos was calculated based on the video power index (VPI) ([like count/dislike count + like count] × 100).^[12] The mean value of the VPI was 769,936.89, and the SD was 6,538,852.37 [Table 4].

Table 3: Secondary characteristics of the video contents on arthroscopic TE surgery available on YouTube

Variables	Value (mean, SD)
Views	41,644.97, 226,655.94
Likes	433.78, 3137.32
Years since upload	5.03, 3.39
Views/day	34.34, 240.71
Likes/day	0.44, 3.42
Likes/view	0.0084, 0.015
Views ratio	1156.67, 383.04

Table 4: Score variables

Variables	Value (mean, SD, CI)
DISCERN Score	21.47, 6.28, 20.04–22.9
JAMA Score	1.05, 0.92, 0.85–1.25
VPI Score	769,936.89, 6,538,851.37, 719,882.76–2,259,756.54
TEARS Score	4.17, 2.62, 3.58–4.76
GQSC Score	1.70, 0.82, 1.52–1.98

SD, standard deviation; CI, confidence interval

None of the videos published on the medium had any dislike counts. The inter-rater reliability suggested the agreement regarding the two different scorers was good, with the weighted Kappa value of 0.862 and 95% CI 0.816–0.883 [Table 5]. The views ratio was noted to have a mean of 1156.67 and SD 383.04 [Table 3]. The inter-rater reliability suggested an excellent agreement with the weighted Kappa value of 0.942 and 95% CI 0.805–0.993 [Table 5].

The present study highlights, physician targeted outcomes were very poor—41/59 (69%), poor—18/59 (30%), moderate—1/59 (0.017%), good—0, and very good—0; patient targeted outcomes were very poor—14/15 (93.3%), poor—1/15 (0.067%), moderate—0, good—0, and very good—0. Statistically, a significant difference was seen

with very poor to moderate TEARS graded videos and VPI, and both physicians targeted category and patients targeted [Table 6]. No significant differences were noted among the secondary data categories [Table 7]. According to the secondary data categories, days since upload, views/day, likes/day, likes/views, and view ratio were measured [Table 7].

A negative association to poor correlation was noted between the duration of the videos and their quality scores [Table 8].

Discussion

According to this present study, the reliability and quality of the video content available on arthroscopic management of TE on YouTube were objectively analysed to be extremely poor. The popularity of the videos was calculated to be

relatively high according to the views ratio and VPI scores. VPI scores have a statistically positive correlation. None of the videos had any dislikes by the viewers. This objective scoring data questions the overall content quality of the videos on arthroscopic TE surgery available on YouTube.

Over the years, the Internet has evolved, and as high as 70% of the general mass consult the web for various health-related information.^[13] YouTube is an extensive platform with over 500h of non-peer-reviewed open-access video content uploaded every minute.^[14] It remains one of the most widely accessed informative social media platforms today. Several studies have also highlighted the frequent integration of online content and conventional didactic lectures, especially after the pandemic.^[15] This paradigm shift has revolutionised the medical education system with more and more focus on online educational content. With its comprehensive, freely accessible video content, YouTube remains very useful for a quick browse and helps in adding to the knowledge gathered from textbooks. Most of the surgical trainees at times use YouTube as a source of learning new techniques/topics. Though these online educational tools should not be the only source of education, they can be valuable adjuncts to the conventional educational system. Most of the content on YouTube is never peer-reviewed and is published quickly; hence the quality of the content remains debatable always.^[16] One of the earliest studies by Keelan *et al.*^[17] on the available YouTube

Table 5: Comparison of inter-rater reliability of the various scoring systems

Scoring variables	Inter-observer reliability (ICC, 95% CI)
DISCERN	0.848 (0.885–0.877)
JAMA	0.862 (0.816–0.883)
GQSC	0.820 (0.727–0.864)
TEARS	0.894 (0.774–0.952)
VPI	0.857 (0.805–0.881)
Views ratio	0.942 (0.805–0.993)

Table 6: TEARS specific other scoring systems

Variable	Value (mean, SD)			
	DISCERN	JAMA	VPI	GQSC
TEARS category (physician targeted)				
Very poor	18.92, 4.47	0.75, 0.90	2,562.93, 15,960.47	1.09, 0.29
Poor	25.83, 6.57	1.61, 0.82	760.13, 2033.18	2.33, 0.66
Moderate	42, 0	2, 0	28.62, 0	3, 0
<i>P</i> -value	0.567	0.081	0.043	0.06
TEARS category (patient targeted)				
Very poor	21.76, 4.72	1.07, 0.82	4,358,927.8, 15,091,625.2	2.38, 0.48
Poor	24, 0	1, 0	19,0540, 0	4, 0
<i>P</i> -value	0.474	0.328	0.036	0.072

Significant *P* value in bold style. Kruskal–Walis test used for comparison

Table 7: TEARS-related secondary data

Variable	Value (mean, SD)				
	Days since upload	Views/day	Likes/day	Likes/view	Views ratio
TEARS category (physician targeted)					
Very poor	1686.78, 1247.91	4.04, 15.36	0.0148, 0.042	0.0059, 0.0072	892.34, 321.23
Poor	1932.94, 1273.92	4.09, 6.29	0.058, 0.12	0.015, 0.02	922.87, 302.34
Moderate	1730, 0	1.59, 0	0.01, 0	0.0066, 0	1179.54, 392.42
<i>P</i> -value	0.062	0.057	0.823	0.256	0.061
TEARS category (patient targeted)					
Very poor	2109.38, 1188.77	166.78, 553.56	2.34, 7.88	0.0087, 0.0068	946.67, 342.56
Poor	2616, 0	136.1, 0	0.535, 0	0.004, 0	1024.76, 303.25
<i>P</i> -value	0.752	0.231	0.056	0.891	0.078

Table 8: Correlation between the popularity variables and various scoring systems

Variables	DISCERN (rho, P)	JAMA (rho, P)	GQSC (rho, P)	TEARS (rho, P)	VPI (rho, P)
Views	0.062, 0.60	-0.055, 0.641	0.218, 0.064	0.053, 0.656	0.451, 0.00
Likes	0.369, 0.001	0.277, 0.018	0.436, 0.00	0.319, 0.006	0.962, 0.001
Duration	-0.0480, 0.56	-0.0370, 0.21	0.045, 0.07	0.0236, 0.08	0.376, 0.001
Views ratio	0.282, 0.016	0.290, 0.013	0.303, 0.001	0.24, 0.041	0.891, 0.00
VPI	0.344, 0.003	0.299, 0.01	0.416, 0.00	0.303, 0.009	-

Significance of bold values: TEARS score correlate well with VPI score

videos on immunisation states poor quality information on various medical conditions. Several other studies have also previously highlighted the YouTube video on the arthroscopic anterior cruciate ligament reconstruction,^[18] rotator cuff surgeries,^[9] Bankart repair,^[19] lumbar fusion surgeries,^[20] knee arthroplasty,^[21] and gastric surgeries^[22] are of poor quality. The present study on arthroscopic TE surgeries also emphasises a similar finding. While these short videos may be beneficial as an adjunct to conventional medical education, they can be a double-edged sword and wrong or poor-quality information may be passed on to the general public. Several studies have emphasised that many health-related sites contain poor quality and misleading information.^[23,24] Such misleading information can immensely influence patients' health outcomes. Misleading information on multiple ailments is just a click away, and mainly general masses accept such content without much thinking. Before consulting a physician, they would have accessed and studied various possibilities depending on their symptoms. This study results thus highlight that video content on the surgical management of one of the most commonly diagnosed condition of chronic elbow pain is unreliable and poor in quality. Even when most of the available content targeted physicians, their reliability and overall quality were questionable.

Tennis elbow is an important cause of debilitating recurrent lateral elbow pain, leading to immense functional limitation. Conservative and different modalities of physical therapies are considered the usual first-line treatment modalities and primarily result in symptomatic relief.^[25] However, around 3%–11% of all the patients diagnosed with TE develop chronic symptoms.^[26] Surgical management is considered the treatment of choice in this particular cohort of patients. Several surgical techniques like the open release of ECRB,^[27] Nirschl's procedures,^[28] percutaneous tenotomies,^[29] and even micro-ablation^[30] have been tried. Arthroscopic treatment in such recalcitrant cases has shown to be comparable to open surgical procedures in terms of functional outcomes.^[31] Being minimally invasive helps in early pain relief and post-surgical recovery of functions.^[32] With the increasing patient demand and a more significant number of orthopaedic surgeons being trained with arthroscopic techniques, arthroscopic management for TE is on the rise, and arthroscopic release of ECRB tendon is one of the well-accepted management modalities of recalcitrant TE. The correlation analysis of

the popularity indices like VPI and the views ratio showed a poor correlation with the quality and reliability scores. Ferhatoglu *et al.*^[33] and Celik *et al.*^[9] reported a negative association between the popularity of the videos with quality scores. This proves that most viewers were interested in watching low-quality videos. The popularity of the videos depends on various factors like the duration of the videos^[34] and likes on the video content. Our study highlights the number of likes on the videos had an excellent correlation value with VPI. The average duration of each video on TE arthroscopy was around 6 min. A negative association to very poor correlation was seen between quality scores and the duration of the videos. However, a poor positive correlation was seen between VPI and the video durations. This signifies that the viewers were more interested in shorter videos. A similar finding has been reported in the literature by Biggs *et al.*^[35] and Celik *et al.*^[9] YouTube can be considered a very influential social media platform for the dissipation of health-related information. It is time that the large numbers of video content on arthroscopic TE management in this medium were reviewed systematically for their reliability, quality, and overall popularity.

The strength of the current study highlights the various scoring systems used objectively by two different reviewers and the high inter-observer agreement between them. The correlation between the popularity of videos with their quality analysis scores was also determined, which also remains an essential strength of the present study. One of the most important, novel scoring systems used in this study to categorise the videos, the TEARS score, can be considered invalid. However, the same score has been previously used in many studies. To make the score appropriate for rating TE videos, we had to modify the tool a bit. Further analyses for the validity of our TEARS score can be considered in the future. Although YouTube was carefully searched for inclusion of all the videos, inadvertently, some videos might not have been included in this qualitative data analysis. Videos were searched at only one point in time; this may also be considered a limitation of the present review.

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Although the videos available on YouTube on arthroscopic surgery for TE are popular, the overall quality and reliability were inferior. The various information available through these videos are still very premature to be considered good quality scientific evidence.

Authors' contribution

AKC: Planning of study, literature search, writing the manuscript, quality assessment of the included studies. SB: Data management, outcome assessment, manuscript preparation, revising the manuscript. SC: Literature search, writing the manuscript, quality assessment of the included studies. BSR: Data management, outcome assessment, manuscript preparation. SP: Literature search, writing the manuscript, quality assessment of the included studies. RBK: Planning of study, quality assessment of the included studies, writing and revising the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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