Quality and reliability of YouTube videos as a source of information on pulmonary rehabilitation

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ABSTRACT

Objectives: We aimed to evaluate the quality and reliability of the most watched YouTube videos in pulmonary rehabilitation (PR) and to determine the criteria that may be important in the selection of high quality and reliable videos by patients and their relatives.

Methods: We searched for the keywords "pulmonary exercise," "pulmonary rehabilitation," and "pulmonary physiotherapy" on December 12th, 2021. Modified DISCERN (mDISCERN) and Global Quality Score (GQS) were used to assess the quality and reliability of the videos.

Results: Of the 150 videos screened and 76 (50.7%) videos were identified for inclusion. The median mDISCERN score was 2, indicating that most of the videos were of low quality. A statistically significant relationship was found between video reliability classification in terms of video duration, time since upload, number of subscribers, and number of likes ($p < 0.05$). In addition, in terms of video upload source, it was determined that most of the high reliability videos were uploaded by healthcare professionals and most of the low reliability videos were uploaded by independent users ($p < 0.05$). When the videos were compared according to the quality groups subcategory, significant differences were detected in video duration, number of subscribers, average number of views per day, upload sources and mDISCERN scores ($p < 0.05$).

Conclusions: According to the current study results, most of the PR-related videos on YouTube were found to be of poor quality and low reliability. Sharing more videos on social platforms by healthcare professionals in the future may be effective in increasing video quality and reliability.

Keywords: Social networks, social media, patient education, pulmonary rehabilitation

Pulmonary rehabilitation (PR) is a scientifically proven, multidisciplinary and multi-intervention form of rehabilitation for patients with underlying respiratory system diseases and mostly decreased activity levels of daily living due to these diseases, or to provide early intervention without reduction [1]. PR is an essential component of the care of people with chronic respiratory disease [2]. The conservation of effective lung mechanics is closely associated with the proper function of the phases of respiration [3]. PR is important in terms of restoring adequate respiratory functions in patients with impaired lung mechanics. Exercises performed within the scope of PR are effective against pulmonary system disorders by affecting

both respiratory muscles and airway. PR can be applied not only in chronic obstructive pulmonary disease, but also in asthma, interstitial lung disease, pulmonary arterial hypertension, non-cystic fibrosis bronchiectasis, nonsmall cell lung cancer, and many other respiratory problems [4]. Therefore, PR is important not only for the departments dealing with the rehabilitation and respiratory system, but also for many disciplines, especially the departments dealing with intensive care and rheumatology patients. In addition, PR has become more important with the increase in respiratory system diseases after the Covid-19 pandemic. It is inevitable for every physician to have an idea about PR in the management of many diseases today.

Today, the internet and social media are a part of daily life [5]. Many people use social media on health-related issues as well as in other areas. Especially patients with chronic health problems get information from social media at any stage of their illness, especially diagnosis and treatment.

YouTube is one of the most important social networking sites. YouTube is a free video watch and upload platform that allows users and viewers to watch videos that have been posted, upload new videos, and rate and comment on watched videos [6]. Although this video platform has advantages, it may contain inaccurate and unreliable information [7-9]. So it can be as dangerous as it can be useful.

As far as we've researched the literature, no previous research has looked at the content, quality, and reliability of PR videos on YouTube. Therefore, the primary aim of this study was to evaluate the quality and reliability of YouTube videos regarding PR. In addition, it has been tried to determine which parameters should be paid more attention in finding video sources that give better quality and reliable information.

METHODS

Study Design

This was a descriptive study. On December 12, 2021, the keywords "pulmonary rehabilitation", "pulmonary physiotherapy" "and "pulmonary exercise" were used to search for videos on YouTube (www.youtube.com). These search terms have been selected based on the terms that may be most relevant to PR. Among the scanned videos, the top 50 most watched videos for each keyword were included in the study analysis. Separately, for each keyword, the English language videos were assessed by two researchers experienced in PR. Since many studies examining the quality and reliability of YouTube videos analyze the 50 top-viewed videos, we evaluated the 50 top-viewed videos for each keywords [10-12]. We considered that evaluating the first 50 most watched videos would reflect what most YouTube users opinion. 150 videos were watched in total. Off-topic videos, duplicate videos, videos in a language other than English, and videos whose sound and video quality were too poor to be evaluated were excluded. As a result, 76 videos remained that met the inclusion criteria.

Video Parameters

In all watched videos, the length of the video, the number of views, the upload date, the number of likes, the number of subscribers of the watched channel and the comments number were determined. Total views, likes and comments were divided by the day difference between the date the video was watched by us and it was uploaded to YouTube. In this way, daily values were also evaluated as they would give more reliable results for some parameters.

Video Upload Sources

The video sources were categorized into 3 groups: patient or caregiver, healthcare professionals (physical therapists, physicians, pharmacists, or other healthcare professionals), and independent users (associations, advertisements, or news).

Assessment of Quality

Non-specific educational content quality was assessed using the Global Quality Scale (GQS), a non-validated but widely used score in many similar studies in the literature, that assesses the video quality [13-15]. GQS is a 5-point likert scale. According to this scale, 5 points represent the highest quality content, while 1 point represent the lowest quality content. Results obtained from the scale are indicated as low quality (1-2 points), medium quality (3 points) and high quality (4-5 points) according to quality levels (Table 1) [13].

Assessment of Reliability

The reliability parameter of the YouTube videos was evaluated using modified DISCERN tool (mDISCERN). This scale was found by Charnock *et al*. This scale includes five questions and yes or no options are marked for each video to these questions. While 1 point is given for each "yes" answer on this scale, no point is given to the "no" answer. Therefore, total score can be a maximum of 5 points and a minimum of 0 points, with 5 points indicating the highest reliability and 0 points the lowest reliability. To say a video is high reliability, it must have an mDISCERN score of 3 or more (Table 2) [16, 17].

Ethics committee approval is not required as human or animal subjects were not used in this study and it was done by examining videos that can be accessed by everyone from the internet.

Statistical Analysis

Shapiro Wilk test was used for determine whether the variables follow normal distribution or not. Continuous variables were specified as median (min-max) values. Categorical variables were specified as n (%). Based on the normality test results, the Mann Whitney U test was used for comparisons between the 2 groups, and the Kruskal Wallis test was used if the number of groups were more than 2. Multiple comparisons were performed using the Dunn-Bonferroni approach to identify different group or groups after the Kruskal Wallis test. Pearson chi-square test, Fisher's exact chi-square test or Fisher Freeman-Halton test were used for comparing categorical variables. SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0, Armonk, NY: IBM Corp.) was used for statistical analysis. The level of significance was determined as $p < 0.05$.

RESULTS

General Characteristics

Of the 150 videos screened and 76 videos (50.7%) were identified for inclusion. 11 duplicate videos, 36 off-topic videos, 23 non-English videos, and 4 videos with very poor image and sound quality were excluded. The general features, quality, and reliability scores of the videos are summarized in Table 3.

The Comparison of Reliability Groups

Comparison of video features and upload source by reliability classification is summarized in Table 4. A statistically significant relationship was found between video reliability classification in terms of video duration, time since upload, number of subscribers, and number of likes ($p < 0.05$). Also, according to the video upload source, it was determined that most of high reliability videos were uploaded by healthcare professionals and most of low reliability videos were uploaded by independent users (p < 0.05).

The Comparison of Quality Groups

Comparison of video features, reliability scores and upload source by quality classification is summarized in Table 5. There was a significant difference between the quality groups in terms of total video duration ($p = 0.043$) (Table 5). Pairwise comparisons were also made to determine from which group the difference originated. According to the subgroup analysis, total video duration of medium quality videos has been determined to be higher than the total video duration of low quality videos ($p = 0.043$). There was a significant difference between the quality groups in terms of the number of subscribers ($p = 0.006$) (Table 5). Subgroup analysis was performed to determine the source of the difference. According to the subgroup analysis, the subscriber numbers of the channel, where low quality videos are watched, were found to be lower than the number of subscribers of the channel of the channel, where medium quality videos are watched ($p = 0.006$).

There was no significant difference between the quality groups in terms of the median average number

Table 1. Global quality scale

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

Table 2. Modified DISCERN tool

1. Is the video clear, concise, and understandable?
2. Are valid sources cited?
3. Is the information provided balanced and unbiased?
4. Are additional sources of information listed for patient reference?
5. Does the video address areas of controversy / uncertainty?

of views ($p = 0.027$) (Table 5). Subgroup analysis was performed to determine the source of the difference. According to the subgroup analysis, it was determined that the median average number of views of low quality videos was lower than the median average number of views of medium quality videos ($p = 0.038$). here was a significant difference between the quality groups in terms of mDISCERN scores ($p = 0.001$) (Table 5). Subgroup analysis was performed to determine the source of the difference. According to the subgroup analysis, the rate of those with mDISCERN < 3 in the low quality video group is higher than those with mDISCERN < 3 in the medium quality and high quality video groups ($p < 0.001$ and $p < 0.001$, respectively).

A statistically significant difference was found between the quality groups in terms of the videos upload by the patient or caregiver ($p = 0.041$) (Table 5). After the overall significance, subgroup analyzes were performed. However, since the number of units in the groups could not reflect this significance in pairwise comparisons, no significance could be obtained in the subgroup analyzes. There was a significant difference between the quality groups in the videos uploaded by health professionals ($p < 0.001$) (Table 5). Subgroup analysis was performed to determine the source of the difference. According to the subgroup analysis, rate of uploading low quality videos by health professionals was higher than rate of uploading medium and high quality videos ($p = 0.002$ and $p = 0.002$, respectively). A statistically significant difference was determine between the quality groups in terms of videos upload by independent users ($p < 0.001$) (Table 5). Subgroup analysis was performed to determine the source of the difference. According to the subgroup analysis, it was determined that the upload rate of low quality videos

by independent users was higher than the upload rate of medium and high quality videos ($p = 0.007$ and $p = 0.007$, respectively).

DISCUSSION

Today, the use of the internet and video sharing sites (especially YouTube) as a guidance is increasing. Although the use of YouTube and other social media networks has a positive effect in the field of health as in other fields, it creates hesitation due to the presence of low quality, unreliable and contradictory information [18, 19]. As far as we have examined in the literature, our current study is the first to examine the quality and reliability of YouTube videos on PR. The information obtained from this study will shed light on future studies. In addition, it will shed light on the situations that physicians should pay attention to when prescribing exercises related to PR to patients at a time when patient education with telemedicine and videos

Table 3. Features, quality, and reliability scores of videos

Source of upload	
Patient or caregiver	10 (13.16%)
Healthcare professionals	35 (46.05%)
Independent users	31 (40.79%)
Video features	
Duration (seconds)	476 (44-2297)
Time since upload (days)	1770 (205-4921)
Number of views	51766 (4115-2315013)
Number of likes	499 (5-31000)
Number of subscribers	5120 (7-3730000)
Number of comments	12 (0-1342)
mDISCERN score	2 (0-4)
Global quality scale	
Low	50 (65.79%)
Medium	13 (17.11%)
High	13 (17.11%)

Data are expressed as n (%) and median(minimum-maximum). MDISCERN = Modified DISCERN tool

Table 4. Comparison of video features and source of upload according to reliability classification

	mDISCERN score < 3	mDISCERN score ≥ 3	*p* value
Video features			
Duration (seconds)	407 (44-1912)	769 (282-2297)	**0.003[a]**
Time since upload (days)	2116 (209-4921)	764 (205-4081)	**0.033[a]**
Number of subscribers	1380 (7-1490000)	10700 (99-3730000)	**0.029[a]**
Average number of views per day	30.70 (1.44-3727.88)	82.90 (1.36-2536.48)	0.119[a]
Average number of likes per day	0.21(0-56.53)	1.02 (0.01-73.17)	**0.028[a]**
Average number of comments per day	0.01 (0-2.16)	0.02 (0-4.99)	0.157[a]
Source of upload			
Patient or caregiver	10 (17.86%)	0	0.055[b]
Healthcare professionals	18 (32.14%)	17 (85%)	**< 0.001[c]**
Independent users	28 (50%)	3 (15%)	**0.006[c]**

Data are expressed as n (%) and median(minimum-maximum). MDISCERN = Modified DISCERN tool
[a]Mann Whitney U Test, [b]Fisher's Exact Chi-Square Test, [c]Pearson Chi-Square Test

are so important.

Most of the videos evaluated in our study were of low quality (65.79%). The median mDISCERN score was 2. In addition, in our current study, it was determined that the majority of the videos were uploaded by healthcare professionals (46.05%) and independent users (40.79%). A study that evaluated YouTube as an information source for narcolepsy, 80 videos were analyzed that met the inclusion criteria. As a result of the study, it was determined that most of the videos were uploaded from sources other than health professionals and the quality of the videos about narcolepsy was low [20]. Ferhatoglu *et al*. [21] stated that online information on cardiopulmonary resuscitation is of low quality and the source and reliability of its content are unknown. The current study showed that, similar to the literature, most of the online videos were of low quality and unreliable. We think this is due to the fact that videos can be shared on YouTube and many other social networking platforms without a control and monitoring mechanism.

D'Souza *et al*. [22] in a study in which they examined the reliability of YouTube videos about epidural analgesia for labor pain, they found mean mDISCERN score of 1.9 (1.3). It has also been found that videos from medical sources have higher mDISCERN scores than videos from other sources. In a study evaluating

YouTube videos about epidural injection, it was determined that 22% of the videos were of high reliability and that these videos were upload by medical sources [11]. Study examining YouTube videos about restless legs syndrome, 80 videos were analyzed and 44 (55.0%) videos were found to be reliable. Also misleading videos were found to have a longer mean length than reliable videos (*p* = 0.005). There was no statistically significant difference between other video features and video reliability [23]. In our study, similar to the literature, determined that most of the videos with high reliability were uploaded by healthcare professionals. While most of videos with high reability are uploaded by healthcare professionals, it has been found that many videos with low reability are uploaded by healthcare professionals. This shows us that not all videos uploaded by healthcare professionals are of high reliability. In addition, a statistically significant relationship was found between video reliability and video duration, time since upload, number of subscribers and average number of likes per day. We think that high reliability videos uploaded recently may be related to the increasing interest of health professionals in social media and sharing sites and the uploading of more videos to these platforms by these people. In addition, we think that the high reliability of videos with more subscribers and more likes may be related

Table 5. Comparison of video features, reliability scores and source of upload according to quality classification

	Low quality	Medium quality	High quality	*p* value
Video features				
Duration (seconds)	407 (44-1912)	628 (197-2297)	617 (282-1671)	**0.043[d]**
Time since upload (days)	2116 (209-4921)	1277 (215-3365)	616 (205-4081)	0.133[d]
Number of subscribers	1040 (7-280000)	26400 (20-3730000)	8030 (99-67900)	**0.006[d]**
Average number of views per day	30.70 (1.44-3727.88)	109.50 (2.34-2263.51)	25.58 (1.36-2536.48)	**0.027[d]**
Average number of likes per day	0.18 (0-56.53)	1.28 (0.01-40.43)	0.59 (0.01-73.17)	0.178[d]
Average number of comments per day	0.01 (0-2.16)	0.08 (0-2.13)	0.02 (0-4.99)	0.121[d]
mDISCERN score				
< 3	50 (89.29%)	5 (8.93%)	1 (1.79%)	**< 0.001[e]**
≥ 3	0	8 (40%)	12 (60%)	
Source of upload				
Patient or caregiver	10 (100%)	0	0	**0.041[e]**
Healthcare professionals	15 (42.86%)	10 (28.57%)	10 (28.57%)	**0.001[b]**
Independent users	25 (80.65%)	3 (9.68%)	3 (9.68%)	**< 0.001[b]**

Data are expressed as n (%) and median (minimum-maximum). MDISCERN = Modified DISCERN tool
[b]Pearson Chi-Square Test, [d]Kruskal-Wallis Test, [e]Fisher Freeman-Halton Test

to the increasing awareness of social media users recently.

In a study evaluating the quality of YouTube videos on cancer rehabilitation, a statistically significant relationship was found between quality groups and video upload source, mDISCERN score, and video duration [13]. According to Koçyiğit *et al*. [24] in a study evaluating YouTube videos on COVID-19 and rheumatic disease, they found a statistically significant relationship between quality groups and reliability and daily views. In the same study, no significant relationship was found between quality groups and daily comment and like ratio [24]. In the current study, a statistically significant relationship was found between the quality groups and the video

duration, number of subscribers, average views per day, and mDISCERN score. In addition, it was determined that quality groups and video upload sources were related. In our study, it was determined that high quality videos were more common in the high reliability group according to the mDISCERN score, which supports the literature. In addition, the low number of subscribers and the average number of views per day in the low quality group in our study may be an indication that social media platforms have been used more effectively and selectively by users recently. We think that relationship between video duration and quality groups in the current study may be related to the inclusion of a small number of videos in the statistical analysis. Finally, the majority of videos

uploaded by all upload sources were found to be of low quality, even though most high quality videos were uploaded by healthcare professionals. Our results differing from the literature may be due to the fact that we did not review all videos for each keyword and only selected the 50 most viewed videos.

Limitations

This study has several limitations. One of the limitations of this study is the interpretation of English videos only. Other limitation is that videos are evaluated on a certain day. Since YouTube is a constantly watched video sharing platform, its statistical information is constantly changing, so only the current situation at the date and time the video was watched can be determined.

CONCLUSION

In conclusion, exercise therapies are very important treatments for patients with pulmonary system problems. Visual materials and videos guide the patient and caregiver to learn proper exercise methods. In our study, most of the PR-related videos on YouTube were found to be of low quality and unreliable. It may not be the right approach to recommend YouTube to patients for PR due to the abundance of contradictory and misleading videos. Sharing more videos on social platforms by healthcare professionals in the future may be effective in increasing video quality and reliability.

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