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Youtube as a source of information about stroke rehabilitation during the COVID-19 pandemic

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Abstract

Objective: Although stroke rehabilitation (SR) is part of post-stroke recovery, patients have limited knowledge on this subject. This study aims to analyze YouTube videos about SR in terms of the information value and quality. *Methods:* On YouTube.com; the word "SR" was searched in September 6th, 2021. The listed first 100 videos were classified according to count of like, dislike, source of upload, origin of country and contents of SR. Quality, reliability and accuracy of the videos were determined with Global Quality Score (GQS), Journal of American Medical Association (JAMA) benchmark criteria and Modified DISCERN questionnaire, respectively. *Results:* According to the results of the study, 59 low quality, 28 medium quality, and 13 high-quality videos were determined. Eighty one percent of the videos contained insufficient data. Academic and physician-sourced videos comprised the majority (84.7%) of the high-quality group. A statistically significant result was found between the video sources and the number of views, likes, dislikes, comments, and video duration ($p<0.05$). A weak positive correlation was found between video durations and GQS ($r=0.671$), JAMA benchmark criteria ($r=0.665$), modified DISCERN ($r=0.701$) scores ($p<0.001$).
Conclusion: Our results showed that most of the YouTube videos on SR have poor quality and insufficient data. High-quality videos have a longer duration and are uploaded by academic and physician video sources. YouTube can be considered an alternative resource besides tele rehabilitation for patients who need SR and whose health care was interrupted during the COVID pandemic. It can be said that higher-quality videos created by health professionals will be more useful for patient education in future.

Keywords: E-learning, medical knowledge, rehabilitation, stroke, YouTube

INTRODUCTION

Stroke is one of the leading causes of disability in adults worldwide and is one of the most common causes of death. In the United States, 700,000 stroke cases and 165,000 stroke-related deaths occur annually.[1] Stroke, which manifests such as with weakness, numbness, pain, difficulty in walking, speaking, and swallowing, often in one half of the body, has been stated by the World Health Organization as "the incoming epidemic of the 21st century".[2]

In the Guidelines for Adult Stroke Rehabilitation and Recovery by the American Heart Association/ American Stroke Association in 2016 for both ischemic (85%) and hemorrhagic (15%) stroke, it has been mentioned that rehabilitation at home should be a part of the treatment in addition to rehabilitation in the hospital, and that the effectiveness of using social media communication resources may be higher.[3] A new guideline was prepared in 2019 by the American Heart Association/American Stroke Association on early management of acute stroke. In the guideline, it was mentioned that rehabilitation should start quickly and should be a part of the daily life. It has been reported that early diagnosis and treatment provided by health care providers can prevent many negative effects of the disease.[4]

It is not only patients, but also healthcare professionals (doctors, physiotherapists, nurses) lack sufficient knowledge on stroke rehabilitation.[5,6] It is observed that admissions to the hospital due to stroke have increased after the onset of the Covid pandemic, and it is important

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for health professionals to improve the knowledge of care in the acute and chronictreatment of the disease.[7]

It is a known that approximately half of the adult population consults the internet for health-related information.[8] Although, there are studies on YouTube information resources on stroke[9], epilepsy[10], Parkinson's disease[11], hip rehabilitation[12] and vestibular rehabilitation[13], there is no study on stroke rehabilitation. Therefore, the current study aimed to evaluate the quality and reliability of YouTube videos on stroke rehabilitation. It was aimed to evaluate the videos according to the sources uploaded, the number of views, likes, dislikes, comments, and video durations.

METHODS

In this cross-sectional study, medical videos were evaluated by searching the title "stroke rehabilitation", "stroke exercises", "post-stroke exercises" and "exercises after stroke" in the YouTube search engine as of September 6, 2021, after obtaining the permission from the ethics committee (Ethics committee decision no: 6490-GOA 2021/20-08). Each investigator selected and watched the first 100 educational videos in English language as in previous studies.[14,15] The information on the number of likes and dislikes, the number of views, the duration of the video, the number of comments, the year they were uploaded, the video source (academic, physician, Society/Professional Organization, Health-related Website and patient), the animation content, whether they were high definition (HD) and from which country they were uploaded were analyzed. Videos for medical educational purposes were reviewed, and GQS (Global Quality Score)[16], JAMA (Journal of American Medical Association benchmark criteria)[17], and modified DISCERN[18] questionnaires were used for the educational quality, reliability, and accuracy of the videos. Participant measurements were taken for each video. Videos not related to stroke rehabilitation, not in English, repeat videos, and videos with commercial promotional content were excluded from the study. When evaluating content, the educational content in each video was evaluated with the presence/absence of nine stroke-related factors, as there was no validated scoring system available for the videos; i.e., 1) Risk factors, 2) Diagnosis, 3) Pathophysiology, 4) Functional evaluation, 5) Rehabilitation methods, 6) Gait disorders, 7) Spasticity, 8) Bracing, 9) Comorbidities of the systems. This study used a quantitative method for data collection and analysis. Assessment was based on behavioral likes and views.

Global Quality Score (GQS)

Developed by Bernard *et al*.[16], GQS is a five-point Likert scale indicating the quality, usability, and flow of websites. (Global score 1-5, 5: Excellent quality and excellent flow, very useful for patients; 4: Good quality and generally good flow, useful for patients; 3: Moderate quality, suboptimal flow, somewhat useful for patients 2: Generally poor quality and poor flow, of very limited use to patients; 1: Poor quality, poor flow of the site, not at all useful for patients).

Journal of American Medical Association (JAMA) benchmark criteria

The JAMA benchmarks criteria analyzes online videos and resources under 4 criteria: authorship, attribution, disclosure, and currency. (JAMA score 0-4). Authorship (1 point): Authors and contributors, their affiliations,and relevant credentials should be provided. Attribution (1 point): References and sources for all content should be listed. Disclosure (1 point): Conflicts of interest, funding,sponsorship, advertising, support, and video ownership should be fully disclosed. Currency (1 point): Dates that ontent was posted and updated should be indicated). JAMA bechmark criteria is used to evaluate the accuracy and reliability of videos. The scorer awards 1 point for each criterion in the video, and the final score ranges from 0 to 4. Four points represent the highest quality.[17]

Modified DISCERN questionnaire

It is an assessment tool consisting of 5 yes/no questions designed to evaluate the quality and reliability of health information publications. The score of this questionnaire varies between 0 and 5 points and the total score is the sum of the yes points (yes=1 point, no=0 points). The questions included in the questionnaire are:"Does the video address areas of contro-versy/uncertainty?", "Are additional sources of information listed for patient reference?", "Is the provided information balanced and unbiased?", "Are valid sources cited?" (from valid studies, physiatrists)," Is the video clear, concise, and understandable".[18]

Evaluating the user engagement

Five user interaction measurements recorded for each video; 1) views, 2) likes, 3) dislikes, 4) video duration and 5) comments. These data were collected between the dates of 6-10 September 2021.

Evaluator team

Data analysis was performed independently by two investigators (E.O., V.H.) with more than seven years of experience. If the investigators' evaluations were not the same, each video was re-rated with a combined assessment of both investigators. Inter-rater correlation was evaluated. For analysis, only videos intended for medical education and healthcare professionals were included.

Statistical analysis

Acquired data was analyzed using a SPSS (Statistical Package for Social Sciences, Chicago, IL, USA) 24.0 software. Data with continuous values were expressed as mean ± standard deviation; data indicating frequency were expressed as number (n) and percentage (%). In the analysis of frequency data, the Chi-square test was used; in the analysis of data with continuous values, the Kruskal-Wallis -test or the Mann-Whitney-U-test was used, depending on the number of groups; and in the correlation analysis, the Pearson correlation test was used to compare the groups. A p value less than 0.05 was considered as significant difference.

RESULTS

In our study, the first 100 videos viewed by typing the keyword "stroke rehabilitation" into the YouTube search engine were evaluated between 6-10 September 2021. A total of 20 hours, 10 minutes and 14 seconds of video was watched. The longest video was 1 hour, 13 minutes 41 seconds, and the shortest was 39 seconds. The video with the most likes got 5,900 likes, the video with the least likes got 0 likes. The most watched video was watched 767,815 times, and the least watched video was watched 41 times. The video with the most comments received was 47, while the video with the least comments received was 0. The mean number of views per video was 41,347.85±101,148.98, the mean number of likes was 351.07±857.21, the mean number of dislikes was 16.48±41.86, the mean number of comments was 17.81±33.08, and the mean video duration was 726.44±1066.8 seconds. Eighteen (18%) animated videos and 43 (43%) HD featured videos were evaluated. With 58 (58%) videos, the most videos were uploaded between 2015-2019 (Table 1, 2) (Figure 1).

Six (6%) of stroke-related videos contained information on risk factors, 13 (13%) on diagnosis, 17(17%) on pathophysiology, 3(3%) on functional evaluation criteria, 100(100%) on rehabilitation methods, 61(61%) on gait disorder, 16 (16%) on spasticity, 7(7%) on bracing, and 25 (25%) on comorbidities.

According to the GQS results, 59 of the videos were determined as low quality, 28 of them as medium quality, and 13 of them as high quality. In the high-quality group, it was determined that the most video source was academic (46,2%), and it was followed by physician (38,5%). A statistically significant relationship was found between the source of the videos and the results of the quality and reliability scales GQS, modified DISCERN, and JAMA ($p<0.001$). This statistical difference can be explained by the higher quality and reliability of academic and physician-sourced videos. On the other hand, although health-related websites offer videos with lower quality content, the number of views, likes, dislikes, and comments are higher because of their high level of video interaction. A statistically significant difference was found between video sources and the number of views, likes, and dislikes ($p<0.05$) (Table 3).

There is a weak positive correlation between the video durations and the results of JAMA ($r=0.665$, $p<0.001$), modified DISCERN ($r=0.701$, $p=0.001$) and GQS ($r=0.671$, $p=0.001$). Accordingly, higher quality and higher reliability videos have longer durations. A similar situation occurs between the video source and the durations ($p<0.001$). Academic and physician-sourced videos have longer durations (Table 4).

A statistically significant difference was found between the countries where the videos were uploaded and the number of video views, likes, dislikes, and comments ($p<0.05$), but not with duration. This statistical difference can be explained by the fact that videos from the United States have more views, likes, dislikes, and comments. There is no statistically significant difference between the continents where the videos are uploaded and the video characteristics ($p>0.05$).

Table 1: Comparison of the content of videos over the years

Video content/years		<2015, n (%)	2015-2019, n (%)	≥2020, n (%)	p
High Definition	+	2(4.7%)	27(62.8%)	14(32.6%)	
Videos	-	17(29.8%)	31(54.4%)	9(15.8%)	**0.003**
Animation	+	3(16.7%)	7(38.9%)	8(44.4%)	
	-	16(19.5%)	51(62.2%)	15(18.3%)	0.054
Risk factors	+	1(16.7%)	3(50%)	2(33.3%)	0.825
	-	18(19.1%)	55(58.5%)	21(22.3%)	
Diagnose	+	2(15.4%)	7(53.8%)	4(30.8%)	0.764
	-	17(19.5%)	51(58.6%)	19(21.8%)	
Pathophysiology	+	2(11.8%)	11(64.7%)	4(23.5%)	0.696
	-	17(20.5%)	47(56.6%)	19(22.9%)	
Functional assessment	+	0(0%)	1(33.3%)	2(66.7%)	0.176
	-	19(19.6%)	57(58.8%)	21(21.6%)	
Rehabilitation methods	+	19(100%)	58(100%)	23(100%)	
	-	0(0%)	0(0%)	0(0%)	
Gait disorder	+	12(19.7%)	36(59%)	13(21.3%)	0.879
	-	7(17.9%)	22(56.4%)	10(25.6%)	
Spaticity	+	4(25%)	7(43.8%)	5(31.3%)	0.451
	-	15(17.9%)	51(60.7%)	18(21.4%)	
Bracing	+	1(14.3%)	4(57.1%)	2(28.6%)	0.909
	-	18(19.4%)	54(58.1%)	21(22.6%)	
Comorbidities	+	6(24%)	11(44%)	8(32%)	0.254
	-	13(17.3%)	47(62.7%)	15(20%)	
JAMA	Insufficient data(1 Point)	14(73.7%)	51(87.9%)	16(69.6%)	
	Partially sufficient data(2 or 3 points)	4(21.1%)	5(8.6%)	5(21.7%)	0.330
	Completely sufficient data (4 points)	1(5.3%)	2(3.4%)	2(8.7%)	
GQS	Low quality (1or 2 points)	9(47.4%)	40(69%)	10(43.5%)	
	Intermediate quality(3 points)	8(42.1)	10(17.2%)	10(43.5%)	0.085
	High quality (4-5 points)	2(10.5)	8(13.8)	3(13%)	
Modified DISCERN	0 Point	0(0%)	1(1.7%)	0(0%)	
	1 Point	3(15.8%)	14(24.1%)	3(13%)	
	2 Points	9(47.4%)	32(55.2%)	11(47.8%)	0.457
	3 Points	4(21.1%)	6(10.3%)	6(26.1%)	
	4 Points	3(15.8%)	3(5.2%)	1(4.3%)	
	5 Points	0(0%)	2(3.4%)	2(8.7%)	

GQS: Global Quality Score, JAMA: Journal of American Medical Association benchmark criteria, Bold font: statistically significant

Table 2: Video characteristics according to years and assesment parameters (mean ± standard deviation)

Years	Follow-up Mean ± SD	Like Mean ± SD	Dislike Mean ± SD	Comment Mean ± SD	Time Mean ± SD
<2015 (n=19)	68245.73±176572.72	412.26±1016.68	23±56,68	15.10±28.09	654.58±1186.39
2015-2019 (n=58)	43930.29±81566.90	369.77±887.97	17.82±41.75	18.34±32.57	695.74±1012.73
≥2020 (n=23)	12615.6±42279.97	253.34±635.52	7.69±24.84	18.69±39.03	861.91±1134.13
p	**<0.001**	0.116	0.075	0.121	0.452
Video sources					
Academic (n=6)	4442±5816.63	39.16±46.85	2.16±3.92	0.5±0.54	3433±632.89
Physician (n=22)	29881.45±67539.07	182.45±593.32	18.36±53.92	7.90±19.27	806.41±1003.02
Society/Professional Organization (n=41)	43130.39±121375.28	313.95±719.71	13.73±37.13	19.36±32.75	600.73±972.58
Health-related Website (n=16)	84883.26±128282.63	945±1532.86	36.37±53.93	35.81±47.85	403.50±275.22
Patient (n=15)	21470.46±48841.70	191.06±385.95	5.73±16.61	15.80±31.61	212.60±118.29
p	**0.034**	**0.024**	**0.004**	**0.026**	**0.001**
GQS(1-5 points)					
Low quality (1 or 2 points) (n=59)	32990.57±76816.63	338±892.23	12.45±32.15	16.89±33.56	296.02±389.04
Intermediate quality (3 points) (n=28)	68578.92±150789.81	506.32±955.12	31.25±61.98	27.25±36.99	660.14±803.84
High quality (4-5 points) (n=13)	20625.46±46774.31	76±151.37	2.92±5.10	1.61±3.54	2820.38±1237.96
p	0.461	0.142	0.156	**0.040**	**<0.001**
JAMA score (0-4 Points)					
Insufficient data (1 Point) (n=81)	48981.98±110914.68	395.77±935.21	19.37±45.98	18.98±32.90	442.26±648.93
Partially sufficient data (2 or 3 points) (n=14)	10202.85±16645.08	202.21±334.37	4.71±7.15	17.14±39.38	1470.50±1573.40
Completely sufficient data (4 points) (n=15)	4880.8±6391.2	43.60±50.96	2.60±4.21	0.60±0.54	324.80±472.89
p	0.266	0.906	0.602	0.266	**<0.001**
Modified DISCERN score (0-5 points)					
0 Point (n=1)	74	1	0	0	0
1 Point (n=20)	7387±10898.64	33.25±31.73	1.50±2.38	6.75±10.43	346.50±453.15
2 Points (n=52)	37726.43±126535,96	383.82±1569.90	9.87±31.43	23.19±73.73	284.59±327.11
3 Points (n=16)	35307.14±82238.81	397.07± 1268.74	10.88±27.95	37.40±84.15	366.56±335.16
4 Points (n=7)	47423.48±81316.07	320.12±499.89	16.08±31.33	22.16±34.54	753.44±953.56
5 Points (n=4)	31562.66±33770.90	199±166.27	13.33±15.94	22.33±19.75	897.33±841.58
p	0.555	0.059	0.199	0.209	**0.008**

N:Number of videos, SD: Standart Deviation, GQS: Global Quality Score, JAMA: Journal of American Medical Association benchmark criteria, Bold font:statistical significance

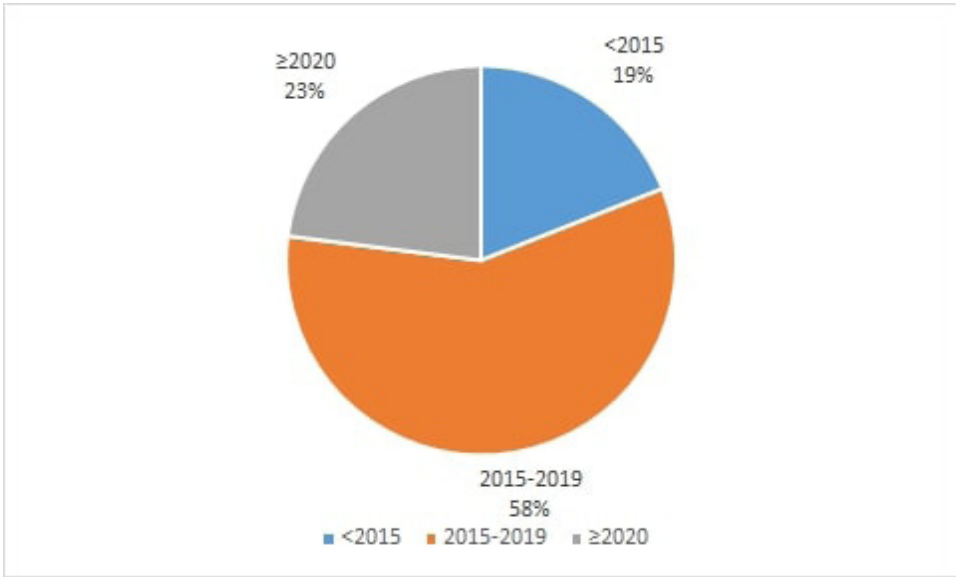

Figure 1: Number of videos by year

Table 3: Video sources by assesment parameters

		Academic	**Physician**	**Society/ Professional Organization**	**Health-related Website**	**Patient**
GQS (1-5 points)	Low quality (1or 2 points)	0	9	26	12	12
	Intermediate quality (3 points)	0	8	13	4	3
	High quality (4-5 points)	6	5	2	0	0
JAMA score (0-4 Points)	Insufficient data(1 Point)	0	14	36	16	15
	Partially sufficient data(2 or 3 points)	1	8	5	0	0
	Completely sufficient data (4 points)	5	0	0	0	0
Modified DISCERN score (0-5 points)	0 Point	0	0	1	0	0
	1 Point	0	1	10	5	4
	2 Points	0	10	23	9	10
	3 Points	0	7	6	2	1
	4 Points	2	4	2	0	0
	5 Points	4	0	1	0	0

GQS: Global Quality Score, JAMA: Journal of American Medical Association benchmark criteria

Table 4: Correlations between quantitative variables and scores

	GQS	JAMA	Modified DISCERN
Number of views	0.020	-0.084	-0.008
Number of likes	0.841	-0.064	-0.024
Number of dislikes	0.017	-0.078	-0.017
Number of comments	-0.038	-0.072	-0.035
Video duration;second	0.671**	0.665**	0.701**
Upload Year	0.040	-0.010	0.024
GQS	-	0.737**	0.858**
JAMA	0.737**	-	0.842**
Modified DISCERN	0.858**	0.842**	-

GQS: Global Quality Score, JAMA: Journal of American Medical Association benchmark criteria
**p<0,01 Nonparametric Spearmens's rank correlation coefficients

DISCUSSION

In this study, the content, quality, reliability, and user engagement of videos about stroke rehabilitation on YouTube was evaluated. Although most videos were uploaded between 2015 and 2019, a significant number of videos were uploaded by 2020 at 23%. The COVID-19 pandemic, which started after 2020, has affected the healthcare system and the physiotherapy and rehabilitation practice, including stroke rehabilitation Because of treatment disruption, they may loose their old gains and their health care procurement has become difficult. Tele-rehabilitation and the continuation of treatment with internet-based patient-oriented videos became an inevitable part of the treatment process.[19] The aim of our study was to evaluate the content of YouTube videos on stroke rehabilitation under these difficult conditions, and evaluate their quality and reliability.

In the age where 8 out of 10 internet users can access information on health online, the existence of social media and its power of information transmission cannot be ignored.[20] YouTube, a social media platform that offers open access video sharing service, has content with informative videos about diseases. This is in the context of stroke as a disease that affect many people worldwide from the elderly to the young adults, that can result in death or requiring long-term rehabilitation treatment. In a previous study, it was shown that the level of knowledge about stroke is insufficient even in high-risk patient groups.[21]

The literature has shown that there are varieties of YouTube video sources, with variable video quality. Springer *et al*.[22] mentioned that the videos prepared by health professionals are of higher quality in their study on rehabilitation and return to sports after anterior cruciate ligament repair. Similarly, Tolu *et al*.[23] showed that the videos uploaded by physicians, academics, and professional organizations offer higher quality content. Similar to previously published literature, it was found that academic and physician-sourced videos had higher quality than other video sources in our study. This can be explained by the fact that high-quality videos are associated with higher modified DISCERN and JAMA benchmark criteria scores. Similar to our study, Yildiz *et al*.[13] reported that high-quality videos have higher DISCERN scores in their study of vestibular rehabilitation videos on YouTube.

Ruiz-Roca *et al*.[24] evaluated YouTube videos with Parkinson's disease and found that videos originating from low-quality television channels had a high number of views, likes, and dislikes. Similar to the literature, in our study, a significant relationship between video sources and video characteristics (views, likes, dislikes, number of comments, and video duration) was found. Accordingly, it was determined that low-quality videos originating from health-related websites and professional organizations have more views, likes, dislikes, and comments. The reason why video characteristics are higher in low-quality videos compared to high-quality academic and physician-sourced videos can be explained by the fact that videos prepared by health-related websites and professional organizations use more advertisements, increase video interaction and reach more users.

Video duration can be thought of as a criterion that indicates the integrity of the video content. According to our findings, it was found that high-

quality videos have a longer video duration. In the literature, Ozdemir *et al*.[25] also found that high-quality videos have a longer duration in their study on cancer rehabilitation on YouTube. Bagcier *et al*.[26] also found that high-quality videos have a longer duration in their study on knee osteoarthritis exercises on YouTube. While designing the the video, it should be aimed to provide quality and necessary information.

According to the quality and reliability results, 59% of the videos in our study were of poor quality and 81% of them contained insufficient data. As might be expected, academic and physician-sourced videos had better quality and sufficient data, while other sources had poor quality and insufficient data. In this respect, our study is similar to other studies in the literature.[13,22]

Our study has some limitations. First, our sample size was small and our compilation consisted of the first 100 videos. Another limitation is that we have only included videos using English language. Since we could not include non-English videos, we were not able to assess the knowledge and experience of other language speaking nationalities in our study. However, considering that English is the most widely spoken language globally, this study remained to be significant.

In conclusion, we analyzed youtube videos on stroke rehabilitation. We found that many videoswere of poor quality and contained insufficient information. We also found that high-quality videos had a longer duration and were uploaded by academic and physician video sources; poor-quality videos prepared by health-related websites had more views, likes, dislikes, and comments, and shorter video durations. It is hoped that high-quality Youtube video can increasingly be a useful source of information for patients in stroke rehabilitation.

DISCLOSURE

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