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ORIGINAL ARTICLE

Digital transformation of knowledge: role of YouTube electrotherapy videos in physiotherapy and rehabilitation

Bilginin dijital dönüşümü: fizyoterapi ve rehabilitasyonda YouTube elektroterapi videolarının rolü

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Abstract

Purpose: YouTube is one of the most important websites among university students and researchers. Because of this reason, it is important to determine the quality and reliability of videos in this platform to be used as educational content. The purpose of this study is to evaluate the quality and reliability of YouTube videos in electrotherapy education.

Methods: The keywords namely; electrotherapy in physiotherapy, electrotherapy in physiotherapy lecture, electrotherapy in physical therapy and rehabilitation were searched on YouTube. The reliability and quality of the videos were evaluated respectively by using DISCERN and Global Quality Scale (GQS) scores.

Results: A total of 150 videos were reviewed in the current study. Finaly, 28 videos met the inclusion criteria were included in the study. The level of agreement between the two investigators was good regarding classifying the videos as reliable (Kappa coefficient: 0.904). Inter-observer agreement was 0.86 and 0.92 for DISCERN and GQS scores, respectively. The types of organizations that upload videos with Electrotherapy videos were most commonly uploaded by Physiotherapists. Doctors uploaded the lowest number of videos. It was found that physiotherapist uploaded the highest quality videos. DISCERN instrument, where the average total score was 3 (range 0 to 5).

Conclusion: YouTube can be a valuable platform for making application-based electrotherapy techniques more comprehensible, leveraging contemporary technological tools.

Keywords: Electrotherapy, Education, Internet, Video, YouTube

Öz

Amaç: *YouTube, üniversite öğrencileri ve araştırmacılar arasında en önemli web sitelerinden biridir. Bu nedenle, bu platformdaki videoların eğitim içeriği olarak kullanılmak üzere kalitesinin ve güvenilirliğinin belirlenmesi önemlidir. Bu çalışmanın amacı, elektroterapi eğitiminde YouTube videolarının kalitesini ve güvenilirliğini değerlendirmekti.*

Yöntem: *YouTube'da fizyoterapide elektroterapi, fizyoterapi dersinde elektroterapi, fizik tedavi ve rehabilitasyonda elektroterapi anahtar kelimeleri aranmıştır. Videoların güvenilirliği ve kalitesi sırasıyla DISCERN ve Genel Kalite Ölçeği (GKÖ) puanları kullanılarak değerlendirilmiştir.*

Bulgular: *Mevcut çalışmada toplam 150 video incelenmiştir. Sonuç olarak, dahil edilme kriterlerini karşılayan 28 video çalışmaya dahil edildi. İki araştırmacı arasında videoların güvenilirlik açısından sınıflandırılması konusunda iyi bir uyum sağlandı (Kappa katsayısı: 0,904). Gözlemciler arası uyum, DISCERN ve GKÖ puanları için sırasıyla 0,86 ve 0,92 idi. Elektroterapi videoları yükleyen kuruluşların türleri arasında en yaygın olanı fizik tedavi uzmanlarıydı. Doktorlar en az sayıda videoyu yüklemiştir. Fizyoterapistlerin en yüksek kaliteli videoları yüklediği tespit edilmiştir. DISCERN aracında ortalama toplam puan 3 (0 ila 5 aralığı) bulunmuştur.*

Sonuç: *YouTube, çağdaş teknolojik araçlardan yararlanarak uygulama tabanlı elektroterapi tekniklerini daha anlaşılır hale getirmek için değerli bir platform olabilir.*

Anahtar kelimeler: *Elektroterapi, Eğitim, İnternet, Video, YouTube*

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INTRODUCTION

In the 21st century, the internet has become a vital and increasingly convenient source of information for patients and their families.[1] YouTube is considered one of the largest internet platforms with more than one billion users and is the second most visited website after the Google search engine.[2] YouTube is a popular video sharing platform that has been providing online video viewing. It is reported that approximately eight out of ten internet users obtain their health-related information from online information sources. First of all interns and medical school students frequently use the internet for educational purposes.[3] YouTube has become an important tool for the students in their access to information, learning and academic development processes. The easily accessible, audiovisual and interactive content offered by YouTube supports students in understanding complex concepts, reinforcing course materials and developing multifaceted perspectives on topics across different disciplines. In addition to this many patients and families utilize. YouTube to learn more about their disease and available treatment options.[1] This situation supports individuals' active participation in their own treatment processes, increases health literacy and strengthens awareness in therapeutic processes. Furthermore, physiotherapists sharing educational materials via YouTube contributes to the widespread dissemination of clinical knowledge and ensures that current approaches to electrotherapy reach wider audiences.

Developing digital technologies and social networking sites offer people opportunities to learn and collaborate without time and space restrictions.[4,5] Social networking tools are now a part of medical education and allow people to obtain information, stay up to date, present their knowledge to others, communicate with others effectively and instantly develop a sense of community,[6,7] and control video content characteristics, including speed and time.[8,9]

In medical education, students reported high levels of satisfaction with the brevity and conciseness of educational videos, ease of access and use, and the ability to watch videos in a variety of settings to support clinical experiences and reinforce their learning.[10] YouTube also has easy-to-use feedback tools. Viewers can comment on videos to review and discuss the content, share additional resources, or ask and answer questions through forums, and they also support the content by using the like feature.[11] Because this platform is free and easily accessible, students and academicians have increasingly begun to combine YouTube videos with other medical education resources to meet their learning needs.[12] In addition, the fact that it has many advantages such as being easily accessible, being able to share videos on social media, and allowing options for commenting, liking, and disliking has increased the interest of publishers in YouTube.[11] Unfortunately, it has been stated that the popularity of YouTube videos does not depend on the quality and educational value of the video, but on the viewing rate, number of comments and likes.

On the other hand, there are concerns about the quality and reliability of the content of videos uploaded to YouTube. Since videos can be uploaded by anyone without verification and many videos are produced for commercial purposes, the information contained in the video content and the accuracy of this information can be questioned.[13,14] Considering all these conditions there is a constant need to evaluate the quality of YouTube's health-related videos. A research investigation of You Tube videos on a variety of topics found that YouTube can provide high-quality health-related information, but can also provide conflicting and misleading health-related information.[15] There are a large number of videos on Electrotherapy education on the YouTube Video platform, and it is important to determine the quality and reliability of these videos in order to be used as educational content.

As a result of our literature review, we could not find any study on You Tube using as a electrotherapy education platform. In the current literature, a study was conducted to evaluate the reliability and quality of YouTube videos as an information source for Transcutaneous Electrical Nerve Stimulation (TENS),[16] but no study examining the reliability and quality of YouTube videos in electrotherapy education could be found. The aim of this study is to evaluate the quality and reliability of YouTube videos in electrotherapy education.

The hypothesis of our study; YouTube platform can be used in electrotherapy education consists of high quality and reliable videos.

METHODS

This research was designed as a descriptive study and was conducted at Hasan Kalyoncu University. YouTube was searched with the keywords " electrotherapy in physiotherapy", " electrotherapy in physiotherapy lecture", and "electrotherapy in physical therapy and rehabilitation" for this research on 16-17 June 2023. The search was conducted in English, and each keyword was written separately and all related videos were identified. Since the information analyzed in this study was publicly accessible on YouTube, ethical approval was not obtained.

The video uploaders were divided into 4 categories: (1) physicians, (2) physiotherapist, (3) medical companies, (4) independent users.

Selection of keywords

There are no standardized guidelines for keyword selection in studies analyzing YouTube content; therefore, researchers typically determine keywords based on their own criteria. To enhance the generalizability of the findings and reduce potential selection bias, a systematic review of multiple databases was conducted to identify the most frequently used terms related to electrotherapy. The keyword selection process was carried out independently by three physiotherapists with expertise in the field, Two of them held doctoral degrees in physiotherapy and rehabilitation. Each researcher performed the search on a separate computer to ensure objectivity. The final set of keywords was determined through a consensus-based approach, incorporating expert input to strengthen methodological rigor and reproducibility.[17]

Data collection and eligibility criteria

The inclusion criteria were defined as YouTube videos that (1) matched the predefined keywords ("electrotherapy in physiotherapy", "electrotherapy in physiotherapy lecture", and "electrotherapy in physical therapy and rehabilitation"); (2) were presented in English; (3) contained educational or clinical information related to electrotherapy-including its principles, therapeutic techniques, applications, or safety considerations-within physiotherapy and rehabilitation practice; (4) demonstrated adequate audiovisual quality; (5) included narration or visual explanation provided by a physiotherapist, educator, or healthcare professional to ensure the reliability of the content; and (6) had a duration between 30 seconds and 30 minutes, as viewer engagement tends to decline significantly in longer videos.

Videos were excluded if they were duplicated, unrelated to the study topic, or inaccessible during the data collection process. The applied search strategy and eligibility criteria were consistent with those used in previous. YouTube-based content analyses. In total, 28 videos meeting the inclusion criteria were analyzed in this study.

Video selection

The previous browsing history and cookies were cleared before the search. A total of 150 top videos were aimed to be examined and saved in a separate playlist. Fifty top videos were targeted for each keyword, which has been reported to be a feasible method of video selection in the literature. Previous research has shown that individuals tend to watch the first videos listed on any media server.[18,19] The number of views on the YouTube videos was used to search for them. As a result, the videos with the greatest views were shown first. Links to the videos were recorded by the researchers. The study was completed within two days. During the viewing of the videos, the researchers scored them independently in different environments.

Evaluation of the videos

The reliability and quality of the videos were evaluated by two independent physiotherapists (ED, NY) Discrepancies between the scores of the two researchers were determined. In case of any disagreements, a consensus discussion was held to resolve them. To ensure inter- and intra-rater reliability of the customized scoring system, the same reviewers re-evaluated 28 videos 2 weeks after the initial assessment, which were selected using a simple random sampling method. Additionally, these videos were evaluated by the third researcher (DK) without knowing the scores of the other two researchers. Finally, the final decision was reached. Inter-rater reliability was calculated for DISCERN and Global Quality Scale (GQS) scores as described as below.[20,21]

Review

The characteristics of videos (number of views, duration, days, years of upload, number of likes and dislikes, comments) were recorded. The number of likes, dislikes, and comments related to the interaction level of the videos was determined. The engagement rate was calculated with the following formula: number of views/day. The like ratio was calculated with the following formula: likes × 100/(likes + dislikes).

Video quality

The quality of the videos was evaluated by GQS. The scale was created by Bernard et al. The scoring system of this scale is based on the usefulness, flow, and quality of the video for the target individual who will potentially watch the video.[22] This scale was designed to evaluate the content quality of online resources. It is a Likert-type scale. It evaluates between a minimum of 1 and a maximum of 5 points. A score of 4 or 5 indicates that the video has high quality, a score of 3 indicates that it has medium quality, and a score of 1 or 2 indicates that it has low quality.[20]

Reliability of videos

The reliability of the videos was evaluated with modified DISCERN. The scale is created to examine the quality of written health information. Each question of this instrument, which consists of 5 items, is answered "yes" or "no". Each yes answer receives 1 point, and the maximum score is 5. Higher scores indicate greater reliability.[21]

In addition, the video contents were categorized and analyzed according to specific electrotherapy-related themes, such as types of currents. This classification allowed for a more systematic and comprehensive evaluation of the educational and clinical aspects presented in the videos.

Statistical analysis

The normality of data was analyzed with the Shapiro-Wilk test. The data were expressed as median (min-max) for continuous variables and number (n) and median for categorical variables. Cohen's Kappa coefficient of agreement was used to measure the degree of agreement of the reviewed video between two investigators. The Statistical Package for Social Science version 22.0 (IBM Corp. Armonk, NY, USA) was used for analysis. A P-value of <.05 was considered significant.

RESULTS

In a YouTube search on 16-17 June 2023, a total of 150 videos were reviewed in the current study. 39 non-English language videos, 11 poor quality (voice or resolution) videos, 4 repetative videos, 34 duplicated videos, 5 irrelevant content videos and 11 videos with inappropriate time were excluded. The level of agreement between the two investigators was good regarding classifying the videos as reliable and no reliable (Kappa coefficient: 0.904). The remaining 28 videos were assessed in this study. Inter-observer agreement was 0.86 and 0.92 for DISCERN and GQS scores, respectively. The flow chart of the video selection process is shown in Figure 1.

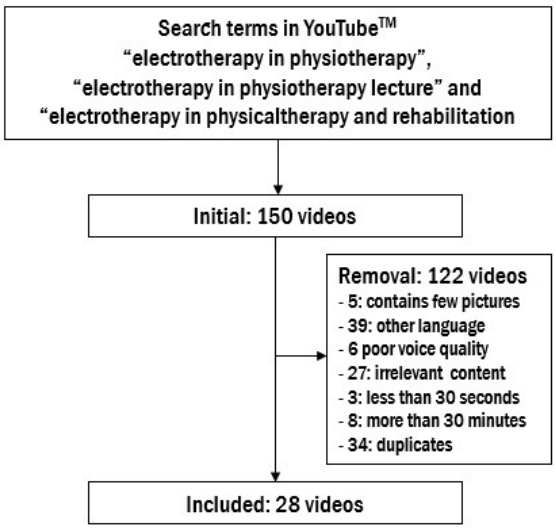

Figure 1. The flow chart of the video selection process

Video characteristics

In our study conducted on the YouTube platform, it was determined that videos containing the keywords we selected for electrotherapy and meeting the inclusion criteria were uploaded between 2020 and 2023.Videos had a median of 6314 views (range 178 to 80,177), with all analyzed videos together being viewed 647,180 times. There were no dislikes in any videos. Electrotherapy education videos available on YouTube received 775

comments. The video duration, knowledge of upload, amounts of views, likes, dislikes, comments, and like ratio are given in Table 1.

Table 1. Video characteristics.

	Median	Min-Max
Video duration (minutes)	6.58	2.01-12.47
Months since upload	48	12-264
Views	6314	178-80177
Likes	3.5	0-19.000
Dislikes	0	0
Comments	0	775
Like rate	100	0-100
Global Quality Scale (GQS)	3	2-4
DISCERN Total	3	2-5

There are six categories of video uploaders in this study. The types of organizations that upload videos with Electrotherapy videos were most commonly uploaded by physiotherapist. Doctors uploaded the lowest number of videos. Independent user has no videos. It was found that physiotherapist uploaded the highest quality videos. The video quality details by GQS and knowledge of video uploaders are given in Table 2.

Video quality evaluation with DISCERN scores and Global Quality Score (GQS)

Videos were assessed for user-focused video quality using the DISCERN instrument, where the average total score was 3 (range 0 to 5). Question-based clustering of the questionnaires examining video quality is demonstrated in Table 3. Two videos received a score of 0 on the DISCERN assessment, while three videos included all questions from the survey and achieved a score of 5. According to DISCERN, the most basic problem in videos is that they are no additional sources of information listed. The distribution of responses according to the DISCERN scoring and the quality of the videos according to the GQS are presented together in Table 3. The responses clustering demonstrated that many videos achieved high scores according to GQS.

Content of electrotherapy methods

The distribution of treatment methods in articles published on YouTube in the field of electrotherapy is presented in Table 4. The largest segment in the chart represents electrical stimulation, which was the most studied and discussed method in the field of electrotherapy (50%). Other video content topics were distributed as follows: TENS (25%), combined electrotherapy applications (20%), iontophoresis (10%), biofeedback (5%), Shortwave Diathermy (SWD) (5%), shock therapy (5%), and paraffin therapy (5%).

DISCUSSION

In the digitalized world, driven by the expectations of Generation Z, technology has become an essential tool in the field of education. With advancements in global technology, education has extended beyond traditional classroom settings and has increasingly embraced digital platforms [23]. A key reason for this transition is that Generation Z tends to favor interactive and non-traditional approaches to learning.[24]

In recent years, YouTube has transcended its initial role as an entertainment platform and has emerged as an educational resource across various domains, including academic subjects, hobbies, and cultural topics.[25]

Electrotherapy education comprises both theoretical knowledge and practical skills. The theoretical concepts taught in class are expected to be integrated with hands-on practice and applied in clinical settings. While students typically receive device-related information from course instructors during practical sessions, opportunities to practice and reinforce this knowledge outside the classroom are often limited. This limitation arises due to factors such as the cost, size, and safety requirements of the devices, which are typically available only in specialized laboratories. Consequently, there is a growing need for visual materials that enable students to revisit and reinforce their practical applications.[26]

Practical demonstrations performed by experts using devices commonly encountered in clinical settings play a crucial role in reinforcing course content and supporting repeated practice. Short, focused, and comprehensible videos that align with the learning outcomes of the course can be used by students for

Table 2. Video quality assessment according to the Global Quality Scale by source group.

	Poor Quality (n=9)	Moderate Quality (n=12)	High Quality (n=7)	Total (n=28)
Sources	n	n	n	n
Doctor	-	1	-	1
Physiotherapist	4	6	5	15
Hospital/Clinic	3	4	2	9
Patient	-	-	-	0
Medical Company	2	1	-	3
Independent user	-	-	-	0

Table 3: Question-based clustering of the questionnaires according to video quality

	Q 1	Q 2	Q 3	Q 4	Q 5	DISCERN Total	GQS (Quality)
1.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
2.	Yes	Yes	Yes	Yes	Yes	5	5 (High Q)
3.	Yes	No	Yes	No	No	2	4 (High Q)
4.	Yes	No	Yes	No	Yes	4	5 (High Q)
5.	Yes	No	Yes	No	No	2	4 (High Q)
6.	No	No	No	No	No	0	2 (Low Q)
7.	Yes	No	Yes	No	No	2	3 (Moderate Q)
8.	No	No	No	No	No	0	2 (Low Q)
9.	Yes	No	No	No	No	1	3 (Moderate Q)
10.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
11.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
12.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
13.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
14.	Yes	No	Yes	No	No	2	3 (Moderate Q)
15.	Yes	No	Yes	No	No	2	2 (Low Q)
16.	Yes	No	Yes	No	No	2	2 (Low Q)
17.	Yes	No	Yes	No	Yes	3	2 (Low Q)
18.	Yes	No	No	No	Yes	2	4 (High Q)
19.	No	Yes	Yes	No	Yes	3	2 (Low Q)
20.	Yes	No	Yes	No	Yes	3	3 (Moderate Q)
21.	Yes	Yes	Yes	No	Yes	4	3 (Moderate Q)
22.	Yes	No	Yes	Yes	No	3	2 (Low Q)
23.	Yes	Yes	Yes	Yes	Yes	5	4 (High Q)
24.	Yes	Yes	Yes	No	Yes	4	4 (High Q)
25.	Yes	Yes	Yes	No	Yes	4	3 (Moderate Q)
26.	Yes	Yes	Yes	Yes	Yes	5	2 (Low Q)
27.	Yes	Yes	Yes	No	No	3	3 (Moderate Q)
28.	Yes	Yes	Yes	Yes	No	4	2 (Low Q)

Table 4. Distribution of electrotherapy methods.

Electrotherapy method	n (%)
Electric stimulation	11 (40)
TENS	6 (20)
Combine method	5 (16)
Shockwave therapy (ESWT)	2 (8)
Shortwave diathermy	1 (4)
Biofeedback	1 (4)
Iontophoresis	1 (4)
Paraffin	1 (4))

independent study and can also be recommended by instructors as supplementary materials. Such instructional content enables learners to progress at their own pace and helps detach the learning process from time and place restrictions. In this way, practice-based topics can be reviewed as often as needed in an online environment, contributing to more permanent and meaningful learning.[27]

In this context, the present study aimed to evaluate the quality and reliability of YouTube videos as educational resources for electrotherapy.

The YouTube videos included in the study were created by physiotherapists, which aligns with the fact that electrotherapy is a primary domain of physiotherapy students and professionals.[28] Other healthcare professionals and assistants, apart from physiotherapists and physical therapy technicians, do not generally utilize this method. Therefore, it is both reliable and appropriate for such videos to be created and uploaded by these professional groups.

A prior study examined the perspectives of physical therapy graduates on electrotherapy education. According to the findings, graduates emphasized the importance of covering topics such as ultrasound, hot pack, cold pack, shortwave diathermy, paraffin therapy, TENS, interferential current, electrical stimulation, and iontophoresis within electrotherapy courses (28). In the current analysis, the most commonly covered topics in the YouTube videos included electrical stimulation, TENS, combined electrotherapy applications, iontophoresis, biofeedback, shortwave diathermy, shock therapy, and paraffin therapy. This overlap suggests that the electrotherapy-related video content on YouTube largely meets the expectations of physical therapy graduates.

The findings of the present study are consistent with our initial hypothesis, which assumed that the YouTube videos used in electrotherapy education would demonstrate an acceptable level of quality and reliability. Although only a limited number of videos met the inclusion criteria, those selected videos were of sufficient educational value and aligned well with the needs of electrotherapy training. From an educational perspective, these results highlight the importance of carefully curated and evidence-based video content as a supportive tool for students, particularly in skill-oriented courses with limited laboratory time. When integrated into the learning process, structured online videos have the potential to reinforce knowledge, enhance self-paced learning, and contribute to competency-based electrotherapy education.

To ensure optimal quality, videos were evaluated based on predefined criteria, resulting in only 19% of the videos being included in the study. While the videos that met the criteria demonstrated high quality and reliability, the limited number highlights the need to enhance existing content in terms of material quality, narration, and visual presentation. Therefore, it is recommended that future video content be enriched to better support educational objectives.

Limitations

Certain limitations of this study should be acknowledged. The subjective scales utilized in the study may have been influenced by the personal perceptions and opinions of the evaluators. However, as no standardized quantitative method exists for this purpose, similar criteria have been commonly employed in previous studies. Another notable limitation pertains to the timing of the video assessments. YouTube is a dynamic platform where millions of new videos are uploaded daily, and the characteristics of these videos can change over time. Consequently, the findings of this study are confined to a specific time frame. Future research should consider this dynamic nature and analyze the same videos at different time points to assess potential changes over time.

Conclusion

YouTube appears to be a valuable platform

for making application-based electrotherapy techniques more comprehensible, leveraging contemporary technological tools. However, there remains a need to increase the number of high-quality videos available on the platform. Additionally, newly uploaded videos should be further enriched to maximize their educational impact.

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