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Are YouTube videos claiming to describe lumbar spinal manipulation techniques adequate?

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ABSTRACT

Background and objective: YouTube has become a digital visual library in almost all fields of life, including medicine. Healthcare professionals and students frequently use YouTube to gain new skills and knowledge; however, the content of these videos has not been scientifically evaluated. Therefore, this study aimed to determine the descriptive adequacy and quality of YouTube videos on lumbar spine manipulation techniques (LSMTs) prepared by different healthcare professionals.

Methods: The first 50 most relevant videos retrieved on searching YouTube for the keyword 'lumbar spinal manipulation techniques' were included in the study. The video metrics (total duration, number of views, time since upload, number of comments, number of likes, and number of dislikes) that could be accessed from video descriptions were recorded. However the videos were scored according to manipulation definition criteria proposed by the American Academy of Orthopedic Manual Physical Therapists (AAOMPT manipulation description score – AAOMPT-MDS) and benchmark criteria for quality of digital content by the Journal of American Medical Association's (JAMA). The video metrics, AAOMPT-MDS and JAMA scores of the videos prepared by medical doctors, chiropractors, osteopaths, and physiotherapists were compared.

Results: Video metrics of groups were similar. The mean AAOMPT-MDS of the videos was 2.40 ± 1.57 out of 6.00 (higher score was better), and the mean JAMA score was 2.14 ± 1.05 out of 4.00 (higher score was better). Videos created by all professional groups had statistically comparable AAOMPT-MDS and JAMA scores ($p > 0.05$).

Conclusion: Although YouTube videos on LSMTs offer valuable information for professionals and students, creators should follow the proposed recommendations when producing these videos to ensure quality content and systematic presentation.

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Introduction

Lumbar spinal manipulation techniques (LSMTs) are an efficient treatment option for multiple back-related problems, primarily low back pain [1,2] While there are substantial benefits of LSMT, such as reducing pain and improving function [3], there are some serious and potentially harmful effects, such as lumbar subdural hematoma [4]. It has been reported that LMSTs can lead to lumbar disc herniations, and their use is not recommended in known cases of lumbar disc herniation [5]. Therefore, LMSTs must be applied only by trained professionals in well-indicated conditions using the appropriate techniques [6]

Social media platforms, which were initially created as a means of entertainment and communication, are now used to share educational information [7]. YouTube is the second most frequently used social media platform worldwide; functioning as a visual digital library, it allows access to information related to any topic [8]. Interestingly, the keyword 'YouTube' drew 2402 results on the PubMed search engine (accessed 10 March 2021), which indicates the incorporation of YouTube into medical literature as a potential source and topic of research [9]. However, videos uploaded to YouTube do not undergo an editorial process; therefore, despite the availability of valuable medical information, users may be exposed to inaccurate, low-quality information from unreliable sources [10]. Therefore, there has been an exponential increase in the number of scientific studies evaluating the quality, accuracy, and reliability of YouTube videos in offering information regarding different disciplines of healthcare [11].

Information competencies of educational YouTube videos for different healthcare disciplines such as general anatomy, nervous system examination and pain neuroscience education varies in a wide range from adequate to limited [12–14]. However, the number of studies investigating the quality of YouTube videos for health education is limited, and evidence to date shows that the quality of the videos is low [15]. So far, there is no evidence corroborating the descriptive adequacy and quality

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of YouTube videos related to LSMTs, as well as other manual therapy topics. Therefore, we compared the existing LSMT relevant videos on YouTube prepared by medical doctors, physiotherapists, chiropractors, and osteopaths to determine whether they included appropriate descriptions to enable the replicability of LSMTs. A secondary aim of this study was to examine the general quality of these videos.

Materials and methods

The sample size of the study was calculated using G*Power 3.1.7 for Windows (G*Power from the University of Düsseldorf, Düsseldorf, Germany). This process was assumed to be a power calculation to detect between-group differences in quality scores of groups. Using the Journal of American Medical Association's (JAMA) benchmark criteria scores proposed by Erdem and Karaca for different four video sources (academic, physician, non-physician, medical) in their study, we calculated that a minimum of 20 videos had to be included to obtain an effect size of 1.2 at $\alpha = 0.05$and $1\text{-}\beta = 0.95$ (actual power = 0.98) [16]. Accordingly, 50 videos depicting LSMTs in the English language were included in the study. The phrase 'lumbar spinal manipulation techniques' was used for a keyword search on YouTube on 1 May 2022, which resulted in 20,000 videos. We used the term to ensure the use of professionally acceptable language and access to educational videos. Out of these results, the first 50 most relevant videos related to LSMT were included in the study. Videos were excluded if they contained manipulation techniques for the cervical and/or thoracic region, explained mobilization and muscle energy techniques, were related to lower back evaluation procedures, had been prepared as patient information videos, short videos, sponsored content not relevant to the keywords searched and similar content from the same source. Ethical review and approval were not required for this study, since no human subjects were directly involved in the study design, and we used publicly available YouTube videos for analysis.

Researchers decided together which videos to include and grouped the videos according to their source as prepared by 1) medical doctor, 2) chiropractor, 3) osteopath, and 4) physiotherapist. Researcher 1 recorded the total duration, number of views, time since upload, number such as of comments, number of likes, and number of dislikes for each video included. These metrics are available in the video's description. Also she computed the view ratio (number of views/days), ratio (number of likes × 100/[likes + dislikes]), and video power index (VPI; like ratio × view ratio/100) [16]. Researcher 1 was a physiotherapist with 15 years of experience. The videos were reviewed by two researchers (Researcher 2 and Researcher 3) according to the JAMA's benchmark criteria and the manipulation description criteria proposed by the American Academy of Orthopedic Manual Physical Therapists (AAOMPT) [17,18]. Researcher 2 was a physiotherapist and osteopath with 20 years of experience; Researcher 3 was a sports medicine specialist with 10 years of experience. Both researchers first evaluated the videos independently and scored them according to the aforementioned criteria proposed by JAMA and AAOMPT. Videos with dissimilar scores were watched together by both researchers, and a common score was allotted for the video after consensus.

The AAOMPT has recommended the use of common terminology for manipulation, which includes six primary characteristics that needed to be clearly expressed when describing a manipulation technique, namely the rate of force application, location within the available range of movement, direction of force, target of force, relative structural movement, and patient position (Table 1) [17]. The videos were examined with respect to each characteristic; the video was given 1 point if it contained information on that characteristic and 0 if it did not. The points for each characteristic were combined to give a total score (maximum = 6 and higher score indicated better) for the video recorded as its AAOMPT manipulation description score (AAOMPT-MDS). We also recorded whether the video contained warnings and/or information about the indications, contraindications, and clinical prediction rules for LMSTs, in addition to whether it contained verbal information about the clinician's position, which is extremely important to manage the direction and force of the manipulation.

The quality of the videos was evaluated according to the JAMA benchmark criteria developed by Silberg et al. to score the quality of the digital content [18]. However, the authors alluded that this scoring system might not be able to guarantee the quality of digital content that contained information to be learned, but it could be used to get an idea about the overall quality of the content. The benchmark principles are based on the four criteria of authorship, attribution, disclosure, and currency (Table 1) [18]. A score of 1 point was assigned to the video if it contained information about a criterion and 0 if there was no information. The points for each criterion were summed to give the total JAMA score (maximum = 4 and higher score indicated better) for the video.

The data were analyzed statistically using the Statistical Package for Social Sciences (Version 22.0; IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.). Video characteristics (duration, number of views, number of likes, number of comments, and VPI) were ratio level data. Conformity of the video characteristics to normal distribution was assessed

Table 1. JAMA benchmarking criteria used to evaluate the quality of videos and AAOMPT manipulation definition criteria used to evaluate whether LSMT is defined clearly enough.

JAMA benchmark criteria		Six characteristics recommended by the AAOMPT to describe a manipulative technique	
Authorship	Authors and contributors, their affiliations, and relevant credentials should be provided.	Rate of force application	Describe the rate at which the force was applied.
Attribution	References and sources for all content should be listed clearly, and all relevant copyright information noted.	Location in range of available movement	Describe whether motion was intended to occur only at the beginning of the available range of movement, toward the middle of the available range of movement, or at the end point of the available range of movement.
Disclosure	Website '"ownership"' should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest.	Direction of force	Describe the direction in which the clinician imparts the force.
Currency	Dates that content was posted and updated should be indicated.	Target of force	Describe the location to which the clinician intended to apply the force.
		Relative structural movement	Describe which structure or region was intended to remain stable and which structure or region was intended to move, with the moving structure or region being named first and the stable segment named second, separated by the word 'on.'
		Patient position	Describe the position of the patient, for example, supine, prone, recumbent. This would include any premanipulative positioning of a region of the body, such as being positioned in rotation or side bending.

JAMA: Journal of American Medical Association, AAOMPT: The American Academy of Orthopaedic Manual Physical Therapists, LSMT: Lumbar spinal manipulation techniques.

with both visual (histogram and probability graphs) and analytical methods (Shapiro – Wilk test, $p < 0.01$). The Kruskal-Wallis test to determine statistical significance between video characteristics of the four groups based on the video's creator. AAOMPT-MDS and JAMA scores were ordinal data and for this reason the Kruskal-Wallis tests were used to compare groups. Mean and standard deviation were given for video characteristics, AAOMPT-MDS and JAMA scores. However both AAOMPT and JAMA criteria were categorical variables and they were analyzed using the Chi-square test. Frequency (n) and percentage (%) were used to describe to each AAOMPT and JAMA criteria. A p-value of < 0.05 was accepted as statistically significant.

Results

Fifty percent videos were created by physiotherapists (Figure 1); video metrics, such as duration, number of views, number of likes, and number of comments, were comparable across the four groups ($p < 0.05$; Table 2). However, the VPI of videos created by chiropractors was significantly higher among the four groups ($p < 0.05$; Table 2).

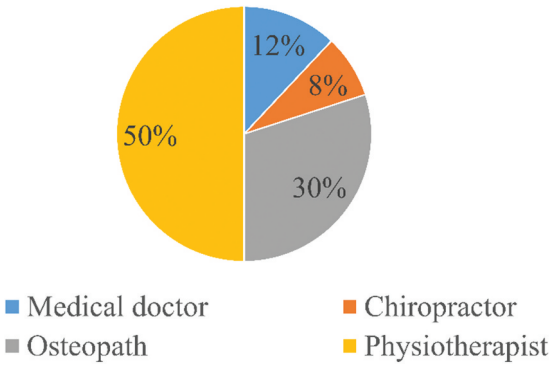

Figure 1. Categorical distribution of the videos based on source.

Table 2. Video characteristics, composite AOMPT and JAMA scores by video source.

	Medical doctors	Chiropractor	Osteopath	Physiotherapist	Total	
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	p^k
Duration (secs)	420.00 ± 435.50	124.00 ± 93.28	294.07 ± 314.31	197.76 ± 184.73	247.42 ± 267.67	0.326
Likes	238.83 ± 423.57	482.25 ± 689.03	316.07 ± 390.54	218.16 ± 466.56	271.14 ± 450.98	0.699
Comments	9.00 ± 13.85	17.25 ± 20.69	10.40 ± 17.61	8.92 ± 24.90	10.04 ± 21.05	0.880
Views	34851.67 ± 59965.74	148479.25 ± 139428.04	52380.93 ± 81593.69	35391.64 ± 75523.94	49470.64 ± 84753.40	0.067
VPI	10.28 ± 15.69	97.54 ± 126.82	27.51 ± 32.65	25.54 ± 84.09	30.06 ± 72.18	**0.038***
JAMA	2.67 ± 1.03	2.25 ± 1.50	2.33 ± 0.90	1.88 ± 1.05	2.14 ± 1.05	0.304
AAOMPT-MDS	2.50 ± 1.51	1.50 ± 2.38	2.73 ± 1.67	2.32 ± 1.41	2.40 ± 1.57	0.587

VPI: Video power index, AAOMPT: The American Academy of Orthopaedic Manual Physical Therapists, JAMA: Journal of American Medical Association, M: Mean, SD: Standard deviation, ^{k}: Kruskal Wallis test, *:$p < 0.05$.

The mean composite AAOMPT-MDS score (maximum = 6 and higher score indicated better) for all videos included in this study was 2.40 ± 1.57; there was no statistically significant between-group difference in terms of the composite AAOMPT-MDS scores ($p > 0.05$; Table 2). The ratios of video which include the information related to rate of force application [12% ($n = 6$)], location within the available range of movement [38% ($n = 19$)], direction of force [46% ($n = 23$)], target of force [56% ($n = 28$)], relative structural movement [62% ($n = 31$)], and patient position [26% ($n = 13$)] varied. All six characteristics were similar in the included videos for different video sources ($p > 0.05$; Table 3). The ratio of video that met all of the manipulation definition criteria recommended by the AAOMPT was 2% ($n = 1$; prepared by osteopath).

The mean JAMA score (maximum = 4 and higher score indicated better) for all videos was 2.14 ± 1.05; all video source groups had comparable JAMA scores ($p > 0.05$; Table 2). Information about authorship was included in 62% of the videos, attribution in 12%, disclosure in 52%, and currency in 88%. The ratio of video meeting each JAMA criteria did not differ by video source ($p > 0.05$; Table 3). However the ratio of video meeting all JAMA criteria was 6% ($n = 3$;

Table 3. Manipulation description criteria of AAOMPT and JAMA Benchmark Criteria.

			Doctor	Chiropractor	Osteopath	Physiotherapist	Total	p^X
Manipulation description criteria of AAOMPT	Rate of force application	Present % (n)	0 (0)	25.0 (1)	13.3 (2)	12.0 (3)	12.0 (6)	0.686
		Absent % (n)	100.0 (6)	75.0 (3)	86.7 (13)	88.0 (22)	88.0 (44)	
	Location in range of available movement	Present % (n)	50.0 (3)	25.0 (1)	60.0 (9)	24.0 (6)	38.0 (19)	0.121
		Absent % (n)	50.0 (3)	75.0 (3)	40.0 (6)	76.0 (19)	62.0 (31)	
	Direction of force	Present % (n)	50.0 (3)	25.0 (1)	46.7 (7)	48 (12)	46.0 (23)	0.851
		Absent % (n)	50.0 (3)	75.0 (3)	53.3 (8)	52.0 (13)	54.0 (27)	
	Target of force	Present % (n)	50.0 (3)	25.0 (1)	66.7 (10)	56.0 (14)	56.0 (28)	0.505
		Absent % (n)	50.0 (3)	75.0 (3)	33.3 (5)	44.0 (11)	44.0 (22)	
	Relative structural movement	Present % (n)	50.0 (3)	25.0 (1)	73.3(11)	64.0 (16)	62.0 (31)	0.314
		Absent % (n)	50.0 (3)	75.0 (3)	26.7 (4)	36.0 (9)	38.0 (19)	
	Patient position	Present % (n)	50.0 (3)	25.0 (1)	13.3 (2)	28.0 (7)	26.0 (13)	0.376
		Absent % (n)	50.0 (3)	75.0 (3)	86.7 (13)	72.0 (18)	74.0 (37)	
JAMA Benchmark Criteria	Authorship	Present % (n)	83.3 (5)	75.0 (3)	80.0 (12)	44.0 (11)	62.0 (31)	0.74
		Absent % (n)	16.7 (1)	25.0 (1)	20.0 (3)	56.0 (14)	38.0 (19)	
	Attribution	Present % (n)	16.7 (1)	0 (0)	13.3 (2)	12.0 (3)	12.0 (6)	0.875
		Absent % (n)	83.3 (5)	100.0 (4)	86.7 (13)	88.0 (22)	88.0 (44)	
	Disclosure	Present % (n)	66.7 (4)	75.0 (3)	60.0 (9)	40.0 (10)	52.0 (26)	0.363
		Absent % (n)	33.3 (2)	25.0 (1)	40.0 (6)	60.0 (15)	48.0 (24)	
	Currency	Present % (n)	100.0 (6)	75.0 (3)	80.0 (12)	92.0 (23)	88.0 (44)	0.432
		Absent % (n)	0 (0)	25.0 (1)	20.0 (3)	8.0 (2)	12.0 (6)	
Other characteristics associated with manipulation	Clinician's position	Present % (n)	33.3 (2)	0 (0)	33.3 (5)	28.0 (7)	28.0 (14)	0.604
		Absent % (n)	66.7 (4)	100.0 (4)	66.7 (10)	72.0 (18)	72.0 (36)	
	Indication	Present % (n)	16.7 (1)	25.0 (1)	20.0 (3)	24.0 (6)	22.0 (11)	0.975
		Absent % (n)	83.3 (5)	75.0 (3)	80.0 (12)	76.0 (19)	78.0 (39)	
	Contra-indication	Present% (n)	0 (0)	25.0 (1)	0 (0)	8.0 (2)	6.0 (3)	0.253
		Absent % (n)	100.0 (6)	75.0 (3)	100.0 (15)	92.0 (23)	94.0 (47)	
	Clinical prediction rule	Present % (n)	0 (0)	0 (0)	0 (0)	16.0 (4)	8.0 (4)	0.226
		Absent% (n)	100.0 (6)	100.0 (4)	100.0 (15)	84.0 (21)	92.0 (46)	

AAOMPT: The American Academy of Orthopaedic Manual Physical Therapists, JAMA: Journal of American Medical Association, ^{X}: Chi-square test.

prepared by osteopath = 1, prepared by physiotherapist = 1 and prepared by medical doctor = 1).

Verbal information about the clinician's position during manipulation was included in only 28% of the videos, indications for lumbar manipulation in 22%, contraindications for lumbar manipulation in 6%, and the rule of clinical prediction for lumbar manipulation in only 8% of the videos. There were no between-group differences among the four video source groups in terms of including this information ($p > 0.05$; Table 3).

Discussion

The aim of this study was to compare the descriptive adequacy and quality of LSMT videos available on YouTube prepared by different healthcare professions related to this field. We found that the videos prepared by medical doctors, physiotherapists, chiropractors, and osteopaths were comparable in terms of the description of the technique and the content quality of the video. Notably, only a few videos contained information related to the clinician's position, indications, contraindications, and the clinical prediction rule for LSMTs.

Social media platforms are frequently used by healthcare professionals, and recent studies have acknowledged the role of social media for professional training and instruction [19]. Tacket et al reported that YouTube afforded the global population the opportunity to access medical training videos and recommended that more creators should produce educational content [20]. Likewise Barry et al. recommended integrating YouTube content in anatomy education programs to protect users from consuming unreliable and incorrect information [12]. Azer et al reported that YouTube is an appropriate source to learn about nervous system examination [13], and Heathcote et al. stated that, although limited, YouTube provides sufficient educational videos for pain neuroscience training [14]. However, no study has so far evaluated YouTube content for LSMTs.

Manipulation is one of the oldest treatment methods used in medicine [21]. Medical doctors, physiotherapists, chiropractors, and osteopaths are the four primary professional groups qualified to perform manipulation [22]. With increasing scientific evidence supporting the efficacy of manipulation, more professionals are trying to learn and practice these techniques [23]. A working group formed within the AAOMPT defined six characteristics of manipulation that needed to be described while performing manipulation techniques to ensure standardization and transfer of knowledge and skills among professionals [24]. Therefore, the current study investigated whether YouTube videos regarding LSMTs sufficiently described the technique for clinical reproduction. We observed that only a small proportion of videos contained sufficient information about the AAOMPT manipulation description recommendations. The AAOMPT-MDS was poor (2.40 ± 1.57), which indicates that the six basic characteristics were not sufficiently defined. Accordingly, only a few videos provided information about the features considered essential in the learning of LSMTs and the clinical decision-making process. The rates of video explaining the clinician's position during LSMT, indications, contra-indications and the rule of clinical prediction of LSMT, which we think is important for LSMT applications, were also very limited. Consequently, the application of LSMTs studied from YouTube as the source of information can limit their efficacy, and may even result in unwanted outcomes.

Several studies have investigated the quality of YouTube videos providing information regarding different medical disciplines, especially videos prepared for patient information [11,15]. It is noteworthy that, although limited in number, studies investigating the quality of YouTube videos for medical training have reported that the content is of poor quality. Helming et al. reported that the content quality in videos prepared for professional medical training was widely variable; there were no standard grading criteria to evaluate video quality, and the search algorithm was weak, which decreased the quality of the videos [15]. We also found that the quality of LSMT-related educational videos found on YouTube was not sufficient, as assessed using the JAMA score. Very few videos contained information about attribution and disclosure, which led to particularly low JAMA scores. However, it should be noted that the JAMA score only reflects one aspect of the quality, and it may not be sufficient to judge all aspects of the quality of these videos [18]. Our study offers preliminary results in this direction; further studies are warranted to corroborate our findings.

Despite providing a source of educational content on the subject of LSMT to support the learning process, these videos lack the basic characteristics essential to describing manipulation techniques. In particular, the information was not presented systematically to facilitate contextual learning. Therefore, when preparing YouTube videos to describe LSMT, creators must ensure that all information relevant to the six characteristics recommended by AAOMPT is provided to avoid incorrect applications and achieve its optimum effect. However, adding information about the attribution and outcomes relevant to the content or the explanation section of the videos may help increase the quality of the video source.

There were certain limitations to this study. First, we included only 50 videos; although the keyword

search retrieved 20,000 relevant videos from the website, not all were related to LSMT. Some described neck or thoracic manipulations, while others were related to peripheral joint manipulations. Moreover, not all LSMT-related videos were made for educational purposes. Also, most Internet users do not go beyond the first two pages of the results of an online search [25] therefore, the study was limited to the first 50 videos, which were thought to be educational. Another limitation was the dynamic nature of YouTube. Since the time of our video search, new content may have been uploaded, or the existing videos may have altered video characteristics, such as new likes and comments; all these updates may affect our study results [26]. A further limitation was that the search was limited to the phrase 'lumbar spinal manipulation techniques,' and videos with other terms, such as 'low back pain' and 'mass,' were not included. Because of we thought the clinician's position was important during LSMT for the management of force vectors, we determined whether the clinician's position was verbally emphasized in the videos. However, the content creators may not have considered it necessary to disclose the clinician's position due to it has already been seen on the video. It might have affected the result regarding the clinician's position during LSMT.

Conclusion

YouTube videos on LSMT are a potential sources of learning for healthcare professionals; however, the current study provides evidence that the descriptive adequacy and quality of these videos need to be enhanced. Therefore, clinicians should be encouraged to create quality YouTube content on LSMTs according to AAOMPT manipulation definition criteria. The clinicians should create content by using evidence from already published literature while following the AAPMT's and JAMA's criteria to increase educational value and quality of the content. Enhancing the quality of YouTube videos on LSMT can contribute to preventing the harmful effects of incorrect LSMT practices and gaining the expected benefit from LSMT.

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Informed consent

All participants were informed about the study and Declaration of Helsinki; after that, written informed consent was signed.

Ethical approval

Publicly available YouTube videos were used in this study. No ethics review and approval are required for this type of study.

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