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Is YouTube a Reliable Resource for Osteoporosis Exercise Guidance? A Descriptive Cross-sectional Study

YouTube Osteoporoz Egzersizi Rehberliği için Güvenilir Bir Kaynak mıdır? Tanımlayıcı Kesitsel Çalışma

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Abstract

Objective: The study aimed to evaluate the reliability, quality, and content analysis of English-language osteoporosis exercises videos on YouTube.
Materials and Methods: On December 12, 2023, a search for "osteoporosis exercise" was conducted on YouTube. The 200 best-match English videos were included. The content, source, and characteristics were recorded. Reliability and quality were analyzed using the modified DISCERN (mDISCERN) score, Journal of the American Medical Association benchmark criteria, and global quality scale (GQS) score.
Results: Of the 200 videos screened, 133 met the inclusion criteria. Of these, 8.2% (n=11) were presented by medical doctors, 51.8% (n=69) by physiotherapists or physical therapists, and 39.8% (n=53) by exercise specialists. GQS indicated that 15.0% (n=20) of the videos were high, 45.1% (n=60) medium, and 39.8% (n=53) poor quality. Videos featuring strengthening exercises and impact exercises had significantly higher GQS and mDISCERN scores compared to videos without these type of exercises.
Conclusion: The majority of YouTube videos on "osteoporosis exercises" are of low quality and lack reliability. Medical doctors should prioritize sharing and demonstrating exercises to improve content quality and trustworthiness.
Keywords: Osteoporosis, exercise, YouTube, video, quality, reliability

Öz

Amaç: Bu çalışma, YouTube'daki İngilizce "osteoporoz egzersizleri" videolarının güvenilirlik, kalite ve içerik analizini değerlendirmeyi amaçlamaktadır.
Gereç ve Yöntem: Aralık 2023'te YouTube'da "osteoporoz egzersizleri" araması yapıldı. En iyi eşleşen 200 İngilizce video dahil edildi. Videoların içerikleri, kaynakları ve özellikleri kaydedildi. Güvenilirlik ve kalite, modifiye DISCERN (mDISCERN) skoru, Journal of the American Medical Association kriterleri ve küresel kalite ölçeği (GQS) skoruyla analiz edildi.
Bulgular: İncelenen 200 videodan 133'ü dahil edilme kriterlerini karşıladı. Bu videoların %82'si (n=11) hekimler, %51,8'i (n=69) fizyoterapistler ve %39,8'i (n=53) egzersiz profesyonelleri tarafından sunulmuştu. GQS'ye göre videoların %15,0'i (n=20) yüksek, %45,1'i (n=60) orta ve %39,8'i (n=53) düşük kalite olarak değerlendirildi. Kuvvetlendirme ve darbe egzersizleri içeren videoların GQS ve mDISCERN skorları, bu tür egzersizler içermeyen videolara göre anlamlı derecede daha yüksekti.
Sonuç: YouTube'daki "osteoporoz egzersizleri" videolarının çoğunluğu düşük kalite ve güvenilirliktedir. İçerik kalitesini ve güvenilirliğini artırmak için hekimlerin egzersizleri paylaşması ve demonstrasyon yapması öncelikli olmalıdır.
Anahtar kelimeler: Osteoporoz, egzersiz, YouTube, video, kalite, güvenilirlik

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Introduction

An estimated 200 million women globally are thought to be affected by osteoporosis, or around a tenth of women in their 60s and one-fifth of those in their 70s. An osteoporotic fracture occurs every three seconds due to osteoporosis, which causes more than 8.9 million fractures each year (1). Osteoporosis-related fractures have a substantial financial cost, estimated at $17.9 and £4 billion annually in the United States of America and the United Kingdom, respectively (2). Clinical practice recommendations suggest calcium and vitamin D supplements as well as exercise training as preventive measures against osteoporosis, in addition to pharmaceutical therapy as a treatment for osteoporosis (3,4). Exercise programs, particularly those incorporating resistance training, weight-bearing or impact exercises, and balance training, are recognized for their beneficial effects on bone health and the enhancement of muscle mass and strength. These improvements contribute to better posture, balance, and stability, consequently reducing the likelihood of falls among older individuals over time (5,6). Exercise and mobility may be limited by a fear of falling. The lack of physical activity results in decreased flexibility, strength, and balance, ultimately raising the risk of falls and the occurrence of fractures. Lack of time and transportation are primary barriers to exercise, with 50% dropping out within 6 months (7). Especially in the elderly, weak muscles and bad posture can lead to imbalance and falls. Improved balance and a reduction in the risk of falls can be achieved by core strengthening exercises and resistance training targeting the spinal extensor muscles. It's possible that those who have osteoporosis don't have access to appropriate resources when they try to incorporate exercise into their everyday routine (8). Hence, further research is warranted to comprehend the quality of physical activity information accessible to individuals diagnosed with osteoporosis.

Research has revealed that 75% of individuals at risk for osteoporosis conduct health-related research on the internet (9). One of YouTube's biggest advantages over other social media platforms is its effective utilization of audio and visual communication features, making it accessible to everyone. With 122 million daily active users, 1 billion hours watched daily, and approximately 54% of all internet users, it is a popular choice (10). Several studies have recently assessed YouTube as a resource for medical information (11,12). Some studies have specifically evaluated YouTube videos about osteoporosis in English (13), as well as the quality and reliability of exercise videos intended for certain clinical conditions (14).

To our knowledge, while a study has evaluated online resources on physical activity for individuals with osteoporosis (8), no research has analyzed the content, reliability, and quality of YouTube videos on osteoporosis exercises in English. This study aims to assess the quality and reliability of these videos. A secondary goal is to offer recommendations for healthcare providers and associations to better utilize YouTube and promote reliable, high-quality information.

Materials and Methods

Video and Data Extraction from YouTube

This research was a descriptive cross-sectional study**.** The hypothesis was that YouTube videos on "osteoporosis exercise" would vary significantly in quality and reliability, with many lacking professional oversight. On March 15, 2024, a search for the keyword "osteoporosis exercise" was conducted on YouTube. The top 200 videos were retrieved based on relevancy. Videos addressing unrelated topics (n=34), non-English videos (n=6), videos shorter than one minute (n=18) and dublicates (n=9) were excluded. A total of 133 videos were included for evaluation.

Video Parameters, Sources, and Content

Video metrics, including views, likes, dislikes, and comments, were recorded on the same day to ensure consistency. Additional information, such as speaker type, video duration (minutes and seconds), and days online, was also documented.

Popularity was assessed using the video power index (VPI), a metric developed to account for changes over time. VPI is calculated by multiplying the like ratio [likes*100/(likes+dislikes)] and view ratio (view count/days online) and dividing by 100, providing a consistent popularity measure (15) despite variable upload dateswere categorized based on the speaker: Medical doctors, physiotherapists or physical therapists, and exercise specialists (e.g., trainers, fitness or yoga instructors). Exercise types were classified according to osteoporosis guidelines into strengthening, impact (walking, running, jumping), balance/coordination, flexibility/stretching, and core strengthening exercises. The presence or absence of each exercise type and whether demonstrations were included were noted.

Scoring Protocol

Video content was evaluated for quality, reliability, and educational value. The global quality scale (GQS) is a commonly used tool for assessing the quality of health-related online content. It rates quality on a 1-5 scale, with 1-2 indicating low quality, 3 intermediate quality, and 4-5 high quality (13,15).

The modified DISCERN (mDISCERN) is a five-point scale designed to evaluate the reliability and accuracy, assigning one point for each of the following met criteria: conciseness, reliability, balance, source referencing, and addressing uncertainty, with higher scores indicating better reliability (14).

The videos were evaluated using the Journal of the American Medical Association (JAMA) benchmark criteria, which assess accuracy and reliability using four criteria. Higher scores indicate greater reliability, with points added for authorship, attribution, disclosure, and currency (16). The educational quality and reliability of the videos were assessed by two independent physiatrists that blinded to the characteristics of the videos.

Ethical Considerations

This study involved publicly accessible videos only, without human or animal subjects, so ethics committee approval was unnecessary, aligning with similar studies (11,13,14).

Statistical Analysis

All analyses were conducted using SPSS (IBM SPSS Statistics, Version 26.0), with significance set at p<0.05. Descriptive statistics for Internet content characteristics were reported as number, percentage, and median (interquartile range, 25th-75th). The Kruskal-Wallis H test was applied to compare numerical characteristics of the videos based on video source, while video content characteristics and GQS scores were compared by video source using the chi-square test.

To compare GQS, mDISCERN, and JAMA scores based on video content characteristics, the Kruskal-Wallis H test was used, followed by pairwise comparisons in post-hoc analysis. For comparisons between two groups, the Mann-Whitney U test was used. Spearman Correlation Analysis assessed correlations among video content features, GQS, mDISCERN, and JAMA scores. Data normality was checked using the Shapiro-Wilk and Kolmogorov-Smirnov tests.

Results

Of the 133 videos analyzed, 8.2% (n=11) were presented by medical doctors, 51.8% (n=69) by physiotherapists or physical therapists, and 39.8% (n=53) by exercise specialists. No videos from independent users or patients were included. Medical doctors shared "impact exercise" videos at statistically higher rates than exercise specialists (p=0.001) and physiotherapists/physical therapists (p<0.001). Flexibility-stretching exercises were shared more frequently by physiotherapists/physical therapists (p=0.037) and exercise specialists (p<0.001) compared to medical doctors. The "no exercise demonstration" category was statistically higher in videos from medical doctors than in those from physiotherapists/physical therapists (p<0.001) and exercise specialists (p<0.001) (Table 1).

According to the GQS, 15.0% (n=20) of videos were high quality, 45.1% (n=60) were medium quality, and 39.8% (n=53) were low quality (Table 2). Comparing strengthening exercise videos and impact exercise videos to those without these elements, GQS and mDISCERN scores were significantly higher. GQS scores for balance and coordination exercise videos were also significantly higher. Videos lacking exercise demonstration had significantly higher scores for GQS (p=0.022), mDISCERN (p=0.001), and JAMA (p=0.009). GQS scores did not differ significantly between medical doctors and physiotherapists/physical therapists. However, both groups scored higher than exercise specialists (p=0.001) (Table 3). Medical doctors had significantly higher mDISCERN scores than exercise specialists (p<0.001) and physiotherapists/physical therapists (p=0.031), and physiotherapists/physical therapists had higher mDISCERN scores than exercise specialists (p=0.001). JAMA scores were also higher in medical doctors than in exercise specialists (p=0.002). Median scores were mDISCERN =3 (range, 3-4), GQS =3 (range, 2-3), and JAMA =3 (Table 3).

A significant positive correlation was found between GQS scores and both mDISCERN (r=0.734, p<0.001) and JAMA scores (r=0.403, p<0.001). Medical doctors (p=0.036) and exercise specialists (p=0.001) had longer video durations than physiotherapists/physical therapists, who also uploaded videos earlier. Video length and GQS scores had a positive correlation (r=0.318, p<0.001). Median values for video metrics were as follows: Video length =10.77 minutes (range, 5.73-17.98), views =28,802 (range, 12,056-111,501), views per day =5.24 (range, 1.14-35.18), likes =860 (range, 216-2.276), dislikes =8 (range, 1-26), comments =42.5 (range, 0-152), and VPI score =45.19 (range, 11.85-120.78). No significant differences were found between groups in views, views per day, likes, dislikes, comments, or VPI (p>0.05). Additionally, no significant associations were

Table 1. Features of video exercise content

Exercise type		Total		Medical doctors (n=11)		Physiotherapists/ physical therapists (n=69)		Exercise experts (n=53)		
		n	%	n	%	n	%	n	%	p[a]
Strengthening	No	39	29.3	1	9.1	21	30.4	17	32.1	0.300
	Yes	94	70.7	10	90.9	48	69.6	36	67.9	
Impact	No	84	63.2	1	9.1	48	69.6	35	66.0	**<0.001**
	Yes	49	36.8	10	90.9	21	30.4	18	34.0	
Balance-coordination	No	105	78.9	8	72.7	57	82.6	40	75.5	0.549
	Yes	28	21.1	3	27.3	12	17.4	13	24.5	
Flexibility-stretching	No	81	60.9	10	90.9	44	63.8	27	50.9	**0.037**
	Yes	52	39.1	1	9.1	25	36.2	26	49.1	
Core-abdominal	No	85	63.9	8	72.7	46	66.7	31	58.5	0.529
	Yes	48	36.1	3	27.3	23	33.3	22	41.5	
Exercise is demonstrated	Yes	114	85.7	4	36.4	62	89.9	48	90.6	**<0.001**
	No	19	14.3	7	63.6	7	10.1	5	9:4	

[a]: chi-square test

observed between GQS, mDISCERN, and JAMA scores with views, likes, dislikes, comments, or VPI (p>0.05) (Table 4).

Discussion

To the best of our knowledge, no prior study has specifically investigated the content and quality of YouTube videos on "osteoporosis exercise" in the English language. In this study, physical therapists or physiotherapists represented over half of the speakers, while medical doctors accounted for only 8.3%, a distribution that aligns with previous research. Esen et al. (17) reported minimal physician representation, with only 10% of videos produced by doctors. Similarly, Abed et al. (18) found that physicians produced only 10% of the videos in their study, while Özbek et al. (19) reported that 46% of the videos were uploaded by healthcare professionals other than physicians, such as physiotherapists and occupational therapists, and only 28% by physicians.

The GQS revealed that only 15.0% of the videos were classified as high quality, 45.1% as medium quality, and 39.8% as low

Table 2. Comparison of speaker distribution based on GQS-educational quality tool

Educational quality (GQS)	Total		Medical doctors (n=11)		Physiotherapists/ physical therapists (n=69)		Exercise experts (n=53)		
	n	%	n	%	n	%	n	%	p[a]
Poor	53	39.8	2	18.2	29	42.0	22	41.5	**<0.001**
Moderate	60	45.1	1	9.1	31	44.9	28	52.8	
High	20	15.0	8	72.7	9	13.0	3	5.7	

GQS: Global quality scale, [a]: chi-square test

Table 3. Comparison of GQS, mDISCERN, and JAMA values according to video content

		GQS			mDISCERN			JAMA		
		Med.	Q1	Q3	Med.	Q1	Q3	Med.	Q1	Q3
Speaker of the video	Medical doctor	4.00	3.00	4.00	4.00	4.00	5.00	3.00	2.00	3.00
	Physical therapist/ physiotherapist	4.00	4.00	5.00	3.00	3.00	4.00	3.00	2.00	3.00
	Exercise specialist	3.00	3.00	4.00	3.00	2.00	3.00	2.00	2.00	3.00
	p[a]	**0.001**			**<0.001**			**<0.001**		
Strengthening	No	2.00	2.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00
	Yes	3.00	2.00	3.00	3.00	3.00	4.00	3.00	2.00	3.00
	p[b]	**0.001**			**0.019**			**0.550**		
Impact	No	3.00	2.00	3.00	3.00	2.00	3.00	3.00	2.00	3.00
	Yes	3.00	3.00	4.00	4.00	3.00	4.00	3.00	2.00	3.00
	p[b]	**<0.001**			**0.003**			**0.351**		
Balance-coordination	No	3.00	2.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00
	Yes	3.00	2.50	4.00	3.00	3.00	4.00	3.00	2.00	3.00
	p[b]	0.010			0.159			0.717		
Flexibility-stretching	No	3.00	2,00	3.00	3.00	3.00	4.00	3.00	2.00	3.00
	Yes	3.00	2.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00
	p[b]	0.352			0.988			0.732		
Core-abdominal	No	3.00	2.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00
	Yes	3.00	2.00	3.00	3.00	3.00	4.00	3.00	2.00	3.00
	p[b]	0.753			0.484			0.203		
Exercise is demonstrated	Yes	3.00	2.00	3.00	3.00	2.00	4.00	3.00	2.00	3.00
	No	3.00	2.00	4.00	4.00	3.00	4.00	3.00	3.00	4.00
	p[b]	**0.022**			**0.001**			**0.009**		

GQS: Global quality scale, mDISCERN: modified DISCERN, JAMA: Journal of the American Medical Association, Med.: Median, [a]: Kruskal-Wallis H test, [b]: Mann-Whitney U test

Table 4. Video content characteristics and relationships between GQS, mDISCERN, and JAMA

		GQS	mDISCERN	JAMA
GQS	rho	-	-	-
	p	-	-	-
mDISCERN	rho	**0.734**	-	-
	p	**<0.001**	-	-
JAMA	rho	**0.403**	**0.658**	-
	p	**<0.001**	**<0.001**	-
Number of views	rho	0.058	0.040	-0.071
	p	0.509	0.651	0.416
Number of likes	rho	0.115	0.069	-0.051
	p	0.195	0.437	0.567
Number of dislikes	rho	0.146	0.158	0.005
	p	0.098	0.074	0.956
Number of comments	rho	0.065	0.003	-0.118
	p	0.460	0.977	0.180
Length	rho	**0.318**	0.078	-0.061
	p	**<0.001**	0.374	0.489
Days online (n)	rho	-0.075	0.032	-0.005
	p	0.393	0.710	0.959
VPI (%)	rho	0.132	0.057	-0.040
	p	0.136	0.523	0.650

GQS: Global quality scale, mDISCERN: modified DISCERN, JAMA: Journal of the American Medical Association, VPI: Video power index, Rho: Spearman's rank correlation

quality. These findings are consistent with those of Abed et al. (18) and Ertem et al. (20), who reported high-quality video rates of 19.5% to 20%. In contrast, studies by Kocyigit et al. (14) and Tolu et al. (21) on various disorders demonstrated a higher proportion of beneficial videos, with approximately 50% rated as helpful. The variability in previous findings may be attributed to factors such as the diversity of conditions analyzed or the subjective nature of video evaluations, as well as differences in the number of videos reviewed.

In this study, medical doctors were significantly more likely to share videos focused on "impact exercise", while fewer videos on stretching and flexibility exercises were shared. This suggests that doctors may adhere more closely to guidelines when sharing osteoporosis exercise videos. Conversely, videos from yoga instructors, classified under exercise specialists, primarily emphasized stretching and flexibility exercises, often diverging from guideline recommendations. Videos featuring strengthening and impact exercises were associated with higher GQS and mDISCERN scores. Additionally, videos demonstrating balance and coordination exercises exhibited significantly higher quality. According to guidelines, multi-component exercises, particularly those involving resistance and impact training, are more effective in mitigating osteoporosis and osteopenia risk factors (22,23). Adherence to guideline-recommended exercises by speakers likely contributed to the higher GQS and DISCERN values observed for these videos. This result aligns with Vancini et al. (12), who found that videos with two or more recommended exercises scored higher on both DISCERN and GQS scales compared to those with fewer exercises.

Notably, medical doctors were more likely to present videos without exercise demonstrations, and these videos received significantly higher GQS, mDISCERN, and JAMA scores. These "exercise not demonstrated" videos often consisted of long academic webinars shared primarily by doctors and physiotherapists, offering more comprehensive and accurate information on osteoporosis exercises. Despite their high quality and reliability scores, these videos may not be as useful for patients due to their academic language and lack of practical exercise demonstrations.

Physicians and physiotherapists in this study achieved higher GQS scores than exercise specialists, corroborating findings from Onder et al. (13) and Esen et al. (17), which showed that health professionals produced higher-quality videos compared to non-health professionals. This may be because physicians and physical therapists are more likely to share evidence-based information, while non-professionals tend to rely on anecdotal evidence drawn from personal experience.

mDISCERN scores were higher in videos produced by medical doctors than in those by exercise specialists or physiotherapists, with physiotherapists scoring higher than exercise specialists. JAMA scores were also significantly higher in videos by medical doctors compared to those by exercise specialists. These findings align with earlier studies suggesting that the source of a video

influences its quality, with physician-produced content providing higher-quality information (11,19). Moreover, a positive correlation was observed between GQS and mDISCERN values, as well as between mDISCERN and JAMA values, indicating a strong relationship between video reliability and quality (24). As suggested in prior research, higher-quality videos tend to be more reliable (20).

This study found a significant positive relationship between video length and quality. Yaradılmış et al. (25) attributed the poor quality of short videos to insufficient information, while Rodriguez Rodriguez et al. (24) found no statistically significant relationship between video length and quality. In general, longer videos may better address exercise types and explanations, leading to higher quality. However, other studies suggest that while longer videos can provide clearer explanations, patients may lose interest, implying that video creators should aim to deliver high-quality, relevant content within reasonable time frames (11).

Compared to physiotherapists, both medical doctors and exercise specialists tended to produce longer videos. This is consistent with the higher scores observed in the medical doctor group, as longer videos allow for more detailed and accurate content. However, despite their longer videos, exercise specialists scored lower, likely due to limited access to academic resources and guidelines, resulting in less reliable content.

Finally, no significant correlation was found between GQS, mDISCERN, JAMA scores, and viewer engagement metrics such as views, likes, dislikes, comments, and VPI. This is consistent with findings by Onder et al. (13), who also reported no significant correlation between viewer interactions and video quality. It appears that viewers may not reliably differentiate between high- and low-quality videos based solely on engagement metrics.

Study Limitations

This study has several limitations. First, only English-language YouTube videos were included, which may limit the generalizability of the results. Second, as a cross-sectional online study, it may not fully capture YouTube's evolving content, as new videos are constantly added and interacted with. Additionally, the GQS, designed for websites, may not be ideal for evaluating video quality. Finally, the search was restricted to YouTube, excluding videos from other platforms.

Conclusion

In conclusion, our study revealed that YouTube videos on "osteoporosis exercises" are generally of poor quality and reliability. To improve patient access to trustworthy content, professional review processes should be implemented before videos are published. Collaboration with leading medical associations could help generate higher-quality osteoporosis-related content. Medical professionals, whose videos ranked highest in quality, must further contribute to patient education by regularly sharing accurate and informative videos on YouTube to ensure the platform becomes a more reliable resource.

Ethics

Ethics Committee Approval: This study involved publicly accessible videos only, without human or animal subjects, so ethics committee approval was unnecessary, aligning with similar studies.

Informed Consent: N/A.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: S.Ç., E.T.Ç., Concept: S.Ç., E.T.Ç., Design: S.Ç., E.T.Ç., Data Collection or Processing: S.Ç., E.T.Ç., Analysis or Interpretation: S.Ç., E.T.Ç., Literature Search: S.Ç., E.T.Ç., Writing: S.Ç., E.T.Ç.

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