

ORIGINAL ARTICLE OPEN ACCESS

Educational Value and Reliability of Exosome Therapy Videos on YouTube: A Cross-Sectional Quality Assessment

Emrah Işıktekin  | Salih Kılıç 

Department of Plastic, Reconstructive and Aesthetic Surgery, Faculty of Medicine, Balıkesir University, Balıkesir, Türkiye

Correspondence: Emrah Işıktekin (emrah.isiktekin@balikesir.edu.tr)**Received:** 18 December 2025 | **Revised:** 20 February 2026 | **Accepted:** 6 March 2026**Keywords:** dermatology | digital health information | exosome therapy | plastic surgery | regenerative medicine | wound healing | YouTube

ABSTRACT

Exosome therapy has emerged in recent years as a promising acellular approach for the treatment of tissue regeneration and wound healing. Initial preclinical investigations have demonstrated accelerated fibroblast proliferation, improved angiogenesis and reduced scar formation. It is evident that patients are more likely to gain an understanding of these treatments and acquire information from digital platforms as opposed to from peer-reviewed scientific publications. This study assessed the credibility and instructional merit of exosome therapy content on YouTube, a prominent source of online health information. A cross-sectional study was performed on the initial 50 videos in English obtained using the keyword ‘exosome therapy’ (15 July 2025). The videos were independently assessed by two plastic surgeons and a dermatologist using three validated scoring systems. The scoring system was based on the *Journal of the American Medical Association* (JAMA) reference criteria for transparency and reliability, the Global Quality Score (GQS) for overall educational quality and the modified DISCERN tool for content reliability and balance. The median scores obtained were consistently low (DISCERN: 2.67; GQS: 2.67; JAMA: 2.00). However, videos created by doctors exhibited a statistically significant higher average score compared to videos published by patients, companies and YouTubers ($p < 0.05$). A robust positive correlation was identified between DISCERN and GQS ($\rho = 0.95$, $p < 0.001$). Despite the substantial experimental evidence that confirms the efficacy of exosome therapy for acute and chronic wounds, none of the videos addressed the recognised wound healing applications of exosome therapy. In contrast, the contents primarily focus on cosmetic enhancement, anti-ageing interventions and beauty-related applications. The discrepancy between the scientific advancements in the fields of regenerative medicine, dermatology and plastic surgery and the accessibility of online educational resources, highlights the necessity for professional health organisations to furnish accessible, evidence-based materials that accurately demonstrate the therapeutic potential of exosomes in wound healing.

1 | Introduction

Exosomes are defined as extracellular vesicles with an average diameter of 30–150 nm. It has been established that these vesicles function as critical mediators in intercellular communication under both normal and pathological conditions [1]. The term exosome was first established in the 1980s to describe cellular by-products; however, recent research has revealed that these structures are biologically active. Exosomes have been demonstrated to coordinate a wide range of physiological and

pathological processes, including immune regulation, angiogenesis, tissue regeneration and tumour progression, by carrying various cargoes consisting of proteins, lipids and nucleic acids derived from the parent cells [1, 2]. Their capacity to reflect the biological state of the cell from which they originate makes them promising biomarkers for diagnostic and prognostic applications. Moreover, their therapeutic potential has been demonstrated in the domain of regenerative medicine. In addition, the potential of these substances in domains associated with aesthetics and dermatology has been demonstrated by

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2026 The Author(s). *International Wound Journal* published by Medicalhelplines.com Inc and John Wiley & Sons Ltd.

Key Points

- Exosome therapy is predominantly characterized in publicly available health information as an aesthetic and anti-ageing intervention.
- The videos produced by physicians exhibit a marked superiority in quality and reliability when compared with those created by non-professional sources.
- Despite substantial experimental evidence, wound healing applications of exosome therapy are not represented in publicly accessible YouTube content.

various studies. Preliminary findings from a study indicate its effectiveness in facilitating hair restoration and no significant side effects have been reported [3]. Exosome therapy, a cell-free treatment method, is an innovative alternative that supports traditional stem cell therapies. In these treatments, the characteristic regenerative and immunomodulatory properties of their cellular counterparts are preserved, while standardisation is also achieved with low risk [1, 3]. The role of exosome as indicators of disease pathophysiology and as mediators of treatment places them at the forefront of biomedical research and innovation.

In light of the fact that approximately half of the adult population now consults the internet for health-related information prior to seeking professional medical care, the impact of online content on patient awareness and decision-making processes is also seen to be increasing. As interest in exosome therapy grows, patients are also increasingly accessing online platforms as a source of exosome-related information. YouTube (California, USA) has been among the most widely used websites worldwide for approximately 20 years, but concerns about the reliability of its medical content remain significant. A systematic review encompassing over 22 000 videos revealed that the overall quality of health information was average to below average, with only one-third of videos classified as neutral, while the remainder exhibited bias or misinformation [4]. This trend has been confirmed through condition specific studies. For instance, an analysis of opioid use disorder related content indicated that the majority of videos exhibited low accuracy and poor quality, thereby underscoring the necessity for expert driven, evidence-based material [5]. A similar phenomenon was observed in a broader review of healthcare topics, including vaccination, organ donation and obesity. This review demonstrated that misleading or anecdotal information is both prevalent and highly accessible, often competing with or surpassing professional sources in terms of visibility [6]. In the domain of aesthetic medicine, a study of facelift surgery videos revealed that the majority were uploaded by private medical practices. These videos were found to offer incomplete or substandard educational content, resulting in low scores across various validated assessment tools, including the GQS, DISCERN and JAMA criteria [7].

The presence of spoken explanations and significant written content in YouTube videos renders the concept of health literacy

more pertinent. It is evident that eminent organisations such as the National Institutes of Health (NIH), the American Medical Association (AMA) and the US Department of Health and Human Services have thus recommended that patient education materials be written at or below a sixth-grade reading level [8]. Assessments of online health resources show readability and comprehensibility scores generally exceed acceptable levels. This indicates that patients often struggle to understand complex medical information.

YouTube's extended video format, global reach, superiority in health-related searches and reliable protection system make it particularly advantageous for comprehensive patient education. This is a significant reason why patients choose YouTube over other leading platforms such as TikTok, Instagram, or Facebook. Furthermore, by prioritising popularity and audience engagement over accuracy, its algorithm could potentially increase the impact and spread of incorrect medical information. It is important to note that patients who possess sufficient knowledge about the aetiology, pathophysiology and treatment of their illnesses are more likely to adhere to treatment recommendations, actively participate in the shared decision-making process and achieve better clinical outcomes. Therefore, online misinformation may lead to unrealistic expectations or delay in seeking specialist care.

Overall, the evidence indicates that YouTube's popularity based algorithms favour visibility over accuracy, thereby enabling the dissemination of misinformation to a greater extent than evidence-based knowledge does. This issue is of particular pertinence in fields such as plastic surgery, dermatology and tissue regeneration, where exosome therapies are increasingly investigated for applications in skin rejuvenation, scar modulation and wound healing. Despite the fact that public interest in exosome-based interventions is largely directed towards cosmetic and anti-ageing indications, wound healing remains one of the most extensively studied and biologically supported therapeutic applications of mesenchymal stem cell (MSC)-derived exosomes. Experimental and translational evidence shows their role in angiogenesis, controlling inflammation and scar remodelling. Accordingly, wound-related applications were selected as the clinical reference framework for evaluating the reliability and educational quality of publicly available digital content.

In view of the substantial experimental literature supporting exosome-mediated wound healing and the growing public interest in exosome therapies, the objective of this study was therefore to evaluate the reliability, quality and educational value of YouTube videos on exosome therapy and to determine whether publicly available content provides accurate and clinically meaningful information.

2 | Materials and Methods

The study was designed as a cross-sectional observational analysis. This type of research does not involve the use of human subjects or relevant medical data and thus ethical approval is not required.

2.1 | Search Strategy

The video-based search was conducted on the YouTube online video-sharing platform (<https://www.youtube.com/>) on 15 July 2025, using the English keyword 'exosome therapy'. The selection of this keyword is predicated on its prevalence in the relevant literature and public dialogue regarding the applications of exosome therapy in regenerative medicine. In order to minimise the impact of algorithmic bias, the search was conducted after signing out of all Google and YouTube accounts and utilising the browser's incognito mode. This ensured that personalised recommendations did not influence the results. The subsequent process entailed the ranking of the videos according to a scale of relevance, following the entry of the search term. In accordance with the findings of preceding studies that employed analogous methodologies, the initial 50 videos were deemed adequate for the sample size and were consequently incorporated for preliminary evaluation. The Uniform Resource Locators (URLs) of the videos that were identified were transferred into an Excel database. The exclusion criteria were as follows: The content is in a language other than English. There is an absence of audio support. The content is irrelevant to exosome therapy. The content is classified as a YouTube 'Shorts'.

The first 50 videos were selected according to YouTube's relevance-based ranking system. This approach reflects typical user behaviour, as users are most likely to view content presented on the initial search results pages. Accordingly, limiting the analysis to the first 50 videos was considered appropriate to capture content with the greatest potential patient exposure.

The initial 50 videos were included after applying exclusion criteria and subsequently analysed. The evaluation was carried out independently by two plastic surgeons and one dermatologist, each with a minimum of 5 years of professional experience in their respective fields. In an effort to minimise subjectivity, the mean scores of the three evaluators were utilised for the purpose of statistical analysis. In instances of divergence, a collective deliberation was initiated until a consensus was achieved.

2.2 | Characteristics of the Videos

The following parameters were collected for each video: The upload date is used to calculate the number of days since upload. The duration is measured in seconds. The number of views, likes and comments is also recorded.

Furthermore, videos were categorised based on their producer (physician, plastic surgeon, dermatologist, clinic, company, YouTuber, patient or other) and content type (therapy, mechanism, patient experience or mixed). In cases where the uploader was a licensed physician who maintained a high volume of non-clinical or commercially driven video content, classification was based on the primary purpose of the channel. Channels predominantly oriented towards entertainment, marketing or personal branding were categorised as 'YouTuber', whereas channels primarily focused on clinical education were categorised under the relevant medical profession (e.g., physician, dermatologist or plastic surgeon).

2.3 | Assessment of Video Quality and Reliability

The reliability of the data was evaluated using JAMA benchmark criteria, including authorship, attribution/sourcing, disclosure and currency. The overall educational quality was evaluated using the GQS, a five-level global rating of instructional value, clarity, organisation and usefulness for learners. It was also evaluated using the modified DISCERN instrument, which examines transparency of sources, balance, potential bias and the appropriateness of recommendations.

JAMA has established a set of criteria that serve as a benchmark for evaluating health information quality. These criteria encompass four distinct domains, with each domain being assigned a score ranging from 0 to 4 points, depending on the fulfilment of the respective criterion. A higher score indicates a greater degree of transparency and accountability in the content.

GQS is a five-point Likert scale that is utilised to evaluate the overall educational value. Scores within the range of 1–2 are indicative of poor quality, 3 signifies moderate quality and 4–5 denotes high quality.

The Modified DISCERN instrument is composed of five binary items (scored 0–5) that have been adapted from the original DISCERN tool. It has been developed for the purpose of measuring the reliability of health-related information. Conversely, a higher score is indicative of greater reliability.

2.4 | Statistical Analysis

All analyses were performed using SPSS Version 20.0 (SPSS Inc., Chicago, IL). A *p*-value less than 0.05 was considered statistically significant. The Shapiro–Wilk test was employed to evaluate the normality of the data. Given the non-normal distribution of most variables, the results were expressed as the median (25th–75th interquartile range, IQR). A comparison of the groups was executed through the implementation of a non-parametric statistical test, known as the Kruskal–Wallis test, which was employed in the context of analysing data across multiple categories. In instances where the test indicated significant differences, a series of Mann–Whitney *U* tests were implemented. The present study sought to analyse the correlation between modified DISCERN, GQS and JAMA benchmark scores. To this end, Spearman's rank correlation coefficient was utilised as a statistical tool. Inter-rater reliability among the three independent evaluators was assessed using a two-way random-effects model with absolute agreement. Intra-class correlation coefficients (ICC) were calculated separately for GQS, JAMA and modified DISCERN total scores.

3 | Results

A total of 50 videos satisfied the inclusion criteria and were consequently subjected to analysis. The descriptive characteristics of the included videos are summarised in Table 1. The median number of views was 24 483 (IQR: 17 533–45 182) and the median video duration was 412 s (range: 73–2804). The

median reliability and quality scores were 2.67 (IQR: 2.0–3.67) for the Modified DISCERN, 2.67 (IQR: 2.0–3.67) for GQS and 2.00 (IQR: 1.0–3.0) for the JAMA benchmark score, indicating overall low-to-moderate educational quality. Inter-rater reliability was good to excellent across all assessment tools. ICC (2,1) values were 0.83 for GQS, 0.85 for JAMA and 0.82 for Modified DISCERN total scores. When average ratings were considered, reliability reached an excellent level (ICC (2,k): 0.94 for GQS, 0.94 for JAMA and 0.93 for Modified DISCERN), indicating strong agreement among evaluators.

The distribution of video producers was as follows: physicians ($n=13$, 26%), YouTubers ($n=9$, 18%), companies ($n=8$, 16%), clinics ($n=6$, 12%), other sources such as students or collaborative productions ($n=5$, 10%), patients ($n=3$, 6%), dermatologists ($n=2$, 4%) and plastic surgeons ($n=2$, 4%). The median DISCERN, GQS and JAMA benchmark scores, stratified by producer type, are displayed in Table 2. A comparative analysis of video quality and reliability scores revealed that videos created by physicians, dermatologists and plastic surgeons exhibited median reliability and quality scores that consistently exceeded those uploaded by patients, companies and YouTubers.

TABLE 1 | General characteristics of the videos.

Variable	Median	IQR (25–75)	Min	Max
Views	24483	17 533–45 182	8613	259044
Likes	380	141–871	2	4800
Comments	56	6–155	0	806
Duration (seconds)	388	131–816	73	2804
DISCERN (median)	2.67	2.0–3.67	1.0	5.0
GQS (median)	2.67	2.0–3.67	1.0	5.0

Note: Values are presented as median (interquartile range) unless otherwise specified. DISCERN and GQS scores range from 1 to 5, with higher scores indicating greater informational reliability and educational quality, respectively. Abbreviation: IQR: interquartile range.

TABLE 2 | Characteristics of the videos by video producer (median values).

Video producer	Views	Likes	Comments	Duration (s)	DISCERN median	GQS median	N
Physician	39014	871	155	518	3.33	3.33	13
Plastic surgeon	16272	282	65.5	744	4.17	4.50	2
Dermatologist	17037	832	154.5	588	4.00	3.83	2
Clinic	20587	180	13.5	228	3.00	3.00	6
Company	31 731	109	2.5	125	2.00	2.00	8
YouTube	24131	502	128	1069	1.67	1.67	9
Patient	29660	820	77	534	1.67	1.33	3
Other	30012	261	12	131	3.67	3.33	5

Note: Values are presented as median values. DISCERN and GQS scores range from 1 to 5, with higher scores indicating greater informational reliability and educational quality. Abbreviation: N: number of videos per category.

The subsequent Mann–Whitney U test confirmed the existence of significant differences across producer categories (Table 3). A comparative analysis revealed that physician produced videos attained significantly higher DISCERN and GQS scores compared with those from patients ($p=0.015$), companies ($p<0.01$) and YouTubers ($p<0.001$). In a similar vein, JAMA benchmark scores exhibited a marked increase in videos produced by healthcare professionals compared to those created by commercial or non-professional sources. In contrast, videos uploaded by YouTubers and companies exhibited the lowest rankings across all three scoring systems. These differences attained statistical significance in multiple pairwise comparisons.

A robust positive correlation was identified between Modified DISCERN and GQS scores ($\rho=0.95$, $p<0.001$), thereby substantiating the hypothesis that videos evaluated as more reliable were concomitantly regarded as being of higher educational quality. JAMA benchmark scores demonstrated a moderate correlation with both DISCERN ($\rho=0.68$, $p<0.001$) and GQS ($\rho=0.65$, $p<0.001$), thereby substantiating their complementary value in assessing transparency and reliability of online video content.

TABLE 3 | Pairwise significant comparisons by video producer.

Comparison	Metric	U	p
Physician vs. patient	GQS	38.0	0.015
Physician vs. company	DISCERN	89.5	0.0067
Physician vs. company	GQS	94.5	0.0019
Physician vs. YouTube	DISCERN	109.5	<0.001
Physician vs. YouTube	GQS	114.5	<0.001
YouTube vs. other	DISCERN	3.0	0.010
Youtuber vs. other	GQS	4.5	0.018

Note: DISCERN and GQS scores range from 1 to 5, with higher scores indicating greater informational reliability and educational quality. Abbreviation: U : Mann–Whitney U statistic. $p<0.05$ were considered statistically significant.

4 | Discussion

This study revealed that the overall quality, dependability and instructional value of YouTube videos about exosome therapy were graded as low to moderate across all validated assessment instruments. Content generated by physicians typically surpassed videos posted by firms, patients and YouTubers; yet, median ratings for DISCERN, GQS and JAMA benchmarks remained inadequate. A robust positive association between reliability and educational quality substantiated the internal consistency of various evaluation systems. It is noteworthy that none of the reviewed videos addressed the established applications of exosome therapy in wound healing, despite substantial preclinical evidence supporting their role in tissue restoration. On the other hand, videos were chiefly focused on cosmetic and anti-ageing claims. These findings underscore a substantial discrepancy between advancements in exosome research and the information available to patients, underscoring the vulnerability of digital platforms to misinformation and inadequate medical communication. The prevalence of cosmetic and anti-ageing themes may be attributable to heightened patient demand and the commercial viability of aesthetic interventions. In comparison with applications related to wound treatment, cosmetic uses may be more amenable to marketability and less constrained by complex clinical pathways. In addition, variability in regulatory frameworks may shape how regenerative therapies are presented in digital media. Although these interpretations are tentative, they may help explain the discrepancy between established scientific evidence in wound healing and the emphasis observed in online content.

Exosomes are increasingly recognised as versatile, cell-free therapeutic agents in regenerative medicine, oncology and targeted delivery. The clinical potential of these vesicles lies in their capacity to replicate the paracrine benefits of their parent cells while circumventing the transplantation-related risks of ectopic engraftment, tumourigenesis and immune rejection. Research on MSC and dendritic cell-derived exosomes is important in highlighting their translational potential for both immunomodulation and tissue regeneration [9]. However, focusing solely on their cosmetic applications may hinder reaching patients who could benefit from these important properties.

A review of the extant literature reveals a consensus that good manufacturing practice compliant production requires harmonised upstream culture, downstream purification and quality release testing [10]. However, the absence of methodological standardisation hinders the comparability of findings across studies and sites. This, in turn, has a detrimental effect on the translation of the treatment into clinical practice due to various issues concerning production, purification and regulation. In view of the aforementioned circumstances, the sharing of video content that suggests the simplicity, ease and predictability of therapeutic use of exosomes may be misleading to patients.

In addition to biomanufacturing, a comprehensive understanding of exosome biology is essential for effective translation. Comprehensive reviews underscore their potential as biomarkers, cancer vaccines and therapeutic delivery mediators, while concurrently highlighting unresolved issues such as biodistribution, safety and scalability [11]. Mechanistically,

MSC-derived exosome transport proteins (tetraspanins, heat-shock proteins), lipids (sphingomyelin, cholesterol) and nucleic acids (microRNAs, long non-coding RNAs) regulate pathways such as phosphoinositide-3-kinase/protein kinase B, extracellular signal-regulated kinase and signal transducer and activator of transcription 3. The influence of these mediators on a variety of biological processes, including angiogenesis, fibroblast and keratinocyte proliferation, immune modulation and matrix remodelling, has been demonstrated [12]. Additionally, studies have demonstrated the efficacy of these substances in supporting wound healing, myocardial infarction, stroke, liver damage and cartilage and bone regeneration [12, 13]. The conspicuous absence of any mention of the healing properties of exosomes, including wound healing and repair, results in a substantial lacuna in patient education. This emphasises the necessity for professional health authorities to be meticulous in this regard by preparing educational videos with specially prepared and informative content. It has been reported by certain studies that there is potential for exosome therapy to promote tumour growth in specific contexts. This highlights the dual potential of exosome therapy and the necessity for validation to be context-specific [14]. It is imperative that this information is incorporated into the educational content, as patients require awareness of the treatment's effects and potential adverse reactions.

Despite the prominence of YouTube as a health information resource, many medical videos are characterised by substandard quality and biased content [4]. These shortcomings complicate the presentation of clinical information, such as data on exosomes to patients in the digital era. A body of research on opioid-related videos has emerged that lends credence to this trend. These studies report low accuracy and poor reliability and call for content to be expert-driven and guideline-based [5]. A comprehensive review encompassing subjects such as vaccination, obesity and organ donation has also been conducted, which has revealed that misleading content frequently attains greater visibility and engagement than accurate information [6]. In the surgical field, similar issues exist. An evaluation of facelift videos demonstrated that 96.5% came from private practices and were of poor quality across various benchmarks [7].

The findings on exosome-related content are consistent with these patterns. A review of the available videos revealed a lack of balanced discussions concerning indications, risks and long-term outcomes. Additionally, a weak correlation was observed between popular measures (views and likes) and educational quality. This finding is in line with the conclusions of a comprehensive systematic review of surgical education videos, which included 56 studies. The majority of these studies indicated an overall poor educational quality, despite a significant demand and cumulative viewership amounting to millions [15]. A review of the extant literature on YouTube health studies, including 37 studies, revealed a lack of standardised evaluation tools, resulting in heterogeneity and challenges in cross-comparison [16]. The methodological variability observed in the evaluation of exosome therapy videos indicates a lack of standardisation in the process. Nevertheless, this study has demonstrated that the content provided to patients is both inadequate and biased.

The patient perspective serves to increase the complexity of the issue. A study has demonstrated that individuals with inadequate

health literacy are more prone to consulting nonprofessional online resources, such as social media, blogs and influencer pages. Conversely, they are less inclined to use or trust websites managed by health professionals [17]. This phenomenon has the potential to exacerbate existing risks in developing fields such as exosome therapy, where commercial marketing and anxieties frequently dominate online debates. A national survey revealed that nearly half of users modified their diets or increased their physical activity based on health information found online, with some subsequently seeking consultations or additional diagnostic tests [18]. The present study demonstrated that online health information has the capacity to influence patient behaviour in a direct manner. Although such behaviours may enhance patient engagement, they also risk creating expectations that are not supported by evidence for unproven therapies.

Exosome therapy has been found to significantly heal acute and chronic wounds, with benefits that extend beyond mere cosmetics. The available literature suggests that adipose-derived stem cell exosome administration accelerates cutaneous repair by enhancing fibroblast migration, proliferation and collagen synthesis. Additionally, exosome therapy modulates collagen remodelling, thereby reducing scar formation [19, 20]. Another study has demonstrated that exosome therapy, whether administered topically or systemically, promotes wound closure, reepithelialisation and extracellular matrix rearrangement. Consequently, this leads to a reduction in inflammation and scar hyperplasia by improving vascularisation and tissue regeneration [21]. A systematic review and meta-analysis that supports these findings reported consistent benefits in 51 rodent studies examined. Furthermore, these studies demonstrated that the exosome regulates all stages of dermal repair via microRNA-mediated mechanisms [22]. In accordance with the data presented, it can be hypothesised that exosome therapy may have potential as a cell-free treatment strategy for both acute and chronic wounds, including diabetic ulcers. However, despite the substantial experimental evidence that supports this argument, our comprehensive YouTube analysis revealed a notable absence of any videos addressing wound healing applications. Instead, the majority of the videos analysed focused exclusively on cosmetic or anti-ageing effects. This apparent inconsistency underscores the critical need for reliable educational resources that align patients' understanding with the expanding body of biomedical literature on exosome therapy in wound healing.

According to the findings of this study, the quality of videos on YouTube pertaining to exosome therapy research is substandard and these videos present a biased representation of clinical applications. The failure to emphasise substantial outcomes concerning wound healing has the potential to mislead patients and limit their comprehension of the potential applications of these findings. This exclusion highlights the critical necessity for evidence-based digital education that encompasses both established and developing therapeutic contexts.

This study presents various strengths and limitations that require careful consideration. The systematic evaluation of YouTube content on exosome therapy is a significant strength, employing three validated assessment tools (DISCERN, GQS and the JAMA benchmark criteria) facilitating a multidimensional appraisal of reliability, transparency and educational quality. The inclusion

of independent evaluators from the fields of plastic surgery and dermatology, who have significant clinical expertise, serves to enhance the methodological rigour of the study and reduce subjective bias. The study identifies a significant gap between the growing scientific evidence on exosome-mediated wound healing and the lack of corresponding information in publicly available online resources. The restriction of the analysis to English-language videos results in a limitation of the generalisability of the findings. This study reflects a cross-sectional assessment conducted at a single time point. Given the dynamic nature of digital platforms, video availability, ranking algorithms and engagement metrics may change over time. Therefore, the findings represent the characteristics of the content accessible during the study period and may not fully capture future trends in online dissemination of exosome-related information. Furthermore, the analysis was confined to the first 50 search results, reflecting algorithm-driven visibility rather than a comprehensive sampling of all available content. The cross-sectional design does not take into account temporal variations in video quality. Although consensus-based scoring is employed, the reliance on subjective evaluation tools may lead to observer bias. It is evident that further research is required, incorporating multilingual and longitudinal analyses.

5 | Conclusion

Exosomes represent a rapidly evolving domain within a range of medical specialties, including regenerative medicine, plastic surgery, dermatology, cancer, wound healing and targeted therapeutic delivery. Their cell-free regeneration ability allows them to replicate numerous paracrine advantages of progenitor cells while avoiding the significant hazards linked to cellular transplantation. Despite promising early preclinical and clinical findings, considerable obstacles persist in standardising manufacturing processes, verifying potency testing and developing effective regulatory frameworks.

Alongside these scientific advancements, patient interest in exosome therapy is being fuelled by digital media channels. This study's findings indicate that YouTube, despite its extensive utilisation as a source of medical information, predominantly offers content of low to moderate quality, frequently neglecting clinically pertinent applications particularly the established wound-healing capabilities of exosome therapy. This divergence between scientific evidence and publicly accessible web information highlights an urgent necessity for precise, accessible and socially acceptable educational materials.

Acknowledgements

The authors would like to thank their institution for providing academic support during the conduct of this study.

Funding

The authors have nothing to report.

Ethics Statement

Ethics approval and informed consent were not required for this study, as it involved no human participants or identifiable personal data and was based solely on publicly available online content.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

1. S. Kourembanas, "Exosomes: Vehicles of Intercellular Signaling, Biomarkers, and Vectors of Cell Therapy," *Annual Review of Physiology* 77 (2015): 13–27, <https://doi.org/10.1146/annurev-physiol-021014-071641>.
2. S. Muthu, A. Bapat, R. Jain, N. Jeyaraman, and M. Jeyaraman, "Exosomal Therapy—A New Frontier in Regenerative Medicine," *Stem Cell Investigation* 8 (2021): 7, <https://doi.org/10.21037/sci-2020-037>.
3. A. K. Gupta, T. Wang, and J. A. Rapaport, "Systematic Review of Exosome Treatment in Hair Restoration: Preliminary Evidence, Safety, and Future Directions," *Journal of Cosmetic Dermatology* 22, no. 9 (2023): 2424–2433, <https://doi.org/10.1111/jocd.15869>.
4. W. Osman, F. Mohamed, M. Elhassan, and A. Shoufan, "Is YouTube a Reliable Source of Health-Related Information?," *BMC Medical Education* 22, no. 1 (2022): 382, <https://doi.org/10.1186/s12909-022-03446-z>.
5. B. O'Kelly, P. Holmes, A. Cheng, J. D. Lee, and B. Tofighi, "Dissemination of Health Content Through Social Networks: YouTube and Opioid Use Disorders," *Journal of Substance Use and Addiction Treatment* 165 (2024): 209475, <https://doi.org/10.1016/j.josat.2024.209475>.
6. K. C. Madathil, A. J. Rivera-Rodriguez, J. S. Greenstein, and A. K. Gramopadhye, "Healthcare Information on YouTube: A Systematic Review," *Health Informatics Journal* 21, no. 3 (2015): 173–194, <https://doi.org/10.1177/1460458213512220>.
7. Z. T. Elliot, J. S. Lu, D. Campbell, et al., "Evaluating YouTube Videos on Facelift Surgery for Facial Rejuvenation as a Resource for Patients," *Annals of Otolaryngology, Rhinology, and Laryngology* 132, no. 11 (2023): 1349–1354, <https://doi.org/10.1177/00034894231154410>.
8. A. S. Wasir, A. S. Volgman, and M. Jolly, "Assessing Readability and Comprehension of Web-Based Patient Education Materials by American Heart Association (AHA) and CardioSmart Online Platform by American College of Cardiology (ACC): How Useful Are These Websites for Patient Understanding?," *American Heart Journal Plus: Cardiology Research and Practice* 32 (2023): 100308, <https://doi.org/10.1016/j.ahjo.2023.100308>.
9. J. Rezaie, M. Feghhi, and T. Etemadi, "A Review on Exosomes Application in Clinical Trials: Perspective, Questions, and Challenges," *Cell Communication and Signaling* 20, no. 1 (2022): 145, <https://doi.org/10.1186/s12964-022-00959-4>.
10. Y. S. Chen, E. Y. Lin, T. W. Chiou, and H. J. Harn, "Exosomes in Clinical Trial and Their Production in Compliance With Good Manufacturing Practice," *Tzu Chi Medical Journal* 32, no. 2 (2019): 113–120, https://doi.org/10.4103/tcmj.tcmj_182_19.
11. K. W. A. Lee, L. K. W. Chan, L. C. Hung, L. K. W. Phoebe, Y. Park, and K. H. Yi, "Clinical Applications of Exosomes: A Critical Review," *International Journal of Molecular Sciences* 25, no. 14 (2024): 7794, <https://doi.org/10.3390/ijms25147794>.
12. M. D. Hade, C. N. Suire, and Z. Suo, "Mesenchymal Stem Cell-Derived Exosomes: Applications in Regenerative Medicine," *Cells* 10, no. 8 (2021): 1959, <https://doi.org/10.3390/cells10081959>.
13. H. Jing, X. He, and J. Zheng, "Exosomes and Regenerative Medicine: State of the Art and Perspectives," *Translational Research* 196 (2018): 1–16, <https://doi.org/10.1016/j.trsl.2018.01.005>.
14. U. Szwedowicz, Z. Łapińska, A. Gajewska-Naryniecka, and A. Choromańska, "Exosomes and Other Extracellular Vesicles With High Therapeutic Potential: Their Applications in Oncology, Neurology, and Dermatology," *Molecules* 27, no. 4 (2022): 1303, <https://doi.org/10.3390/molecules27041303>.
15. A. Javidan, M. W. Nelms, A. Li, et al., "Evaluating YouTube as a Source of Education for Patients Undergoing Surgery: A Systematic Review," *Annals of Surgery* 278, no. 4 (2023): e712–e718, <https://doi.org/10.1097/SLA.0000000000005892>.
16. B. Drozd, E. Couvillon, and A. Suarez, "Medical YouTube Videos and Methods of Evaluation: Literature Review," *JMIR Medical Education* 4, no. 1 (2018): e3, <https://doi.org/10.2196/mededu.8527>.
17. X. Chen, J. L. Hay, E. A. Waters, et al., "Health Literacy and Use and Trust in Health Information," *Journal of Health Communication* 23, no. 8 (2018): 724–734, <https://doi.org/10.1080/10810730.2018.1511658>.
18. M. M. Bujnowska-Fedak and P. Węgierek, "The Impact of Online Health Information on Patient Health Behaviours and Making Decisions Concerning Health," *International Journal of Environmental Research and Public Health* 17, no. 3 (2020): 880, <https://doi.org/10.3390/ijerph17030880>.
19. L. Hu, J. Wang, X. Zhou, et al., "Exosomes Derived From Human Adipose Mesenchymal Stem Cells Accelerates Cutaneous Wound Healing via Optimizing the Characteristics of Fibroblasts," *Scientific Reports* 6, no. 1 (2016): 32993, <https://doi.org/10.1038/srep32993>.
20. Y. An, S. Lin, X. Tan, et al., "Exosomes From Adipose-Derived Stem Cells and Application to Skin Wound Healing," *Cell Proliferation* 54, no. 3 (2021): e12993, <https://doi.org/10.1111/cpr.12993>.
21. M. Rasti, A. H. Parniaei, L. Dehghani, et al., "Enhancing the Wound Healing Process Through Local Injection of Exosomes Derived From Blood Serum: An In Vitro and In Vivo Assessment," *Regenerative Therapy* 26 (2024): 281–289, <https://doi.org/10.1016/j.reth.2024.06.004>.
22. A. Prasai, J. W. Jay, D. Jupiter, S. E. Wolf, and A. El Ayadi, "Role of Exosomes in Dermal Wound Healing: A Systematic Review," *Journal of Investigative Dermatology* 142, no. 3 Pt A (2022): 662–678.e8, <https://doi.org/10.1016/j.jid.2021.07.167>.