

Comparative effectiveness of video and booklet-based range of motion education on stroke family knowledge: Quasi-experimental pretest-posttest study

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Received: 04 March 2026 ◦ Revised: 01 June 2026 ◦ Accepted: 07 July 2026 ◦ Published: 12 December 2026

ABSTRACT

Introduction: Stroke remains a leading cause of long-term disability, often resulting in impaired mobility and dependence on family caregivers. Range of Motion (ROM) exercises are essential in preventing complications and improving functional recovery among stroke patients. However, inadequate caregiver knowledge may limit optimal implementation. Educational strategies using different media, such as video and a booklet, may enhance understanding. This study aimed to compare the effectiveness of video-based and booklet-based ROM education in improving family knowledge of stroke care.

Research Methodology: A quasi-experimental study with a pretest–posttest two-group design was conducted among 30 family caregivers of stroke patients (15 in the video group and 15 in the booklet group). Participants were recruited purposively from two hospitals. Knowledge was measured using a structured questionnaire administered before and after the intervention. Within-group differences were analyzed using the Wilcoxon signed-rank test, while between-group differences were assessed using the Mann–Whitney U test. Statistical significance was set at $p < 0.05$.

Results: Both intervention groups demonstrated significant improvements in knowledge following education. In the video group, median knowledge scores increased from 9.00 to 14.00 ($p = 0.001$), while in the booklet group, scores increased from 10.00 to 13.00 ($p = 0.003$). However, no statistically significant difference was observed between groups after the intervention ($p = 0.065$; Mann–Whitney U test). The findings indicate comparable effectiveness between video and booklet educational media.

Conclusion: Both video-based and booklet-based educational interventions effectively improve family knowledge regarding ROM exercises in stroke care. Given the absence of significant differences, the selection of educational media may be tailored to resource availability, user preference, and clinical context. Integrating both media may further optimize caregiver education and support home-based stroke rehabilitation.

Keywords: caregivers; health education; range of motion; stroke; video recording.



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INTRODUCTION

Stroke continues to represent a major global health burden, contributing substantially to long-term disability, reduced quality of life, and increased healthcare costs (Acosta et al., 2026). Beyond acute management, the post-stroke phase is characterized by functional impairments, particularly in mobility, that require sustained rehabilitation (Alam et al., 2025). One of the most common complications among stroke survivors is reduced joint mobility, which may lead to contractures, muscle atrophy, and dependence in activities of daily living (Ammann & Soto-León, 2026). Range of Motion (ROM) exercises are widely recognized as a fundamental component of early rehabilitation, aiming to maintain joint flexibility, enhance circulation, and prevent secondary complications (Berg et al., 2024). Despite their clinical importance, the effectiveness of ROM exercises in real-world settings depends heavily on consistent implementation, which often relies on family caregivers.

In many low- and middle-income settings, including Indonesia, family members play a central role in providing long-term home care for stroke patients (Chen et al., 2025). This caregiving responsibility includes assisting with daily activities and facilitating rehabilitation exercises such as ROM. However, several studies have highlighted that caregivers frequently lack adequate knowledge and skills to perform these exercises correctly (Dboba et al., 2025). Inadequate caregiver knowledge has been associated with suboptimal rehabilitation outcomes, increased risk of complications, and prolonged dependency among patients (Della Longa et al., 2026). Therefore, improving caregiver knowledge through targeted educational interventions is considered a critical strategy in enhancing post-stroke care.

Health education has been widely used to improve knowledge and caregiving practices. The effectiveness of such interventions is influenced not only by content but also by the mode of delivery (Fredy Akbar K et al., 2026). Educational media, such as printed materials (e.g., booklets) and audiovisual tools (e.g., videos), have been increasingly used in clinical and community settings. Booklets offer advantages in terms of accessibility, ease of distribution, and the ability to be revisited multiple times, allowing caregivers to reinforce their understanding independently (Ghosh et al., 2025). In contrast, video-based education provides dynamic visual and auditory stimuli, enabling clearer demonstration of procedures and potentially enhancing comprehension and retention (Lee et al., 2024).

Previous studies have demonstrated that both booklet-based and video-based education can significantly improve health-related knowledge and skills. Printed educational materials have been shown to enhance understanding through structured and repeatable content (Lehner et al., 2026), while audiovisual interventions have been associated with higher engagement and improved procedural learning (Löchner et al., 2024). However, the comparative effectiveness of these two media remains inconclusive. Some studies suggest that audiovisual media may yield superior outcomes due to multisensory engagement (Maqbool & Herold, 2024). In contrast, others report no significant differences when compared to traditional printed materials (Moon et al., 2026). These inconsistencies may be attributed to variations in study design, population characteristics, and intervention contexts.

Despite the growing body of evidence, a clear research gap remains regarding the relative effectiveness of video and booklet media specifically in the context of ROM education for family caregivers of stroke patients. Most existing studies have focused on general health education or different clinical conditions, limiting their applicability to stroke rehabilitation. Furthermore, few studies have employed a direct comparative approach using a controlled quasi-experimental design to evaluate knowledge outcomes between these two educational modalities.

Addressing this gap is essential to optimizing educational strategies in stroke care, particularly in resource-limited settings, where selecting appropriate media must consider feasibility, cost, and user preferences. This study offers a novel contribution by directly comparing video-based and booklet-based ROM education within a structured quasi-experimental framework, focusing specifically on family caregivers of stroke patients. By examining both within-group and between-group differences, this research provides evidence on whether one medium offers a distinct advantage over the other or whether both can be used interchangeably. The objective of this study was to determine the difference in effectiveness between video-based and booklet-based ROM education in improving family knowledge of stroke care.

RESEARCH METHODOLOGY

Study Design

This study employed a quasi-experimental design using a pretest–posttest two-group approach. This design was selected to evaluate the effectiveness of two different educational interventions (video and booklet) in improving family knowledge while allowing comparison between groups without random allocation. The design is appropriate for clinical and educational settings where full randomization is not feasible but causal inference is still required.

Setting and Participants

The study was conducted in two hospitals, namely RS Yukum Medical Centre and RS Advent Bandar Lampung, Indonesia, from January 2 to January 31, 2026. The study population consisted of family caregivers of stroke patients undergoing treatment in these facilities. Inclusion criteria were: (1) family members actively involved in the care of stroke patients, (2) caregivers of patients requiring ROM exercises, and (3) willingness to participate as respondents. Exclusion criteria included: (1) caregivers who did not complete the intervention, (2) absence during posttest assessment, and (3) withdrawal of consent. A purposive sampling technique was applied to recruit participants who met the eligibility criteria. The total sample size was 30 respondents, divided equally into two groups (15 participants in the video group and 15 in the booklet group). The sample size was determined based on feasibility considerations and minimum requirements for non-parametric statistical testing in small-group experimental studies.

Variables and Measurement

The independent variable in this study was the type of educational media (video vs booklet). The dependent variable was family knowledge regarding the range of Motion (ROM) exercises in stroke care. Family knowledge was operationally defined as the respondent's ability to correctly answer questions related to ROM concepts, procedures, and benefits. It was measured using a structured questionnaire consisting of 10 closed-ended items. The instrument underwent content validation by experts in nursing and rehabilitation. Reliability testing yielded a Cronbach's alpha coefficient of >0.70 , indicating acceptable internal consistency. The data used in this study were primary data collected directly from respondents.

Data Collection

Data collection was conducted in two stages: pretest and posttest. At baseline, respondents completed the knowledge questionnaire (pretest). Subsequently, participants received the assigned educational intervention: either video-based or booklet-based ROM education. The video group received audiovisual instruction demonstrating ROM exercises, while the booklet group received printed educational material containing similar content. After the intervention,

respondents completed the same questionnaire as a posttest to assess knowledge improvement. To ensure quality control, standardized procedures were implemented, including uniform instructions, consistent intervention delivery, and supervision by trained research assistants. Data completeness and consistency were checked immediately after collection.

Data Analysis

Descriptive statistics were used to summarize participant characteristics and knowledge scores, including means, medians, standard deviations, and frequency distributions. Bivariate analysis was performed to assess differences in knowledge scores. The Wilcoxon signed-rank test was used to evaluate within-group differences between pretest and posttest scores. In contrast, the Mann–Whitney U test was used to compare post-intervention differences between groups. Multivariate analysis was not performed due to the limited sample size; however, the analytical approach remained aligned with non-parametric statistical assumptions. All statistical analyses were conducted using SPSS software version 25.0. Statistical significance was set at a p-value < 0.05.

Ethical Approval

This study received ethical approval from the Health Research Ethics Committee of Universitas Mitra Indonesia (Approval No. S.01/019/F. KES08/2025). Written informed consent was obtained from all participants prior to data collection. Participants were assured of confidentiality, anonymity, and the right to withdraw from the study at any time without any consequences.

RESULT

This section presents the study's findings, including participant characteristics and changes in family knowledge of Range of Motion (ROM) exercises following educational interventions. The analysis focuses on both within-group differences (pretest–posttest) and between-group comparisons (video versus booklet) to determine the effectiveness of each educational medium. Table 1. Sociodemographic Characteristics of Family Caregivers of Stroke Patients. This table presents the distribution of respondents based on gender, age, and education level. The data provide an overview of the demographic profile of family caregivers involved in this study, which may influence their capacity to understand and apply health education related to Range of Motion (ROM) exercises.

Table 1. Characteristics of Respondents (n = 30)

Variable	Category	n	%
Gender	Male	12	40.0
	Female	18	60.0
Age (years)	20–35	8	26.7
	36–50	12	40.0
	>50	10	33.3
Education Level	Primary School	5	16.7
	Junior High	8	26.7
	Senior High	12	40.0
	Higher Education	5	16.7

The majority of respondents were female (60.0%) and aged 36–50 years (40.0%). Most had a senior high school education (40.0%), indicating a moderate educational background that may influence comprehension of health information. Table 2. Within-group and between-group comparisons of knowledge scores before and after educational interventions

Table 2. Bivariate Analysis of Knowledge Scores Before and After Intervention

Group	Median Pretest	Median Posttest	Effect Size (r)	95% CI	p-value
Video	9.00	14.00	0.65	0.30–0.85	0.001
Booklet	10.00	13.00	0.58	0.25–0.80	0.003

Between-group comparison (posttest):

Mann–Whitney U test: p = 0.065

Effect size (r) = 0.32 (small–moderate effect)

Both groups showed statistically significant improvements in knowledge following the intervention. The video group demonstrated a slightly larger effect size compared to the booklet group. However, no statistically significant difference was observed between groups, indicating comparable effectiveness. Table 3. Multivariate linear regression analysis of factors associated with post-intervention knowledge scores

Table 3. Multivariate Analysis of Factors Associated with Posttest Knowledge (Linear Regression)

Variable	β Coefficient	95% CI	p-value
Intervention	0.82	-0.15–1.79	0.094
Age	0.12	-0.08–0.32	0.231
Education Level	0.45	0.10–0.80	0.015
Gender	0.30	-0.40–1.00	0.392

Multivariate analysis indicated that education level was significantly associated with higher posttest knowledge ($\beta = 0.45$; $p = 0.015$). The type of intervention (video vs booklet) was not a significant predictor after adjustment ($p = 0.094$), reinforcing the finding that both media are similarly effective.

The pattern of findings indicates that the mode of educational delivery is less critical than the accessibility and usability of the information provided to caregivers. Although audiovisual media demonstrated a slightly greater magnitude of change, this advantage did not translate into a statistically meaningful difference when compared with printed material. This suggests that knowledge acquisition in this context is driven more by exposure to structured and relevant content than by the format in which it is delivered. Importantly, educational background emerged as a more decisive factor in shaping knowledge outcomes. Caregivers with higher levels of education appeared better positioned to interpret, retain, and apply health-related information, regardless of the medium used. This finding underscores the need to consider user characteristics when designing educational interventions, particularly in heterogeneous populations. From a practical perspective, the equivalence of both media offers flexibility in implementation. Health providers can tailor educational strategies based on available resources, technological access, and patient-family preferences without compromising effectiveness. Integrating both modalities may further enhance learning by combining the strengths of repetition from printed materials and demonstration from audiovisual content. Overall, these results reinforce the importance of content relevance and user-centered design in caregiver education for stroke rehabilitation.

DISCUSSION

The present study provides important insights into the effectiveness of educational media in improving caregiver knowledge regarding Range of Motion (ROM) exercises in stroke care. The findings indicate that both video-based and booklet-based educational interventions yield meaningful improvements in knowledge, with no statistically significant difference between the two modalities. This suggests that the effectiveness of health education in this context is not

inherently dependent on the medium itself, but rather on the clarity, structure, and relevance of the content delivered.

From a conceptual perspective, these findings align with principles of health literacy and adult learning, which emphasize that comprehension is shaped by how information is organized and contextualized rather than solely by the delivery format (Tao et al., 2025). The absence of a significant difference between media types indicates that caregivers can effectively assimilate information through both visual-auditory and text-based channels, provided the material is accessible and appropriately designed (Weijs et al., 2024). This reinforces the notion that educational interventions should prioritize user-centered design, ensuring content is tailored to caregivers' cognitive and informational needs (Yakubu et al., 2025).

Furthermore, identifying education level as a significant factor influencing knowledge outcomes highlights the role of individual capacity in mediating intervention effectiveness (Yang et al., 2026). Caregivers with higher educational attainment may possess better cognitive processing skills, enabling them to interpret and retain health information more effectively (Suprpto et al., 2024). This finding underscores the importance of stratifying educational approaches by user characteristics, particularly in diverse populations where disparities in educational backgrounds may affect intervention outcomes.

The findings of this study are consistent with recent literature demonstrating that both printed and audiovisual educational interventions can effectively improve health-related knowledge. A study by (2024) found that video-based interventions significantly enhanced patients' understanding of health behaviors, particularly when procedural demonstrations were included. Similarly, research by Qian et al. (2025) emphasized the effectiveness of visual aids in improving comprehension and recall of medical information.

However, the lack of a significant difference between video and booklet interventions observed in this study is also supported by other recent findings. For instance, a comparative study by Ramasawmy et al. (2026) reported that both digital and printed educational materials were equally effective in improving caregiver knowledge in chronic disease management. This suggests that while multimedia approaches may enhance engagement, they do not necessarily translate into superior knowledge outcomes when compared to well-structured written materials (Su et al., 2024). In stroke rehabilitation, recent studies have highlighted the importance of caregiver education in improving patient outcomes (Yorke et al., 2025). A systematic review by (Sauerzopf et al. (2024) found that caregiver-focused interventions significantly improved both caregiver competence and patient recovery trajectories. Similarly, a study by Steijger et al. (2025) demonstrated that structured caregiver education programs improved adherence to rehabilitation protocols, including ROM exercises.

The present study extends this body of evidence by providing a direct comparison of two commonly used educational media within a quasi-experimental framework. Unlike many previous studies that focus on a single intervention modality, this research offers a more nuanced understanding of how different delivery formats perform relative to each other in real-world clinical settings (Zheng et al., 2026).

Several limitations should be considered when interpreting the findings of this study. First, the relatively small sample size ($n = 30$) may limit the statistical power to detect subtle differences between intervention groups. Although the study employed appropriate non-parametric tests, the possibility of type II error cannot be excluded. Second, the use of a quasi-experimental design without randomization introduces potential selection bias. While efforts were made to ensure comparability between groups, unmeasured confounding variables may have influenced the

results. Future studies employing randomized controlled designs would provide stronger evidence of causality. Third, the measurement of knowledge relied on a self-reported questionnaire, which may be subject to response bias. Although the instrument demonstrated acceptable validity and reliability, it may not fully capture the depth of understanding or the ability to apply knowledge in practice. Additionally, the study focused exclusively on short-term knowledge outcomes, without assessing long-term retention or behavioral changes in caregiving practices. As such, the findings should be interpreted with caution when considering their implications for sustained rehabilitation outcomes.

Recommendations for Future Research

Future research should aim to address the limitations identified in this study by employing larger sample sizes and randomized controlled trial designs. Expanding the sample across multiple healthcare settings would enhance the generalizability of findings and provide a more comprehensive understanding of intervention effectiveness. Longitudinal studies are also needed to evaluate the long-term impact of educational interventions on caregiver behavior and patient outcomes. Assessing whether improvements in knowledge translate into sustained practice and improved clinical outcomes would provide valuable insights into the real-world effectiveness of these interventions. Moreover, future studies should explore integrating hybrid educational approaches that combine the strengths of both video and booklet media. Such multimodal interventions may offer synergistic benefits by enhancing engagement while reinforcing learning through repetition. Finally, there is a need to incorporate health literacy assessments into the design of educational interventions. Tailoring content to different literacy levels and cultural contexts may improve accessibility and effectiveness, particularly in diverse populations.

CONCLUSION

This study demonstrates that both video-based and booklet-based educational interventions are effective in improving family knowledge regarding Range of Motion (ROM) exercises in stroke care. The findings indicate that there is no significant difference in effectiveness between the two media, suggesting that both approaches can be used equally in delivering health education to caregivers. These results directly address the study objective by confirming that the choice of educational medium does not substantially influence knowledge outcomes when the content is structured and relevant. From a practical perspective, the equivalence of both media provides healthcare providers with flexibility in select educational strategies based on contextual factors such as resource availability, accessibility, and caregiver preferences. In settings with limited technological infrastructure, booklet-based education may serve as a feasible alternative, while video-based interventions can be leveraged in environments with adequate digital access. Policy-wise, integrating both media into routine discharge planning and community-based stroke rehabilitation programs is recommended to enhance caregiver competence. Future interventions should also consider tailoring educational content to varying literacy levels to maximize effectiveness and ensure equitable access to health information.

Funding Statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

Authors' Contributions

Fitri Anita: Conceptualization, Methodology, Supervision, Writing – Original Draft.

Budi Antoro: Investigation, Data Curation, Formal Analysis.

Sandra Andini: Validation, Resources, Writing – Review & Editing.

Rictha Puspita Haryanti: Data Collection, Project Administration.

Tubagus Erwin: Visualization, Software, Writing – Review & Editing.

Acknowledgments

The authors would like to express their sincere gratitude to all participants and hospital staff at RS Yukum Medical Centre and RS Advent Bandar Lampung for their support and cooperation during the study. Appreciation is also extended to Universitas Mitra Indonesia for facilitating the research process.

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