

Comparative Effectiveness of Leaflet and Video Based Education on Postural Intervention for Reducing Headache and Anxiety Symptoms Among Patients with Brain Tumors in Surakarta

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ABSTRACT

Background: Headache and anxiety are common among patients with brain tumors, and accessible non-pharmacological education may complement routine symptom management.

Methods: This one-group pretest-posttest evaluation included 50 randomly selected postoperative patients with brain tumors in Surakarta. All participants received the same face-to-face postural education supported by both a leaflet and an instructional video; no separate treatment groups were formed. NRS and HARS scores were assessed at baseline and approximately one month later. Paired changes were tested using the Wilcoxon signed-rank test ($p < 0.05$).

Results: The mean age was 47.1 years, and 25 participants (50%) were male. Baseline mean NRS and HARS scores were 3.02 and 20.3, respectively. At the one-month follow-up, both scores were significantly lower than baseline (both $p < 0.05$). No comparison between leaflet and video education was performed because both media were components of the same intervention.

Conclusion: Combined leaflet- and video-supported postural education was associated with lower headache and anxiety scores at one month. The uncontrolled single-group design precludes causal attribution; controlled studies are required to establish effectiveness.

Keywords: anxiety; brain tumor; educational video; headache; health education; postural intervention; pre-post study

BACKGROUND

Headache is a frequent symptom in patients with intracranial tumors and may persist before or after surgery. Tumor-related headache is clinically heterogeneous and may reflect traction or displacement of pain-sensitive intracranial structures, edema, altered intracranial dynamics, or treatment-related factors. Studies of patients with brain tumors have shown substantial headache burden and clinically meaningful changes in headache patterns across the perioperative period^{1,2,3}.

Brain tumors also impose a considerable psychological burden. Anxiety and other forms of psychosocial distress can remain clinically relevant after neurosurgical treatment, even in patients with favorable neurological outcomes^{3,4}. In the present setting, hospital records from Dr. Moewardi General Hospital, Surakarta, documented 608 inpatient and 1,170 outpatient visits related to brain tumor diagnoses in 2024, underscoring the need for practical approaches that

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complement routine clinical care.

Postural strategies are commonly used in neurological and neurosurgical care because head and body position can influence intracranial pressure, cerebral perfusion, and brain tissue oxygenation. In patients with acute neurological conditions, physiologic responses have been shown to vary with body position^{4,5}. These observations provide biological plausibility for teaching appropriate positioning, although evidence that postural education directly reduces headache in ambulatory postoperative brain tumor patients remains limited. Therefore, postural education should be viewed as an adjunct to, rather than a replacement for, standard medical assessment and treatment.

How postural instructions are delivered may also influence whether patients understand and repeatedly apply them. Educational interventions that integrate printed and audiovisual materials have been evaluated in cancer care. A multisite randomized trial of integrated print and video training for cancer pain management demonstrated improvements in pain-management knowledge and related outcomes, while a randomized trial among patients with cancer using transdermal fentanyl found lower pain and anxiety with additional video education compared with leaflet-based information alone⁶⁻⁸. These studies support the use of accessible multimedia education, but they do not establish that the same effects will occur in postoperative brain tumor patients.

Accordingly, the present study evaluated within-participant changes in headache intensity and anxiety symptoms after a combined educational program on postural intervention delivered through face-to-face counseling, a printed leaflet, and an instructional video. Because every participant received both the leaflet and the video, the study was not designed to compare the effectiveness of the two media.

METHODS

This community-based evaluation used a one-group pretest-posttest design and was conducted among postoperative patients with brain tumors attending routine follow-up at the Neurology Outpatient Clinic of Dr. Moewardi General Hospital, Surakarta. A total of 50 eligible participants from the brain tumor patient community were included using a random selection procedure. Random selection referred to participant recruitment; there was no random allocation to separate educational treatment groups.

All participants received the same educational intervention. Healthcare professionals provided face-to-face counseling on postural intervention as a non-pharmacological adjunct for symptom management. The session was supported by a printed leaflet containing concise practical information and an instructional video demonstrating the postural techniques step by step. The video was also made available online so that participants and family members could

review the material after the session. Participants were encouraged to ask questions and practice the techniques during the educational encounter.

Headache intensity was assessed using the Numeric Rating Scale (NRS), and anxiety symptoms were assessed using the Hamilton Anxiety Rating Scale (HARS). Baseline assessments were obtained before the educational session, and the same outcomes were reassessed approximately four weeks later during follow-up. The analysis therefore compared paired pre- and post-intervention observations from the same participants.

Data were analyzed using IBM SPSS Statistics version 20.0 for Windows. Participant characteristics and outcome scores were summarized descriptively. Mean values are reported descriptively to maintain consistency with the program dataset. Because the analysis involved

paired bounded clinical scale scores and normality of the paired changes was not assumed, pre-post differences in NRS and HARS were tested using the Wilcoxon signed-rank test. No Mann-Whitney U test or other between-group comparison was performed because all participants received both the leaflet and the video. A two-sided p-value <0.05 was considered statistically significant.

The study protocol was reviewed and approved by the Komite Etik Penelitian Kesehatan RSUD Dr. Moewardi (Health Research Ethics Committee of Dr. Moewardi General Hospital), Surakarta, Indonesia (No. 1.130/IV/HREC/2025). The educational and data-collection procedures were conducted in accordance with the approved protocol.

As part of the community outreach component, the educational video was disseminated through an online platform to facilitate repeated access to the material. Public dissemination and the World Brain Tumor Day educational activities were intended to broaden access to health information; these dissemination activities were not analyzed as separate treatment exposures in the present study.

RESULTS AND DISCUSSION

This community-based educational program was conducted at the Neurology Outpatient Clinic of Dr. Moewardi General Hospital, Surakarta, in conjunction with World Brain Tumor Day 2025 activities. Fifty postoperative patients with brain tumors participated. Each participant received face-to-face postural education supported by both a printed leaflet and an instructional video. Thus, the leaflet and video were complementary components of a single educational intervention rather than separate study arms.



Figure 1. Educational leaflet on headache management and postural intervention techniques for patients with brain tumors.

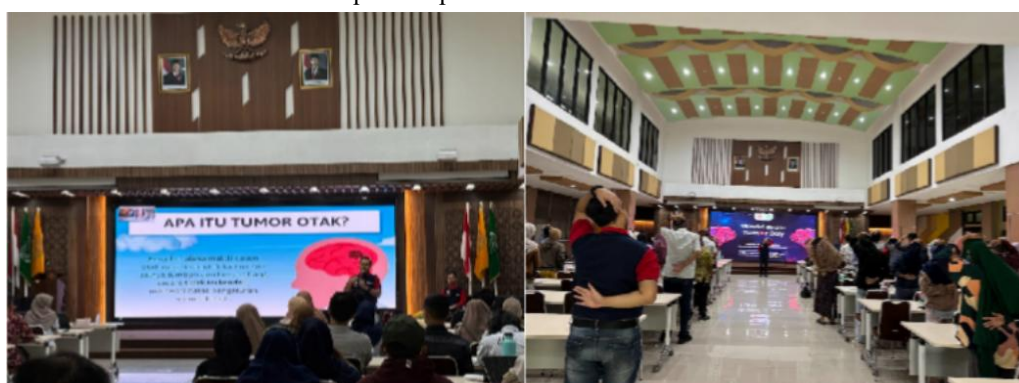


Figure 2. Implementation of the community service program.

The leaflet summarized practical postural principles, whereas the educational video provided step-by-step visual demonstrations. Both were introduced during the same educational encounter, and the video remained accessible for repeated viewing at home. This combined delivery was chosen to provide both a concise printed reference and an audiovisual demonstration of the techniques.



Figure 3. Educational video entitled “Headache and Postural Intervention Techniques”.

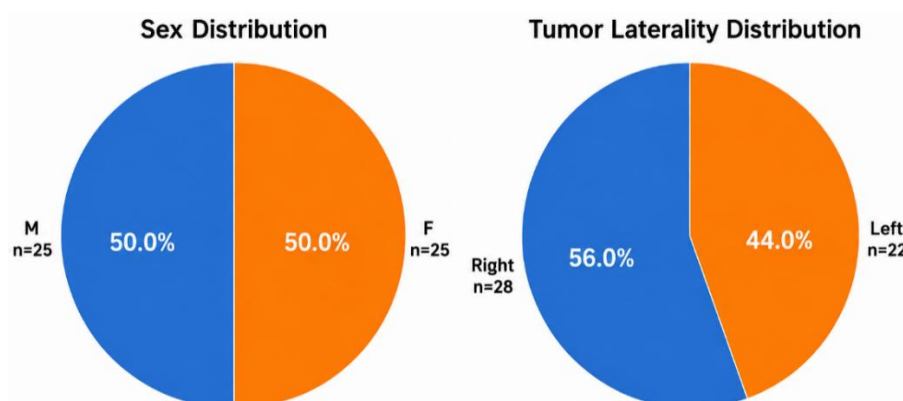


Figure 4. Distribution of sex and tumor laterality among patients with brain tumors. Sex distribution was balanced, with 25 male participants (50%) and 25 female participants (50%). Right-hemispheric tumors accounted for 56% of cases, whereas left-hemispheric tumors accounted for 44% (Primary Data, 2025).

Among the 50 participants, the sex distribution was balanced, with 25 males (50%) and 25 females (50%). Participants ranged in age from 18 to 63 years, with a mean age of 47.1 years. Regarding lesion laterality, 56% of tumors were located in the right cerebral hemisphere and 44% in the left hemisphere. Meningioma was the most common tumor type (52%), followed by glioblastoma (22%) and other tumor types (26%). The predominance of meningioma is broadly consistent with contemporary population-based data showing meningioma as the most frequently reported primary central nervous system tumor in adults⁹.

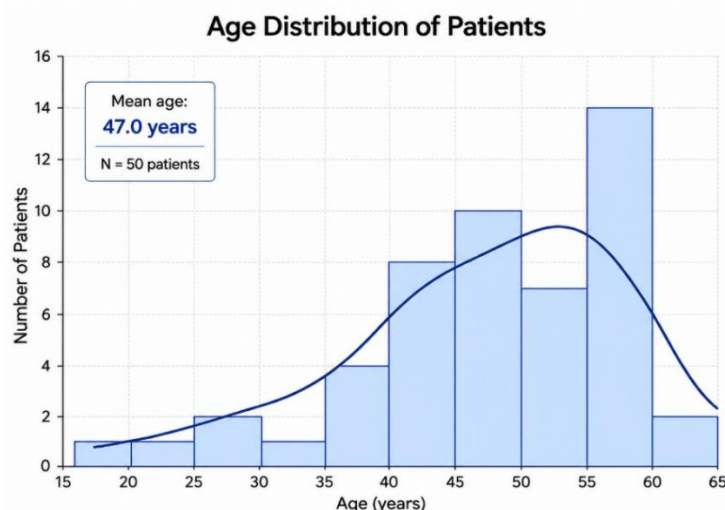


Figure 5. Age distribution of patients with brain tumors. Most participants were aged 40–60 years, with a mean age of 47.1 years, indicating a predominance of middle-aged and early older adults in the study population (Primary Data, 2025).

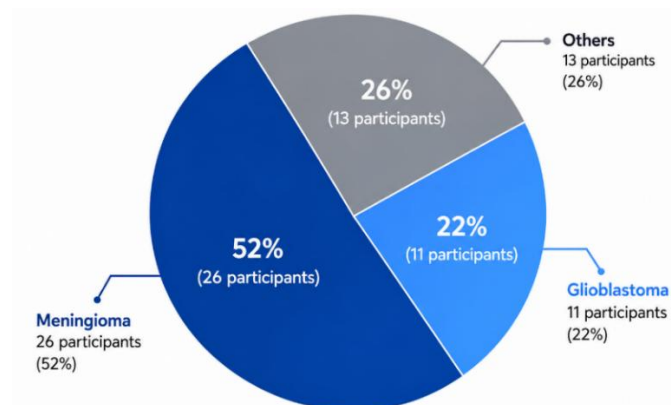


Figure 6. Distribution of brain tumor types among study participants. Meningioma was the predominant histological subtype, accounting for 52% of cases, followed by other tumor types (26%) and glioblastoma (22%) (Primary Data, 2025).

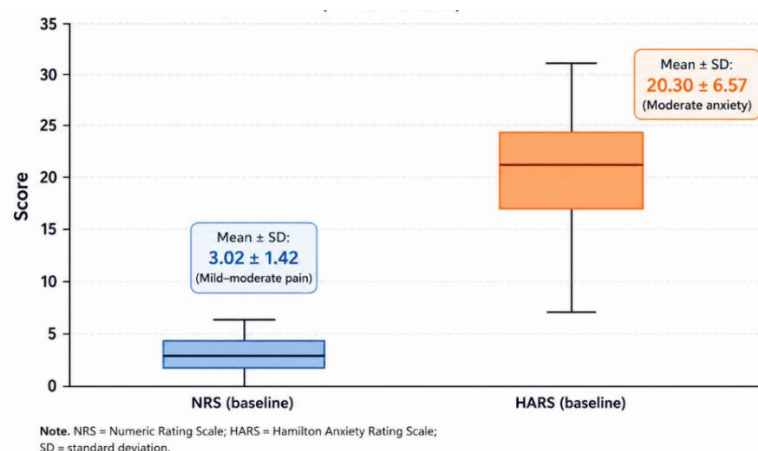


Figure 7. Baseline NRS and HARS scores among study participants. The mean baseline NRS score was 3.02 and the mean baseline HARS score was 20.3 (Primary Data, 2025).

Clinical outcomes were assessed using the NRS for headache intensity and the HARS for anxiety symptoms. At baseline, the mean NRS score was 3.02 and the mean HARS score was 20.3. All participants underwent repeat assessment approximately four weeks after the combined educational intervention.

At the one-month follow-up, both NRS and HARS scores were lower than at baseline. Wilcoxon signed-rank analysis demonstrated statistically significant within-participant reductions in headache intensity and anxiety symptoms (both $p < 0.05$). These findings describe pre-post changes within the same cohort and should not be interpreted as a comparison between leaflet and video education. Because every participant received both educational media as components of the same intervention, the independent effect of the leaflet or the video cannot be estimated from this dataset, and no between-media comparison was performed.

NRS and HARS scores were lower at the one-month follow-up than at baseline, and the paired changes were statistically significant. These observations are broadly consistent with evidence that structured patient education can improve symptom-related outcomes in cancer care. Syrjala et al. reported benefits from integrated print-and-video training for cancer pain management, while Ye et al. found lower pain and anxiety after adding video education to routine written information in patients with cancer^{6,7}. These studies support the plausibility of multimedia education, but differences in population, intervention, and design mean that they do not establish causation in the present cohort.

A possible explanation is that printed and audiovisual materials provide complementary learning opportunities: a leaflet offers a concise reference, whereas a video can demonstrate movement sequences and be replayed. A randomized study in another clinical setting found better short-term knowledge retention with educational animation than with a leaflet⁸. However, knowledge retention, adherence, self-efficacy, and frequency of home practice were not measured in this study; therefore, these mechanisms should be considered interpretations rather than study findings.

The postural component also has physiologic plausibility because body position can influence intracranial pressure, cerebral perfusion, and cerebral oxygenation in neurological patients⁵. Nevertheless, intracranial pressure and other physiologic variables were not measured here. Similarly, the lower HARS scores may have reflected reduced uncertainty or greater familiarity with symptom-management strategies, but psychological mediators were not assessed. The data therefore support only the observed pre-post changes in NRS and HARS, not a specific biological or behavioral mechanism.

Interpretation is limited by the absence of an untreated or usual-care control group, the single-center setting, short follow-up, heterogeneous tumor characteristics, and the lack of direct measures of medication changes, adherence, knowledge, self-management, or quality of life. Natural recovery, concurrent clinical care, regression to the mean, and repeated assessment could have contributed to the observed changes. In addition, because every participant received both the leaflet and video, the independent contribution of either medium cannot be estimated. The program nevertheless demonstrates the feasibility of delivering combined printed and audiovisual education during routine follow-up and community outreach; controlled studies are required to determine effectiveness.

CONCLUSION

Among postoperative patients with brain tumors in this community-based program, headache intensity and anxiety scores were lower one month after combined leaflet- and video-supported education on postural intervention than at baseline. These findings indicate a favorable pre-post association, but the absence of an untreated control group prevents causal attribution to the intervention. Because both media were delivered together, their individual effects cannot be compared. Further controlled studies with longer follow-up are needed to establish effectiveness and clarify which components provide benefit.

ETHICS APPROVAL

The study protocol was reviewed and approved by the Komite Etik Penelitian Kesehatan RSUD Dr. Moewardi (Health Research Ethics Committee of Dr. Moewardi General Hospital), Surakarta, Indonesia (No. 1.130/IV/HREC/2025).

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

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AUTHORS' CONTRIBUTIONS

DKM and the study team conceived and designed the community-based program. The authors developed the educational materials, conducted patient education sessions, collected and analyzed the data, and prepared the manuscript. All authors reviewed and approved the final manuscript.

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REFERENCES

1. Louis DN, Perry A, Wesseling P, Brat DJ, Cree IA, Figarella-Branger D, et al. The 2021 WHO classification of tumors of the central nervous system: a summary. *Neuro Oncol.* 2021;23(8):1231-1251.
2. Ostrom QT, Price M, Neff C, Cioffi G, Waite KA, Kruchko C, et al. CBTRUS statistical report: primary brain and other central nervous system tumors diagnosed in the United States in 2016-2020. *Neuro Oncol.* 2023;25(Suppl 4):iv1-iv99.
3. Schankin CJ, Ferrari U, Reinisch VM, Birnbaum T, Goldbrunner R, Straube A. Characteristics of brain tumour-associated headache. *Cephalalgia.* 2007;27(8):904-911.
4. Ravn Munkvold BK, Sagberg LM, Jakola AS, Solheim O. Preoperative and postoperative headache in patients with intracranial tumors. *World Neurosurg.* 2018;115:e322-e330.
5. Renovanz M, Gutenberg A, Haug M, et al. Postsurgical screening for psychosocial disorders in neurooncological patients. *Acta Neurochir (Wien).* 2013;155(12):2255-2261.
6. Ledwith MB, Bloom S, Maloney-Wilensky E, Coyle B, Polomano RC, Le Roux PD. Effect of body position on cerebral oxygenation and physiologic parameters in patients with acute neurological conditions. *J Neurosci Nurs.* 2010;42(5):280-287.
7. Syrjala KL, Abrams JR, Polissar NL, et al. Patient training in cancer pain management using integrated print and video materials: a multisite randomized controlled trial. *Pain.* 2008;135(1-2):175-186.
8. Ye Z, Chen J, Zhang Y, et al. Video education reduces pain and anxiety levels in cancer patients who first use fentanyl transdermal patch: a randomized controlled trial. *Drug Des Devel Ther.* 2020;14:3477-3483.
9. Nassar AA, Aboalshamat KT, Alsanei BS, Alghamdi AS, Fudah AA, Alhilou AM. The effect of educational animation compared to leaflets on patients' knowledge regarding root canal treatment: a randomized controlled trial. *BMC Med Educ.* 2024;24(1):808.