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The impact of shoulder care educational intervention on pain, spasticity, and function in patients post stroke

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Abstract

Shoulder complications post-stroke hinder recovery and reduce quality of life. Targeted educational interventions are crucial for improving patient outcomes. To evaluate the effectiveness of shoulder care educational program on complications for stroke patients. A quasi-experimental research design was used. The study was conducted in the neurology department of Assiut Neurology, Psychiatry, and Neurosurgery University Hospital. Sample: Sixty stroke patients with shoulder complications were randomly assigned to the study or control group using a shuffled deck of cards. The study group received a structured educational program, including a teaching booklet, while the control group received standard hospital care. Patient Assessment Sheet. Modified Ashworth Scale. American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form. Shoulder Care Educational Program for Stroke Patients (Teaching Booklet). No significant baseline differences between groups ($p > 0.05$). The study group showed significant improvements in shoulder care knowledge and practices ($p < 0.001$), with reduced pain, spasticity, and functional limitations ($p < 0.01$). Follow-up at three months confirmed sustained benefits. The educational program effectively reduced shoulder pain, spasticity and improved functional recovery in stroke patients, highlighting the importance of targeted interventions in rehabilitation. Structured educational programs should be integrated into rehabilitation protocols. Further research is needed on scalability and long-term benefits. The teaching booklet should be accessible in neurology departments to support patient recovery.

Keywords: Shoulder, Stroke, Pain, Spasticity, Educational program

Introduction

Stroke remains one of the most disabling conditions globally and is the second leading cause of death. According to the World Health Organization, approximately 15 million individuals experience a stroke each year worldwide (WHO, 2021). In Egypt, the situation is particularly concerning, with a reported crude prevalence of 963 cases per 100,000 people (Mohammed, et al., 2022).

The WHO defines stroke as the sudden appearance of focal or global neurological signs that last over 24 hours or result in death, without a cause other than vascular origin. Recent global reports indicate that the lifetime risk of stroke has surged by 50% over the past 17 years, making it a condition that will affect roughly one in four individuals during their lifetime (Meneci et al., 2021).

Stroke, often referred to as a cerebrovascular accident or transient ischemic attack, occurs when blood supply to part of the brain is disrupted. Roughly 85% of strokes are ischemic, typically resulting from small vessel disease, embolism, or atherosclerotic blockage of large arteries. Hemorrhagic strokes, which are less frequent, happen when a blood vessel ruptures and bleeds into the brain tissue. The consequences of stroke can range from minor weakness to severe disability or death, with common signs including sudden weakness, facial droop, severe headache, vision disturbances, and speech difficulties (Murphy & Werring, 2020,Jam et al., 2025).

A common consequence of stroke is weakness or paralysis affecting the shoulder or arm, often accompanied by muscle stiffness or spasticity. These changes can disrupt the normal muscle tone, leading to shoulder problems such as pain and subluxation — a partial dislocation caused by the arm's weight pulling on the weakened joint (Arya et al., 2021).

Shoulder pain is reported in 16%–72% of stroke survivors and can significantly interfere with rehabilitation and daily activities. This condition, known as hemiplegic shoulder pain, often arises from

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multiple contributing factors. The best approach is prevention, which requires early intervention soon after the stroke event. Early recognition of potential shoulder issues can help lower the risk of long-term pain and dysfunction (Kumar et al., 2022).

Patients recovering from acute stroke are at high risk of a range of neurological, physical, and psychological complications that can worsen outcomes and increase mortality. However, many of these complications are preventable through prompt and skilled nursing care (Abd El-Hady et al., 2022). Nurses play a critical role from the moment of patient triage, working in close collaboration with neurologists and therapists to maximize patient recovery and quality of life (Tadi & Lui, 2022, Moghavvemi et al., 2025).

Effective nursing care draws on a combination of knowledge, clinical skills, and judgment to meet the complex needs of stroke patients. In Egypt, studies show that many stroke patients develop preventable complications, often due to gaps in nurses' knowledge or practice, ultimately impacting patient outcomes. To address this, WHO (2017) recommends that nursing care be grounded in current evidence and clinical guidelines (Sherief et al., 2022).

Nurses not only provide direct care but also lead the multidisciplinary team to ensure that patients adjust to post-stroke changes, regain independence, and return safely to their home environments. Stroke education is thus crucial for early detection and prevention of complications, ultimately improving patient outcomes (Greenberg et al., 2022; Abbas et al., 2025).

Significance of the study

Stroke patients frequently experience a range of complications, many of which arise from prolonged immobility. Among these, musculoskeletal complications—particularly shoulder problems characterized by muscle weakness—are among the most prevalent and concerning. Based on the researcher's clinical experience in a neurological unit, it has been noted that many stroke patients encounter shoulder-related issues due to insufficient awareness or understanding of rehabilitation strategies essential for minimizing complications and supporting functional recovery.

These shoulder complications not only hinder rehabilitation progress but also contribute to extended hospital stays, increased healthcare costs, and elevated mortality rates.

Given these challenges, the present study was undertaken to assess the impact of designing and implementing an educational program aimed at reducing shoulder complications and enhancing functional outcomes among stroke patients. It is hoped that the findings will contribute to the development of nursing education programs that promote the delivery of high-quality, evidence-based care for this vulnerable patient population.

The aim of the current study:

Evaluate the impact of shoulder care educational intervention on pain, spasticity, and function in patients post stroke.

Research hypothesis

- Patients who will receive the designed educational program will have higher score of knowledge than control group.
- Patients who will receive the designed educational program will demonstrate a better understanding of shoulder care practices.
- Study group who will receive educational program will report less pain and greater improvement in shoulder function than the control group.

Subjects and methods

Research design

Quasi-experimental (study – control) research design was utilized to conduct this study.

Setting

This study was carried out at the neurology department at Assiut Neurology, Psychiatry and Neurosurgery University Hospital.

Duration

Data collection took place between July 2023 and February 2024, with an additional three-month

follow-up period ending in May 2024.

Sample

A purposive sample of 60 male and female patients diagnosed with stroke and admitted to the neurology department was selected. Participants ranged in age from 18 to 65 years. Inclusion criteria included adult patients who were conscious and diagnosed with stroke. Exclusion criteria were prior physical disabilities affecting the shoulder. Participants were randomly allocated into two groups using a shuffled deck of cards (even numbers = control group; odd numbers = intervention group). The intervention group received the shoulder care educational program in addition to routine hospital care, while the control group received standard care only.

Study tools

Tool I: Patient assessment sheet

Developed by the researcher, this tool included demographic data, medical history, and assessments of patients' knowledge and practices related to stroke and shoulder care. Knowledge was evaluated using eight questions, scored as correct (2), incomplete (1), or incorrect (0), with a total score of 0–16. Practice was assessed on 10 shoulder exercises, scored similarly, with a total score of 0–20.

Tool II: Modified Ashworth scale

This tool measured spasticity severity using a 6-point scale, where higher scores indicated greater muscle tone and resistance.

Tool III: American Shoulder and Elbow Surgeons standardized shoulder assessment form (ASES)

This instrument assessed pain and function, combining a pain score (derived from a Visual Analogue Scale) and a functional score (based on daily activity questions), with a total possible score of 100.

Tool IV: Shoulder care educational program (Teaching Booklet)

Developed in simple Arabic, the booklet included evidence-based guidance on stroke management, shoulder care, rehabilitation exercises, and pain management strategies.

Content was reviewed by neurologists, nurses, and physiotherapists to ensure clarity and cultural relevance.

Validity and reliability

The tools were validated by five experts in nursing and neurology. Reliability testing showed high consistency: The Numeric Pain Rating Scale ($r = 0.96$), the Modified Ashworth Scale (interrater reliability = 0.88), and the ASES (Cronbach's $\alpha = 0.92$).

Pilot study

A pilot was conducted with six patients (10% of the sample) to test tool clarity and feasibility; these patients were included in the main analysis as no major changes were needed.

Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Nursing, Assiut University (approval no. 1120230580, date: 26-02-2023). Permissions were obtained from hospital leadership. Written or verbal informed consent was secured from all participants, who were assured of confidentiality and their right to withdraw at any time.

Procedure

The study was conducted in three phases

1.Preparatory phase: Development of study tools and educational materials.

2.Implementation phase

Patients were introduced to the study and baseline data were collected.

Participants were divided into control and intervention groups.

The intervention group received three structured educational sessions addressing stroke, shoulder care, rehabilitation exercises, and home management, supported by a booklet and visual aids.

Follow-up was conducted in outpatient clinics and through phone calls.

3.Evaluation phase: Post-intervention assessment of knowledge, practices, pain, function, and complications after three months.

Statistical analysis

Data were analyzed using SPSS version 26. Descriptive statistics summarized the sample, while chi-square and independent t-tests compared groups. A significance level of $p < 0.05$ was used. Pearson's correlation assessed associations between variables.

Results

Table (1): Demographic data distribution among study and control groups (n= 60)

Variables	Study group (n=30)		Control group (n=30)		X2	P.value
	N	%	N	%		
Age						
20 < 28 years	0	0.0	1	3.3	4.800	.308 Ns
28 < 38 years	0	0.0	2	3.3		
38 < 48 years	4	6.7	1	3.3		
48 < 58 years	10	16.7	10	16.7		
58 ≤ 65 years	16	26.7	16	26.7		
Sex						
Male	19	31.7	14	23.3	1.684	.299 Ns
Female	11	18.3	16	26.7		
Marital status						
Single	1	3.3	3	5.0	1.535	.674 Ns
Married	23	38.3	21	35.0		
Divorced	1	3.3	2	3.3		
Widower	5	8.3	4	6.7		
Level of education						
Illiterate	19	31.7	14	23.3	4.234	.375 Ns
Primary	4	6.7	3	5.0		
Secondary	2	3.3	4	6.7		
Preparatory	1	3.3	5	8.3		
University	4	6.7	4	6.7		
Occupational						
Working	11	18.3	11	18.3	.0001	1.000 Ns
Not working	19	31.7	19	31.7		
Residence						
Urban	4	6.7	8	13.3	1.667	.333 Ns
Rural	26	43.3	22	36.7		

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non-significant difference P>0.05

Table (1): Presents the demographic characteristics of patients in both the study and control groups. No statistically significant differences were found between groups in terms of age (p = 0.308), gender (p = 0.299), marital status (p = 0.674), educational level (p = 0.375), occupational status (p = 1.000), or residence (p = 0.333). The majority of participants in both groups were between 48 and 65 years old, with a predominance of males in the study group. These findings confirm that the groups were demographically comparable at baseline.

Table (2): Comparison between total knowledge scores among study and control groups across pre-intervention, post-intervention, and three-month follow-up (n=60)

Variables	Time	Study Group		Control Group		X2 (P.value)
		N	%	N	%	
Unsatisfied	Pre	28	93.3	26	86.7	.741 P= .671 Ns
	Post	0	0.0	26	86.7	40.000 P= .0001**
	After 3 months	0	0.0	20	66.7	25.000 P=.0001**
Satisfied	Pre	2	6.7	4	13.3	.542 P= .462 Ns
	Post	30	100.0	6	20.0	40.000 P=.0001**
	After 3 months	30	100.0	10	33.3	36.000 P=.0001**
Mean ± SD	Pre	2.100±3.763		3.56±3.28		T : .442 P = .660 Ns
	Post	14.73±1.55		3.50±3.29		T : 16.87 P=.0001**
	After 3 months	12.700±2.053		7.40±3.10		T : 11.23 P=.0001**

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non-significant difference P>0.05

Table (2): Summarizes overall knowledge scores in both groups across the study period. The study group showed a marked increase from 2.1 ± 3.76 pre-intervention to 14.7 ± 1.55 post-intervention, maintaining 12.7 ± 2.05 at follow-up ($p < 0.001$), while the control group showed minimal improvement. This table reinforces the program's effectiveness in enhancing and sustaining patient knowledge.

Table (3): Comparison of total practice scores for study and control groups pre-intervention, post-intervention, and three-month follow-up (n = 60)

Variables	Follow up	Study group Mean ±SD	Control group Mean ±SD	P.value
Shoulder Shrug Exercise	Pre	0.933 ± 1.874	0.267 ± 0.980	0.090 ns
	Post	8.700 ± 1.178	0.267 ± 0.980	0.0001**
	After 3 months	7.833 ± 1.440	0.267 ± 0.980	0.0001**
Exercises for Shoulder Flexibility: Adduction (Reaching Across)	Pre	1.100 ± 1.561	0.933 ± 1.460	0.671 ns
	Post	7.000 ± 1.017	0.933 ± 1.460	0.0001**
	After 3 months	6.466 ± 1.525	0.933 ± 1.460	0.0001**
Shoulder Clock Exercise	Pre	2.266 ± 3.004	0.467 ± 1.074	0.003**
	Post	8.630 ± 1.299	0.600 ± 1.522	0.0001**
	After 3 months	8.200 ± 1.669	0.600 ± 1.522	0.0001**
Shoulder Turn Exercises	Pre	1.100 ± 1.988	0.200 ± 0.805	0.025*
	Post	8.300 ± 1.512	0.200 ± 0.805	0.0001**
	After 3 months	7.533 ± 1.814	0.200 ± 0.805	0.0001**

Shoulder Flexion (Flexibility)	Pre	1.033 ± 1.902	1.766 ± 2.528	0.209 ns
	Post	8.600 ± 1.248	2.060 ± 2.728	0.0001**
	After 3 months	8.066 ± 1.574	2.060 ± 2.728	0.0001**
Back Scratch Exercises	Pre	1.166 ± 2.035	1.700 ± 2.167	0.330 ns
	Post	6.766 ± 1.695	1.667 ± 2.150	0.0001**
	After 3 months	6.066 ± 1.460	1.667 ± 2.150	0.0001**
Wall Pushup Exercises	Pre	1.133 ± 2.129	0.733 ± 1.595	0.414 ns
	Post	8.500 ± 1.432	0.933 ± 1.799	0.0001**
	After 3 months	7.033 ± 1.607	0.933 ± 1.799	0.0001**
Child position exercise	Pre	0.300 ± 0.876	0.300 ± 1.055	1.000 ns
	Post	7.900 ± 2.294	0.033 ± 0.182	0.0001**
	After 3 months	7.800 ± 1.936	0.033 ± 0.182	0.0001**
External Rotation exercise	Pre	0.767 ± 1.381	0.533 ± 1.041	0.463 ns
	Post	5.200 ± 0.961	0.533 ± 1.041	0.0001**
	After 3 months	4.900 ± 1.295	0.533 ± 1.041	0.0001**
Reaching Up" exercise.	Pre	0.700 ± 1.263	0.567 ± 1.330	0.692 ns
	Post	5.366 ± 1.033	0.567 ± 1.330	0.0001**
	After 3 months	4.800 ± 1.242	0.567 ± 1.330	0.0001**
Total practice	Pre	10.500 ± 12.623	7.466 ± 7.166	0.257 ns
	Post	74.960 ± 7.599	7.800 ± 7.594	0.0001**
	After 3 months	68.700 ± 4.962	7.800 ± 7.594	0.0001**

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non significant difference P>0.05

Table (3): Compares the total practice scores between the study and control groups across the three study phases. Pre-intervention, both groups had low practice scores with no significant differences (study group: 10.5 ± 12.6; control group: 7.5 ± 7.2; p = 0.257). Post-intervention, the study group demonstrated a significant improvement in total practice scores (74.96 ± 7.6) compared to the control group (7.8 ± 7.6; p < 0.001). At the three-month follow-up, the study group maintained moderate retention of practice gains (68.7 ± 5.0), while the control group showed no meaningful improvement. These results underscore the educational program's effectiveness in enhancing exercise adherence and performance, with sustained benefits over time.

Table (4): Comparison of muscle tone using the modified ashworth scale between study and control groups pre-intervention, post-intervention, and three-month follow-up (n = 60)

Variables	**Time**	**Study Group**		**Control Group**		**p. value**
		N	**%**	**N**	**%**	
No increase in tone	Pre	3	10.0	3	10.0	0.500
	Post	0	0.0	4	13.3	0.300
	After 3 months	1	3.3	2	6.7	0.700
Slight increase in tone Catch / release at end ROM	Pre	24	80.0	16	53.3	0.040*
	Post	13	43.3	13	43.3	1.000
	After 3 months	23	76.7	15	50.0	0.050*

Slight increase in tone Catch / release and resistance through rest ROM (1/2 ROM)	Pre	0	0.0	4	13.3	0.200
	Post	13	43.3	4	13.3	0.030*
	After 3 months	6	20.0	5	16.7	0.700
Move marked increase in tone through ROM, but affected part moved easily	Pre	2	6.7	4	13.3	0.400
	Post	3	10.0	4	13.3	0.600
	After 3 months	0	0.0	3	10.0	0.150
Considerable increase in tone, passive movement difficult	Pre	1	3.3	2	6.7	0.600
	Post	1	3.3	4	13.3	0.200
	After 3 months	0	0.0	1	3.3	0.400
Affected part in rigid flexion and extension.	Pre	0	0.0	1	3.3	0.500
	Post	0	0.0	1	3.3	0.500
	After 3 months	0	0.0	1	3.3	0.500

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non significant difference P>0.05

Table (4): Summarizes muscle tone changes across pre-intervention, post-intervention, and three-month follow-up phases. Pre-intervention, both groups showed 10% with no increase in tone. Post-intervention, none of the study group remained in this category, while 13.3% of the control group did. At follow-up, the study group improved to 3.3% vs. 6.7% in controls.

For slight tone increase (catch/release), the study group improved from 80.0% pre-intervention to 76.7% at follow-up, compared to 50.0% in controls (p = 0.050). Moderate tone increases rose post-intervention but decreased at follow-up in the study group. Marked or severe tone increases were rare in both groups.

These findings highlight that the intervention effectively reduced muscle tone abnormalities, with better outcomes in the study group.

Table (5): Comparison of American shoulder and elbow surgeons standardized shoulder assessment form scores between study and control groups pre-, post-intervention and three-month follow-up (n = 60)

Variables	Follow up	Study		Control		P Value
		N	%	N	%	
Usual work	Pre	8	26.7	11	36.7	0.400
	Post	11	36.7	12	40	0.700
	After 3 months	7	23.3	9	30	0.500
Usual sport/ leisure activity	Pre	3	10	3	10	1.000
	Post	2	6.7	5	16.7	0.200
	After 3 months	3	10	4	13.3	0.700
Do you have shoulder pain at night?	Pre	30	100	30	100	1.000
	Post	30	100	30	100	1.000
	After 3 months	29	96.7	30	100	0.300
Do you take pain killers such as paracetamol, diclofenac	Pre	30	100	30	100	1.000
	Post	30	100	30	100	1.000
	After 3 months	29	96.7	30	100	0.300
Do you take strong pain killers such as	Pre	6	20	2	6.7	.0.100
	Post	5	16.7	1	3.3	0.050*

codeine, tramadol, or morphine?	After 3 months	2	6.7	1	3.3	0.500

Assessment Form Scores between Study and Control Groups Pre- , Post-Intervention and Three-Month Follow-up (n = 60) Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non significant difference P>0.05

Table (5): Compares ASES outcomes between study and control groups across pre-intervention, post-intervention, and three-month follow-up. Functional tasks like "Usual Work" and "Leisure Activity" showed no significant differences between groups. Both groups reported 100% prevalence of shoulder pain at night pre- and post-intervention, with a slight reduction in the study group at follow-up (96.7%). Notably, strong painkiller uses in the study group declined from 20.0% to 6.7% at follow-up (p = 0.050), while the control group showed no meaningful change. These results suggest the intervention effectively reduced reliance on strong analgesics, though functional challenges remained.

Table (6): Comparison of pain management and intensity scores from the American shoulder and elbow surgeons standardized shoulder assessment form between study and control groups pre- intervention, post-intervention and three-month follow-up (n = 60)

Variables	Group	Time	Mean	Std. Deviation	Minimum	Maximum	P. value
How many pills do you take	Study	Pre	8	3.03996	0	12	0.8
		Post	8.4333	1.81342	5	12	1
		After 3 months	5.6333	1.93842	2	9	0.040*
	Control	Pre	8.4333	2.16051	3	12	0.5
		Post	8.4333	2.16051	3	12	
		After 3 months	8.1	2.12342	4	11	
Intensity of pain	Study	Pre	6.9333	2.1645	0	9	0.9
		Post	7.3333	1.37297	2	9	0.7
		After 3 months	2.8667	1.56983	2	8	0.010*
	Control	Pre	7.2333	1.56873	4	9	0.6
		Post	7.2333	1.56873	4	9	
		After 3 months	7.1	1.52267	5	9	

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non significant difference P>0.05

Table (6): Presents changes in pain medication use and intensity between the study and control groups. Pre-intervention and post-intervention, both groups reported similar pill usage. However, at three-month follow-up, the study group showed a significant reduction in mean pill count (5.63 ± 1.94) compared to the control group (8.10 ± 2.12; p = 0.040). Pain intensity also declined significantly in the study group at follow-up (2.87 ± 1.57) versus the control group (7.10 ± 1.52; p = 0.010). These results highlight the intervention's effectiveness in reducing both pain severity and reliance on medication over time.

Table (7): Comparison of American shoulder and elbow surgeons standardized shoulder assessment total score between study and control groups pre- intervention, post-intervention and three-month follow-up (n = 60).

Variables	Time	Study group	Control group	Sig.
		Mean ±SD	Mean ±SD	
shoulder assessment total score	**Pre**	9.100± 3.021	10.13± 3.830	0.251
	Post	12.533± 3.748	10.200± 3.827	.020*
	After 3 months	21.233 ± 3.568	11.200 ± 3.950	0.0001**

	Total	14.288 ± 6.170	10.520 ± 3.869	0.005**

Chi-Square Tests *=Significant difference *p≤0.05 **= Highly significance *p≤0.01 Ns= Non significant difference P>0.05

Table (7): Compares shoulder function scores using the American Shoulder and Elbow Surgeons (ASES)

Standardized Shoulder Assessment across pre-intervention, post-intervention, and three-month follow-up. Pre-intervention, scores were similar between groups (study: 9.10 ± 3.02; control: 10.13 ± 3.83; p = 0.251). Post-intervention, the study group showed significant improvement (12.53 ± 3.75 vs. 10.20 ± 3.83; p = 0.020). At follow-up, the study group's scores increased further (21.23 ± 3.57), while the control group showed only modest gains (11.20 ± 3.95; p = 0.000). Overall, average scores across all time points were significantly higher in the study group (14.29 ± 6.17) compared to the control group (10.52 ± 3.87; p = 0.005), confirming the intervention's sustained benefit in improving shoulder function.

Discussion

Stroke is a leading cause of disability and mortality worldwide and in Egypt, requiring early recognition, effective management, and interdisciplinary collaboration (Abd-Allah, et al., 2018). This study demonstrated the effectiveness of structured educational and rehabilitation programs in improving knowledge, exercise performance, muscle tone, and shoulder function among stroke patients.

Participants in both groups were mostly aged 48–65 years, with similar demographics and medical histories, strengthening the validity of the findings. Hypertension and diabetes were the most common comorbidities, consistent with global trends (Masson, 2023). The baseline comparability between groups ensured that post-intervention improvements could be attributed to the educational program.

The study group showed significant improvements in stroke knowledge after the intervention, with moderate retention at three months. These results align with previous research emphasizing the importance of structured education for enhancing stroke awareness (Woo et al., 2024). Although knowledge retention declined over time, targeted reinforcement strategies, such as follow-ups or digital modules, could address this challenge.

Functional outcomes also improved markedly in the study group, particularly in shoulder exercises, muscle tone, and pain reduction. Improvements were sustained at follow-up, highlighting the program's long-term benefits. These findings align with (Lee et al. 2022) and (Kim et al. 2024), who emphasized the role of guided and repetitive practice in rehabilitation. Minimal progress in the control group reinforces the need for active, structured interventions over passive approaches.

Correlational analysis showed that increased knowledge was linked to better exercise adherence and improved shoulder function, while reduced pain was associated with functional gains. The Modified Ashworth Scale was useful for measuring muscle tone but had limited predictive value for overall functional recovery.

In summary, this study underscores the transformative impact of structured educational and rehabilitation programs on stroke recovery. Incorporating reinforcement strategies, such as booster sessions or digital tools, could further enhance long-term outcomes. These findings advocate for integrating evidence-based educational interventions into standard stroke rehabilitation protocols.

Conclusion

This study demonstrated that a structured shoulder care educational program significantly improved stroke patients' knowledge, pain management, muscle tone, and shoulder function. The intervention group achieved notable gains in mobility and daily activities compared to controls, and improvements were largely sustained at three-month follow-up. These findings affirm the value of structured education in enhancing rehabilitation outcomes and support the study hypotheses. However, ongoing reinforcement is recommended to optimize long-term benefits.

Recommendations

- Provide clear, illustrated shoulder care booklets at admission and discharge, supported by digital tools (apps, videos) to enhance exercise adherence.
- Offer specialized training for nurses in stroke rehabilitation and organize regular workshops on evidence-based practices.
- Apply standardized assessment tools (e.g., Modified Ashworth Scale, ASES) for routine evaluation and schedule regular follow-ups to reinforce learning.
- Incorporate remote monitoring and tele-rehabilitation to track patient progress and offer real-time guidance.
- Conduct long-term studies comparing educational strategies and exploring personalized rehabilitation approaches.

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