

ORIGINAL ARTICLE

Assessment of Knowledge and Practices Regarding Shoulder Mobilizing Exercises Among Frozen Shoulder Patients

DOI: 10.5281/zenodo.17538458


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Received: 18 Oct 2025
Accepted: 21 Oct 2025
Published: 06 Nov 2025

Published by:
Gopalganj Medical College, Gopalganj,
Bangladesh

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ABSTRACT

Background: Frozen shoulder (adhesive capsulitis) is a common musculoskeletal condition characterized by pain and restricted shoulder movement. Adequate knowledge and consistent practice of shoulder exercises are essential for improving pain and mobility. This study aimed to assess patients' knowledge and practice regarding shoulder exercises and to examine their association with patient-reported improvement. **Methods & Materials:** A cross-sectional descriptive study was conducted among 140 patients diagnosed with frozen shoulder at the Department of Physical Medicine and Rehabilitation, BIRDEM General Hospital, Dhaka, Bangladesh, from January to June 2024. Data were collected using a semi-structured questionnaire assessing socio-demographics, knowledge, and practice of shoulder exercises. Knowledge and practice levels were categorized as good, moderate, or poor. exercise adherence was assessed both via self-report and observation. Associations between education, knowledge, practice, and patient-reported improvement were analyzed using Chi-square tests, with $p < 0.05$ considered statistically significant. **Results:** The majority of participants were middle-aged (45–54 years, 40%) and female (58.6%). Overall, 32.1% had good knowledge, 51.4% moderate, and 16.4% poor knowledge regarding shoulder exercises. Regarding practice, 25.0% demonstrated good practice, 47.9% moderate, and 27.1% poor practice. Higher education was significantly associated with better knowledge ($p = 0.02$) and practice ($p = 0.01$). Patient-reported improvement was significantly associated with both knowledge ($p = 0.011$) and practice ($p = 0.001$), with 62.2% of patients with good knowledge and 71.4% of patients with good practice reporting improvement in pain or mobility. **Conclusions:** Although most patients had moderate knowledge and practice, better knowledge and adherence were strongly associated with improvement in frozen shoulder symptoms. Strategies to enhance patient education, guided exercise sessions, and adherence support are essential to optimize functional outcomes.

Keywords: Frozen shoulder, Adhesive capsulitis, Shoulder exercises, Knowledge, Practice, Adherence, Patient-reported improvement

(The Insight 2025; 8(2): 368-375)

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INTRODUCTION

Frozen shoulder, also known as adhesive capsulitis, is a painful and debilitating shoulder condition characterized by gradual onset of stiffness, pain, and significant reduction in both active and passive range of motion of the glenohumeral

joint without major radiographic abnormalities^[1,2]. The lifetime prevalence of frozen shoulder in the general population is estimated between 2 % and 5 %, and the

condition is more common in middle-aged individuals, particularly women aged 40 to 70 years^[3,4]. Although often regarded as a self-limiting condition, evidence suggests that many patients continue to experience persistent symptoms and functional limitations beyond the classical 1–3-year recovery period^[5].

The exact pathogenesis of frozen shoulder remains unclear, but it is thought to involve synovial inflammation, subsequent capsular fibrosis, joint capsule contracture, and changes in extracellular matrix remodeling^[6]. Several risk factors have been implicated in its development, including diabetes mellitus, thyroid disorders, immobilization, trauma, and certain systemic conditions^[4,7,8]. Evidence suggests that diabetes substantially elevates the likelihood of developing frozen shoulder^[8]. Frozen shoulder of secondary type can develop following shoulder trauma, surgical procedures, or extended periods of immobilization^[9].

Physical therapy, especially therapeutic exercise, is considered a cornerstone of conservative management for frozen shoulder^[10]. Exercise protocols typically include stretching, mobilization, and strengthening modalities aimed at improving joint mobility and reducing pain^[11]. However, the effectiveness of these interventions is often contingent on patient adherence. Poor adherence to home exercise programs has been widely reported in musculoskeletal conditions and can significantly reduce clinical outcomes^[12,13]. Higher self-efficacy and tailored educational interventions are associated with better exercise adherence among patients with musculoskeletal shoulder conditions^[14,15].

Despite the established role of therapeutic exercises in the management of frozen shoulder, most existing studies have focused on the effectiveness of specific exercise protocols rather than patients' understanding and implementation of these exercises. To date, there is a lack of research specifically assessing the knowledge and practices regarding shoulder exercises among patients with frozen shoulder. Understanding patients' awareness, beliefs, and adherence behaviors is crucial for optimizing rehabilitation outcomes and designing interventions that improve compliance and functional recovery. Therefore, this study aims to fill this gap by evaluating the knowledge and practices related to shoulder exercises in frozen shoulder patients.

METHODS & MATERIALS

Study Design and Setting:

This cross-sectional descriptive study was conducted among patients diagnosed with frozen shoulder at the Department of Physical Medicine and Rehabilitation, BIRDEM General Hospital, Shahbag, Dhaka, Bangladesh. BIRDEM General Hospital is a tertiary-level healthcare facility providing comprehensive medical care, including specialized services in physical medicine and rehabilitation.

Study Period:

The study was carried out over a period of 6 months, from January 2024 to June 2024.

Study Population:

The study population included patients clinically diagnosed with frozen shoulder (adhesive capsulitis) who attended the Department of Physical Medicine during the study period. Patients of all age groups and both sexes were considered eligible.

Inclusion Criteria:

- Patients with a confirmed diagnosis of frozen shoulder with diabetes mellitus by a specialist in physical medicine.
- Patients willing to participate and provide written informed consent.

Exclusion Criteria:

- Patients with a history of shoulder surgery, fracture, or other significant musculoskeletal disorders affecting the shoulder.
- Patients with neurological disorders or cognitive impairment that could interfere with understanding or performing exercises.
- Patients unwilling to participate in the study.

Sample Size and Sampling Technique:

A total of 140 patients were included in the study. Purposive sampling was employed to select patients who met the inclusion criteria during the study period.

Data Collection Tool:

Data were collected using a pre-tested structured questionnaire developed by the research team. The questionnaire included sections on:

1. Socio-demographic information (age, sex, occupation, education, etc.)
2. Clinical history and characteristics of frozen shoulder
3. Knowledge regarding shoulder exercises (types, frequency, benefits)
4. Self-reported practices regarding performing shoulder exercises
5. Patient-reported improvement in condition (pain reduction and/or improved mobility following shoulder exercises)

Knowledge and Practice Scoring System:

Knowledge Assessment:

Participants' knowledge regarding shoulder exercises for frozen shoulder was assessed using 10 structured questions covering types of exercises, frequency, duration, benefits, and precautions. Each correct response was scored as 1 point, and incorrect or "don't know" responses were scored as 0 points. Total knowledge score ranged from 0 to 10.

Knowledge levels were categorized as:

- **Good knowledge:** 8–10 points
- **Moderate knowledge:** 5–7 points
- **Poor knowledge:** 0–4 points

Practice Assessment:

Participants' practices were evaluated based on their self-reported and demonstrated performance of shoulder exercises, using 10 items assessing frequency, adherence, proper technique, and consistency. Each correct or appropriate practice was scored as 1 point, and incorrect or

non-adherent practices were scored as 0 points. Total practice score ranged from 0 to 10. Practice levels were categorized as:

- **Good practice:** 8–10 points
- **Moderate practice:** 5–7 points
- **Poor practice:** 0–4 points

Data Collection Procedure:

Eligible patients were approached during their outpatient visits to the Department of Physical Medicine. After explaining the study objectives, written informed consent was obtained. Data were collected through face-to-face interviews using the semi-structured questionnaire. Patients were also observed and asked to demonstrate their regular shoulder exercises to assess their practice.

Operational Definitions:

- **Frozen Shoulder (Adhesive Capsulitis):** Painful restriction of active and passive shoulder movements, particularly in external rotation and abduction, with no other identifiable shoulder pathology, confirmed by a specialist.
- **Shoulder Exercises:** Structured exercises including pendulum, Codman Pendulum exercises, Wand exercises, Wall climbing exercises, Toweling exercises, Overhead pulley exercises, Sperry exercises stretching, range-of-motion (ROM), and strengthening exercises aimed at reducing pain and improving mobility.
- **Knowledge Regarding Shoulder Exercises:** Awareness and understanding of types, frequency, duration, benefits, and precautions of shoulder exercises.
- **Practice Regarding Shoulder Exercises:** Actual performance and adherence to recommended shoulder exercises, assessed by self-report and demonstration.

- **Improvement of Condition:** Self-reported reduction in pain and/or improvement in shoulder mobility after performing exercises, categorized as “Improved,” “Not improved,” or “Not sure.”
- **Good/Moderate/Poor Knowledge or Practice:** Scores categorized as 8–10 (good), 5–7 (moderate), and 0–4 (poor) on respective assessments.

Data Analysis:

Collected data were entered into and analyzed using SPSS version 25.0. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize socio-demographic characteristics, knowledge, practice levels, and improvement. Associations between socio-demographic variables, knowledge, practice, and patient-reported improvement were analyzed using the Chi-square test, with a significance level set at $p < 0.05$.

RESULTS

Socio-demographic and Clinical Characteristics

A total of 140 patients with frozen shoulder participated in the study. The majority were middle-aged adults aged 45–54 years (40.0%), followed by 55–64 years (28.6%), indicating that frozen shoulder is most prevalent in this age group. Females accounted for 58.6% of participants, while males comprised 41.4%, consistent with the higher incidence of frozen shoulder reported among women. Most participants were married (91.4%) and had attained secondary or higher education (68.6%), suggesting a relatively literate study population. Regarding occupation, 42.9% were housewives, 31.4% were engaged in sedentary jobs, and 25.7% performed physical labor. The socio-demographic profile indicates that middle-aged, educated females, particularly housewives, formed the predominant group in this study (Table I).

Table – I: Socio-demographic Characteristics of Participants (n = 140)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
35–44	28	20.0
45–54	56	40.0
55–64	40	28.6
≥65	16	11.4
Gender		
Male	58	41.4
Female	82	58.6
Marital Status		
Married	128	91.4
Unmarried/Other	12	8.6
Education		
No formal education	16	11.4
Primary	28	20.0
Secondary or higher	96	68.6
Occupation		
Housewife	60	42.9
Sedentary job	44	31.4
Physical labor	36	25.7

Knowledge Regarding Shoulder Exercises

Most participants (88.5%) reported being aware of exercises for frozen shoulder. Regarding specific exercises, Codman Pendulum exercises were the most recognized (77.9%), followed by Wand exercises (62.1%), Wall climbing exercises (57.9%), Toweling exercises (53.6%), and Overhead pulley exercises (50.0%) and Sperry exercises (37.1%). Over half of the participants (57.1%) correctly stated that exercises should be performed daily. Regarding session duration, 45.7%

reported 5–10 minutes, and 40% reported 10–20 minutes. Participants were generally aware of the benefits of exercises, including pain reduction (84.3%), improved range of motion (77.1%), and prevention of stiffness (72.1%). About 64.3% acknowledged that precautions should be followed while performing exercises (Table II). Overall, 32.1% of participants had good knowledge, 51.4% had moderate knowledge, and 16.4% had poor knowledge regarding shoulder exercises (Table III).

Table – II: Knowledge Regarding Shoulder Exercises (n = 140)

Knowledge Item	Response	Frequency (n)	Percentage (%)
Have you heard about exercises?	Yes	124	88.5
	No	16	11.5
Beneficial exercises*	Codman Pendulum exercises	109	77.9
	Wand exercises	87	62.1
	Wall climbing exercises	81	57.9
	Toweling exercises	75	53.6
	Overhead pulley exercises	70	50.0
	Sperry exercises	52	37.1
Exercise frequency	Once a week	20	14.3
	2–3 times/week	40	28.6
	Daily	80	57.1
	Don't know	6	4.3
Exercise duration	<5 min	12	8.6
	5–10 min	64	45.7
	10–20 min	56	40.0
	Don't know	8	5.7
Benefits of exercises*	Reduce pain	118	84.3
	Improve range of motion (ROM)	108	77.1
	Prevent stiffness	101	72.1
	Don't know	10	7.1
Precautions	Yes	90	64.3
	No	28	20.0
	Don't know	22	15.7

*Multiple responses allowed

Table – III: Overall Knowledge Levels Regarding Shoulder Exercises (n = 140)

Knowledge Level	Frequency (n)	Percentage (%)
Good (8–10)	45	32.1
Moderate (5–7)	72	51.4
Poor (0–4)	23	16.4

Practice Regarding Shoulder Exercises

Among participants, 70.8% reported performing shoulder exercises regularly. Regarding specific exercises, Codman Pendulum exercises were the most commonly practiced (60.7%), followed by Wand exercises (42.9%), Wall climbing exercises (35.7%), Toweling exercises (34.3%), Overhead pulley exercises (30.0%) and Sperry exercises (20.7%). Daily exercise was reported by 42.9% of participants, while 27.9%

exercised 2–3 times per week. Only 47.9% followed proper technique, and 38.6% adhered fully to physiotherapist or physician recommendations. Improvement in pain or mobility was noted by 45.7% of participants. Overall practice assessment showed 25.0% demonstrated good practice, 47.9% had moderate practice, and 27.1% had poor practice, indicating a gap between knowledge and actual adherence (Tables IV and V).

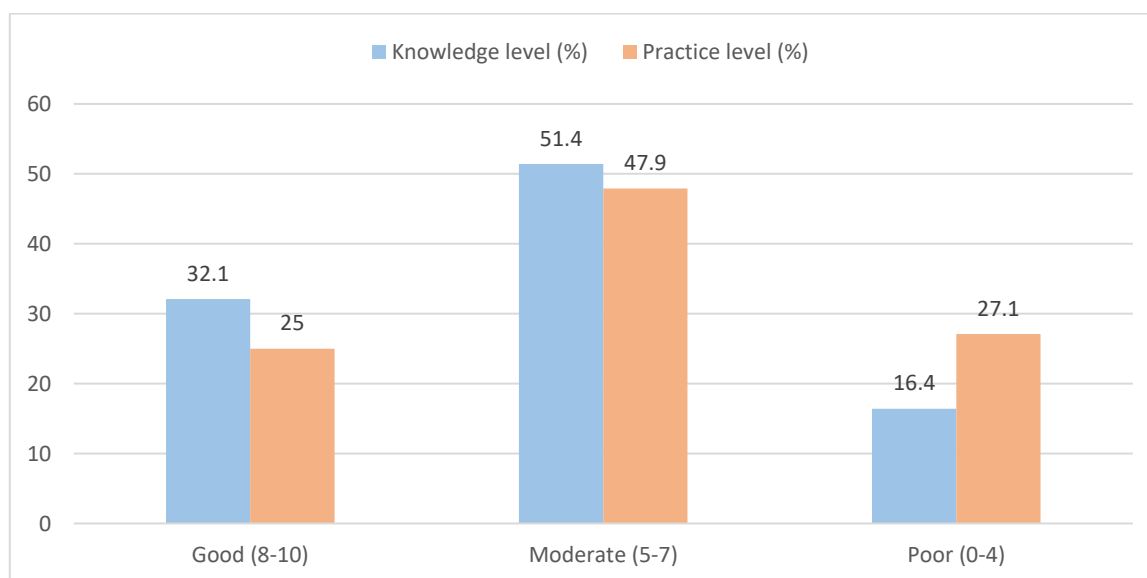
Table – IV: Practice Regarding Shoulder Exercises (n = 140)

Practice Item	Response	Frequency (n)	Percentage (%)
Perform exercises regularly	Yes	99	70.7
	No	41	29.3
Exercises performed*	Codman Pendulum exercises	85	60.7
	Wand exercises	60	42.9
	Wall climbing exercises	50	35.7
	Toweling exercises	48	34.3
	Overhead pulley exercises	42	30.0
	Sperry exercises	29	20.7
Frequency of exercise	Daily	60	42.9
	2–3 times/week	39	27.9
	Occasionally	27	19.3
	Rarely	10	7.1
	Never	4	2.9
Follow proper technique	Yes	67	47.9
	No	49	35.0
	Not sure	24	17.1
Adherence to professional guidance	Yes	54	38.6
	No	46	32.9
	Sometimes	40	28.5
Noticed improvement	Yes	64	45.7
	No	44	31.4
	Not sure	32	22.9

*Multiple responses allowed

Table – V: Overall Practice Levels Regarding Shoulder Exercises (n = 140)

Practice Level	Frequency (n)	Percentage (%)
Good (8–10)	35	25.0
Moderate (5–7)	67	47.9
Poor (0–4)	38	27.1


Figure – 1: Distribution of Knowledge and Practice Levels

The figure 1 shows that most patients demonstrated moderate levels of both knowledge (51.4%) and practice (47.9%) regarding shoulder exercises. While 32.1% had good knowledge, only 25% translated this into good practice.

Notably, a higher proportion of patients exhibited poor practice (27.1%) compared to poor knowledge (16.4%), suggesting a gap between awareness and actual implementation of exercises.

Association Between Education Level and Knowledge/Practice

Education level was significantly associated with both knowledge and practice. Participants with secondary or higher education were more likely to have good knowledge (37.5%) compared to those with primary or no formal

education (5.0%) ($p = 0.02$). Similarly, good practice was more common among participants with secondary or higher education (31.3%) than those with lower education levels (5.0%) ($p = 0.01$), indicating that higher education positively influences knowledge and adherence to recommended exercises (Table VI).

Table – VI: Association Between Knowledge/Practice and Education Level ($n = 140$)

Variable	Category	Good n (%)	Moderate/Poor n (%)	p-value
Knowledge	Secondary or higher	36 (37.5)	60 (62.5)	0.02
	Primary/No education	2 (5.0)	38 (95.0)	
Practice	Secondary or higher	30 (31.3)	66 (68.7)	0.01
	Primary/No education	2 (5.0)	38 (95.0)	

Chi-square test used; $p < 0.05$ considered statistically significant.

Patient-Reported Improvement in Condition

Among the 140 participants, 64 (45.7%) reported noticeable improvement in pain and/or shoulder mobility following their exercise regimen, 44 (31.4%) reported no improvement, and 32 (22.9%) were unsure about any change. This outcome measure was used to explore associations between patients' knowledge and practice levels with actual improvement in their condition.

Table VII presents the relationship between knowledge and practice levels with patient-reported improvement, highlighting the impact of better understanding and

adherence to shoulder exercises on clinical outcomes. Patients with good knowledge were more likely to report improvement (62.2%) compared to those with moderate (41.7%) or poor knowledge (26.1%), and this association was statistically significant ($p = 0.011$). Similarly, practice level was strongly associated with improvement ($p = 0.001$). A substantial majority (71.4%) of patients with good practice reported improvement, whereas improvement rates were lower among those with moderate practice (41.8%) and poor practice (28.9%).

Table – VII: Association Between Knowledge/Practice and Improvement of Patients Condition ($n = 140$)

Variable	Category	Improved n (%)	Not Improved/Not sure n (%)	p-value
Knowledge	Good	28 (62.2)	17 (37.8)	0.011
	Moderate	30 (41.7)	42 (58.3)	
	Poor	6 (26.1)	17 (73.9)	
	Total	64	76	
Practice	Good	25 (71.4)	10 (28.6)	0.001
	Moderate	28 (41.8)	39 (58.2)	
	Poor	11 (28.9)	27 (71.1)	
	Total	64	76	

(Chi-square test applied; $p < 0.05$ considered statistically significant)

DISCUSSION

This study aimed to assess the knowledge and practice of shoulder exercises among patients with frozen shoulder (adhesive capsulitis) and to explore the association between these factors and patient-reported improvement. The findings revealed that while a significant proportion of participants were aware of beneficial exercises and performed them regularly, adherence to proper techniques and professional guidance was suboptimal. Notably, a positive correlation was observed between higher knowledge and practice levels and reported improvements in pain and mobility.

Socio-Demographic Profile

In the present study, the majority of participants were middle-aged adults (45–54 years, 40%) and predominantly female (58.6%), with most being married and having secondary or higher education. This aligns with findings from Mertens et al.^[16], who reported that frozen shoulder is more common in

middle-aged adults, often affecting women more frequently than men. Our findings are consistent with Shahnewaj and Hosain^[17], who also reported a higher prevalence of frozen shoulder among middle-aged women, particularly housewives. The predominance of housewives in our study is noteworthy, as repetitive daily activities and household chores may predispose them to shoulder strain, potentially contributing to the development of frozen shoulder.

Knowledge and Practice Levels

This study revealed that while the majority of participants demonstrated moderate knowledge (51.4%) and practice (47.9%) regarding shoulder exercises, a notable gap exists between awareness and actual adherence. Specifically, 32.1% exhibited good knowledge, yet only 25% translated this into good practice. These findings align with previous research indicating that knowledge alone is insufficient to ensure

consistent exercise adherence among patients with musculoskeletal conditions^[12].

The results are consistent with studies on rotator cuff-related shoulder pain. Phillips et al.^[18] demonstrated that patient knowledge regarding shoulder conditions and management was moderate, and higher knowledge was associated with better engagement in exercise therapy. However, even with adequate knowledge, psychosocial factors such as fear of pain, low confidence in performing exercises, and uncertainty about correct technique often limited adherence^[14,19,20]. In our study, less than half of the participants (47.9%) reported following proper technique, and only 38.6% adhered fully to professional guidance, highlighting the practical challenges of translating knowledge into consistent exercise behavior.

Factors Influencing Adherence

Several factors may explain the observed gap between knowledge and practice. Pain during exercises, lack of structured supervision, and competing daily responsibilities—particularly among housewives—may limit exercise adherence. Qualitative studies on shoulder pain have emphasized that patients often perceive exercises as painful or fear aggravating symptoms, which reduces compliance^[14,19]. Additionally, socio-demographic factors such as education level play a significant role; participants with secondary or higher education levels demonstrated better knowledge and adherence compared to those with lower educational backgrounds. This is consistent with findings from studies on musculoskeletal pain management, where higher education levels were associated with improved exercise adherence^[12].

Moreover, Cridland et al.^[20] reported that clear, confidence-building education from healthcare providers enhances adherence, suggesting that education alone is insufficient without guidance, reassurance, and motivation.

Implications for Clinical Practice

The disparity between knowledge and practice observed in this study underscores the need for comprehensive, patient-centered management strategies that go beyond standard education. Incorporating supervised exercise sessions, regular follow-ups, and personalized rehabilitation plans can enhance adherence and improve clinical outcomes. Importantly, Brindisino et al.^[21] highlighted that patient with frozen shoulder often have specific needs and perspectives that may not align with clinicians' management strategies, suggesting that tailoring interventions to patient expectations and preferences is essential. Furthermore, integrating technology, such as mobile applications for guided exercises, can support self-management, increase patient engagement, and improve adherence to home exercise programs^[22]. Overall, addressing both the educational and behavioral aspects of exercise adherence is crucial for optimizing functional recovery in frozen shoulder patients.

CONCLUSION

This study demonstrated that patients with frozen shoulder generally possess moderate knowledge and practice regarding

shoulder exercises. While a substantial proportion of participants were aware of beneficial exercises, adherence to proper techniques and professional guidance was suboptimal. Higher levels of knowledge and practice were significantly associated with patient-reported improvement in pain and shoulder mobility, highlighting the importance of both education and adherence in achieving positive clinical outcomes. Socio-demographic factors, particularly education level, influenced knowledge and practice, with better-educated patients demonstrating higher adherence and improved outcomes. The study emphasizes the gap between awareness and actual implementation of shoulder exercises, underscoring the need for strategies that translate knowledge into effective practice.

RECOMMENDATION

Based on the findings of this study, it is recommended that patient education on shoulder exercises be clear and practical, emphasizing correct techniques and precautions. Supervised or guided exercise sessions should be incorporated to enhance adherence and ensure proper performance. Rehabilitation plans should be individualized according to patient characteristics and functional needs. Regular follow-up and monitoring are essential to reinforce adherence and track progress. Additionally, integrating digital tools such as mobile applications may support home exercise practice and engagement. Addressing psychosocial barriers, including fear of pain and lack of motivation, is crucial to improve compliance. Future studies should explore strategies to sustain long-term adherence and assess clinical outcomes over time.

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