15 (1) (2026) 153 - 157
Journal of Physical Education, Sport, Health and Recreations
https://journal.unnes.ac.id/journals/peshr

Effectiveness of Modified Shoulder Strengthening Therapy on Post-Dislocation Shoulder Function

Danuditya Purna Atmaja[1]✉, Ainul Ghurri[2], Japhet Ndayisenga[3]

Physiotherapy, Anwar Medika University, Sidoarjo, Jawa Timur, 61626, Indonesia[12]
Institute of Physical Education and Sports, University of Burundi, Burundi[3]

Article History

Received Desember 2025
Accepted January 2026
Published Vol.15 No.(1) 2026

Keywords:
Shoulder Dislocation; Shoulder Rehabilitation; Muscle Strengthening; Flexion; Extension; Exercise Therapy

Abstract

Shoulder dislocation is one of the joint injuries with a high recurrence rate and has a significant impact on upper extremity function. Limitations in range of motion, decreased muscle strength, and shoulder instability are the main problems following reduction. One rehabilitation approach that has continued to develop is functional movement–based strengthening therapy through Modified Shoulder Flexion and Extension exercises. This study aimed to analyze the effect of this method on pain reduction, improvement in shoulder range of motion, and shoulder muscle strength in patients after shoulder dislocation. The study employed a quasi-experimental design with a pretest–posttest approach involving 18 respondents with anterior shoulder dislocation who met the inclusion criteria and completed the entire intervention program. The intervention was administered for six weeks with a frequency of three sessions per week. Data were analyzed using a paired t-test to compare pre- and post-intervention values for pain (VAS), range of motion, and muscle strength. The results demonstrated a significant reduction in pain, with a mean decrease of 3.8 points on the VAS, along with substantial improvements in shoulder range of motion, particularly in flexion and abduction, which increased by more than 70°. Progressive strengthening of the rotator cuff and deltoid muscles was also observed, with all participants achieving at least a one-grade improvement in Manual Muscle Testing scores.. These findings support the effectiveness of Modified Shoulder Flexion and Extension as an integral component of post–shoulder dislocation physiotherapy rehabilitation.

How to Cite

Atmaja, D. P., Ghurri, A., & Ndayisenga, J. (2026). Effectiveness of Modified Shoulder Strengthening Therapy on Post-Dislocation Shoulder Function. Journal of Physical Education, Sport, Health and Recreation, 15 (1), 153-157.

✉ Correspondence address :
E-mail: danuditya@uam.ac.id

p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

The glenohumeral joint is one of the most mobile yet least stable joints in the human body (Hill & Khodaee, 2022). Its high degree of freedom of movement makes the shoulder particularly vulnerable to injury, especially dislocation (Olufade et al., 2022). Anterior dislocation is the most frequently encountered type, particularly among individuals involved in contact sports or repetitive overhead activities (Wilbur et al., 2021). Following reduction, the main problems commonly observed include residual pain, joint instability, restricted range of motion, and weakness of the shoulder stabilizing muscles (Kawabata et al., 2025).

Clinical data indicate that recurrent shoulder dislocation is strongly associated with inadequate recovery of neuromuscular control and insufficient strengthening of the rotator cuff muscles (Marsalli et al., 2022). Rehabilitation programs that focus solely on pain reduction without incorporating functional strengthening exercises have been shown to be less effective in preventing recurrent instability. Therefore, a therapeutic exercise approach based on controlled active movements becomes a primary requirement in the advanced phase of rehabilitation (Matting et al., 2025).

A preliminary survey conducted at the Rehabilitation Medicine Outpatient Clinic of Anwar Medika Hospital, Sidoarjo, during 2024 revealed that shoulder injuries were among the most frequently treated musculoskeletal conditions. Approximately 25–30% of these cases were post–shoulder dislocation, predominantly of the anterior type. Most patients presented with more than 50% limitation in shoulder flexion and abduction, accompanied by rotator cuff muscle weakness, resulting in impaired upper extremity function.

Various exercise methods have been developed, one of which is the Modified Shoulder Flexion and Extension Exercise, which emphasizes synchronous activation of the deltoid muscles, rotator cuff, and scapular stabilizers within controlled dynamic movement patterns. Previous studies have highlighted the importance of active exercise in post-dislocation rehabilitation. Cools et al. (2014) demonstrated that exercises focusing on scapular control and rotator cuff strengthening effectively enhance shoulder stability (British Journal of Sports Medicine). Similarly, Uhl et al. (2010) reported that progressive active exercise resulted in greater improvements in range of motion and muscle strength compared with passive therapy. However, research specifically examining modified shoulder flexion–extension exercises tailored to post-dislocation conditions remains limited, particularly in rehabilitation clinic settings, thereby justifying the need for the present study (Ramírez-Pérez & Cuesta-Vargas, 2025).

The novelty of this study lies in the use of Modified Shoulder Flexion and Extension as the primary method of functional strengthening rather than merely as an adjunct exercise. The purpose of this article is to analyze the effectiveness of this method in reducing pain, improving shoulder range of motion, and increasing shoulder muscle strength in patients following shoulder dislocation. The expected scientific contribution is the provision of clinical evidence to support physiotherapists in selecting strengthening programs that are more specific, practical, and clinically applicable.

METHODS

This study employed a quasi-experimental design using a one-group pretest–posttest approach (Muse & Baldwin, 2021). All participants received the Modified Shoulder Flexion and Extension intervention without a control group. The study was conducted in the Balongbendo District, Sidoarjo Regency, from January to March 2025. The study population consisted of individuals who experienced anterior shoulder dislocation and had undergone medical reduction. A total of 18 respondents were recruited using purposive sampling, with inclusion criteria comprising an age range of 18–45 years, subacute phase status (2–6 weeks post-reduction), absence of associated fractures, and the ability to fully participate in the exercise program. Pain intensity was measured using the Visual Analog Scale (VAS) (Shafshak & Elnemr, 2021). Shoulder range of motion was assessed using a universal goniometer (Lind et al., 2022), while muscle strength was evaluated through Manual Muscle Testing (MMT) (Malartre et al., 2021). The intervention protocol consisted of Modified Shoulder Flexion and Extension exercises administered over a six-week period with a frequency of three sessions per week. Each session included; Active shoulder warm-up exercises lasting 5–7 minutes, Resistance modified flexion–extension exercises using progressive elastic resistance, Cooling-down activities and light stretching.

Data were analyzed using a paired t-test to determine differences between pre- and post-intervention measurements, with a significance

level set at 5% (Aljarbouh et al., 2025).

The percentage increase in range of motion was calculated using the following formula:

$$\Delta ROM(\%)=(ROM\_post-ROM\_pre)/(ROM\_pre)\times 100)$$

This formula was applied to each measured movement to quantify the relative improvement in joint range of motion following the intervention. Meanwhile, the effectiveness of muscle strength improvement was calculated using the following formula:

$$\Delta MMT=MMT\_post-MMT\_pre$$

This calculation was used to determine the relative percentage increase in shoulder muscle strength following the intervention.

RESULTS AND DISCUSSION

Pain assessment was conducted using the Visual Analog Scale (VAS) under conditions of movement-related pain. The measurement results demonstrated a consistent reduction in pain intensity following the implementation of the exercise program.

Table 1. Results of Pain Measurement (VAS) Before and After the Intervention

Parameter	Mean Pretest	Mean Posttest	Δ	Description
Movement-Related Pain	6,1 ± 0,8	2,3 ± 0,6	−3,8	Clinically meaningful reduction in pain, indicating improved tolerance to active shoulder movements and daily activity

The analysis showed that the mean movement-related pain decreased by 3.8 points on the VAS, which is considered clinically significant. All participants reported a progressive reduction in pain starting from the third week of the intervention.

Shoulder range of motion (ROM) was assessed using a universal goniometer for flexion, extension, and abduction movements. The measurement results demonstrated significant improvements across all movement directions following the intervention.

The greatest improvements were observed in shoulder flexion and abduction, each increasing by more than 70° compared to baseline values. No reductions in range of motion or complaints of joint instability were identified during post-intervention assessments.

Table 2. Results of Shoulder Range of Motion (ROM)

Movement	Pretest (°)	Posttest (°)	Δ	Description
Flexion	95 ± 12	168 ± 10	+73	Able to perform light overhead activities
Extension	32 ± 6	54 ± 7	+22	Improved pain-free posterior control
Abduction	88 ± 15	160 ± 11	+72	Near-normal functional abduction

Muscle strength outcomes were evaluated using Manual Muscle Testing (MMT) on the primary shoulder movers. The evaluation demonstrated notable improvements in muscle strength, particularly in the deltoid and rotator cuff muscles.

Table 3. Results of Muscle Strength Assessment (MMT)

Movement	Pretest	Posttest	Description
Flexion	3+	5	Improved from moderate weakness to normal functional strength
Extension	4-	5	Increased to normal strength with better posterior control
Abduction	3	4+	Marked strength gain supporting arm elevation
Ext Rotation	3	4	Enhanced rotator cuff strength improving joint stability
Inter Rotation	4	5	Restored to normal strength for functional movements

The most pronounced improvements in muscle strength were observed in flexion and external rotation, which are key components of dynamic stability of the glenohumeral joint. All participants achieved at least a one-grade increase in MMT scores after six weeks of training.

Based on the calculation of percentage changes in range of motion using Equation (1), the mean increase in shoulder flexion ROM reached 76.8%. Meanwhile, muscle strength improvements calculated using Equation (2) demonstrated an average increase of one to two MMT levels in the primary shoulder muscle groups.

Overall, the study findings indicate that Modified Shoulder Flexion and Extension Exercise has a positive effect on pain reduction, improved shoulder mobility, and enhanced muscle strength in patients following anterior shoulder dislocation.

The results of this study demonstrate that Modified Shoulder Flexion and Extension exercises have a positive impact on the recovery of

shoulder function following dislocation. The significant reduction in pain suggests the presence of neuromuscular adaptations and improved tissue circulation resulting from controlled dynamic muscle activation. These findings are consistent with previous research by Cools et al (Cools et al., 2014) which emphasized that active exercises focusing on scapular control and rotator cuff activation are effective in reducing post-traumatic shoulder pain.

The significant improvement in shoulder range of motion indicates that modified flexion–extension–based exercises are capable of enhancing joint capsule elasticity and improving agonist–antagonist muscle coordination (Lowry et al., 2023) reported that targeted active exercises are superior to passive exercises in improving shoulder range of motion following trauma.

The consistent increase in muscle strength, particularly in the rotator cuff muscle group, reinforces the theory that dynamic stability is a key factor in preventing recurrent dislocation. This finding aligns with the principles of neuromuscular-based shoulder stabilization proposed by Schuette et al (Schuette et al., 2025). which emphasize co-contraction of the rotator cuff and scapular stabilizers during controlled arm movements.

In the present study, the Modified Shoulder Flexion exercise was performed with the arm elevated in the sagittal plane within a controlled range of 60°–120°, while maintaining scapular stability to minimize anterior translation of the humeral head (Figure 1). The Modified Shoulder Extension exercise involved controlled posterior arm movement limited to 20°–40°, with emphasis on eccentric muscle control to enhance posterior shoulder stability (Figure 2). These controlled movement patterns facilitate synchronized activation of the deltoid, rotator cuff, and scapular stabilizers, thereby improving dynamic joint stability while reducing excessive mechanical stress on the glenohumeral joint.

Despite the positive outcomes, this study is limited by a relatively small sample size and the absence of a comparison group. Nevertheless, the findings provide meaningful clinical implications for physiotherapy rehabilitation practice, particularly in supporting the use of modified active exercises as a core component of post–shoulder dislocation rehabilitation programs.

Figure 1. Modified Shoulder Flexion Exercise with controlled elevation and scapular stabilization.

Figure 2. Modified Shoulder Extension Exercise with limited posterior movement and controlled eccentric activation.

CONCLUSION

Modified Shoulder Flexion and Extension has been proven effective in reducing pain, improving shoulder range of motion, and enhancing shoulder muscle strength in patients following shoulder dislocation. This method optimizes dynamic stability and facilitates the progressive restoration of shoulder function. Therefore, this exercise therapy can be recommended as a primary component of post–shoulder dislocation rehabilitation protocols.

REFERENCES

Aljarbouh, A., Yarygina, I., Mohamed, A. P., Bystrova, N., & Tsarev, R. (2025). Evaluating the Effectiveness of an Online Trainer: A Paired T-Test Analysis. Lecture Notes in Networks and Systems, 1481 LNNS, 338–347. https://doi.org/10.1007/978-3-031-95649-2_29

Cools, A. M. J., Struyf, F., De Mey, K., Maenhout, A., Castelein, B., & Cagnie, B. (2014). Rehabilitation of scapular dyskinesis: from the office worker to the elite overhead athlete. British Journal of Sports Medicine, 48(8), 692–697. https://doi.org/10.1136/BJSPORTS-2013-092148

Hill, B., & Khodaee, M. (2022). Glenohumeral Joint Dislocation Classification: Literature Review and Suggestion for a New Subtype. Current Sports Medicine Reports, 21(7), 239–246. https://doi.org/10.1249/JSR.0000000000000973

Kawabata, M., Miyata, T., & Miyatake, K. (2025). A Novel Figure-Eight Taping Technique for Managing Anterior Shoulder Instability in a Recreational Pitcher: A Case Report. International Journal of Sports Physical Therapy, 20(5), 741. https://doi.org/10.26603/001C.136406

Lind, V., Svensson, M., & Harringe, M. L. (2022). Reliability and Validity of a Digital Goniometer for Measuring Knee Joint Range of Motion. Measurement in Physical Education and Exercise Science, 26(3), 191–198. https://doi.org/10.1080/1091367X.2021.2004150;Wgroup:string:publication

Lowry, V., Lavigne, P., Zidarov, D., Perreault, K., Roy, J. S., & Desmeules, F. (2023). Knowledge and appropriateness of care of family physicians and physiotherapists in the management of shoulder pain: a survey study in the province of Quebec, Canada. BMC Primary Care 2023 24:1, 24(1), 49-. https://doi.org/10.1186/S12875-023-01999-6

Malartre, S., Bachasson, D., Mercy, G., Sarkis, E., Anquetil, C., Benveniste, O., & Allenbach, Y. (2021). MRI and muscle imaging for idiopathic inflammatory myopathies. Brain Pathology, 31(3), e12954. https://doi.org/10.1111/BPA.12954;Journal:journal:17503639;Wgroup:string:publication

Marsalli, M., Errázuriz, J. D. D., Morán, N. I., & Cartaya, M. A. (2022). Recurrence of glenohumeral instability in patients with isolated rotator cuff repair after a traumatic shoulder dislocation. Archives of Orthopaedic and Trauma Surgery 2022 143:7, 143(7), 3857–3862. https://doi.org/10.1007/S00402-022-04628-6

Matting, L., Pfeifer, K., Sudeck, G., Jung, A., Langhirt, F., & Geidl, W. (2025). Physical activity promotion in physical therapy, exercise therapy and other movement-based therapies: a scoping review and content analysis of intervention studies and theoretical works. International Journal of Behavioral Nutrition and Physical Activity 2025 22:1, 22(1), 72-. https://doi.org/10.1186/S12966-025-01772-1

Muse, A., & Baldwin, J. M. (2021). Quasi-Experimental Research Design. The Encyclopedia of Research Methods in Criminology and Criminal Justice: Volume II: Parts 5-8, 307–310. https://doi.org/10.1002/9781119111931.Ch61;Ctype:string:book

Olufade, O., Negron, G., & Mautner, K. (2022). Shoulder Dislocations and Fractures. Clinical Guide to Musculoskeletal Medicine: A Multidisciplinary Approach, 215–226. https://doi.org/10.1007/978-3-030-92042-5_23

Ramírez-Pérez, L., & Cuesta-Vargas, A. I. (2025). Effectiveness of therapeutic exercise program in shoulder instability: a systematic review and meta-analysis. European Journal of Physiotherapy. https://doi.org/10.1080/21679169.2024.2449356;Issue:issue:doi

Schuette, H., Gage Griswold, B., Schrock, J. B., Hatzidakis, A. M., & Khazzam, M. (2025). The Diagnosis and Management of Common Shoulder Pathology. Musculoskeletal Pain: Evidence-Based Clinical Evaluation and Management, 207–267. https://doi.org/10.1007/978-3-031-86057-7_10

Shafshak, T. S., & Elnemr, R. (2021). The Visual Analogue Scale Versus Numerical Rating Scale in Measuring Pain Severity and Predicting Disability in Low Back Pain. Journal of Clinical Rheumatology, 27(7), 282–285. https://doi.org/10.1097/RHU.0000000000001320

Uhl, T. L., Muir, T. A., & Lawson, L. (2010). Electromyographical Assessment of Passive, Active Assistive, and Active Shoulder Rehabilitation Exercises. PM&R, 2(2), 132–141. https://doi.org/10.1016/J.PMRJ.2010.01.002

Wilbur, R. R., Shirley, M. B., Nauert, R. F., LaPrade, M. D., Okoroha, K. R., Krych, A. J., & Camp, C. L. (2021). Anterior Shoulder Instability in Throwers and Overhead Athletes: Long-term Outcomes in a Geographic Cohort. Https://Doi.Org/10.1177/03635465211059195, 50(1), 182–188. https://doi.org/10.1177/03635465211059195.