

EFFECT OF CORRECTING GLUTEAL AMNESIA ON SHOULDER PAIN AND ROTATOR CUFF FUNCTION IN OVERHEAD ATHLETES: A SINGLE GROUP EXPERIMENTAL STUDY

¹Chaavi Parasher, ²Dr. Farukh Mohammad Pinjara ³Dr. Geeta, ⁴Dr. Jafar Khan, ⁵Dr. Suhani Bhatnagar, ⁶Dr. Hirendra Katariya, ⁷Dr. Prashant Kumar Ramawat, ⁸Dr. Adil Raza Ansari, ⁹Dr.Divya Tiwari, ¹⁰Devansh Gupta, ¹¹Rohit Khajotia

*¹M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

²Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

³Associate Professor. MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana

⁴Dean & HOD, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

⁵Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

⁶Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

⁷Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

⁸Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

⁹Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

¹⁰M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

¹¹M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan

Corresponding Author: Dr. Chaavi Parasher

Email: chhavipara18@gmail.com

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KEYWORDS

*Gluteal Amnesia,
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Abstract

Background

Overhead athletes frequently experience shoulder pain and rotator cuff dysfunction due to repetitive overhead movements that place excessive mechanical stress on the shoulder complex. Recent biomechanical research emphasizes the importance of the kinetic chain in generating and transferring force during athletic activities. The gluteal muscles play a key role in pelvic stability and force production; however, inhibition or delayed activation of these muscles, commonly referred to as gluteal amnesia, may disrupt the efficiency of the kinetic chain and increase stress on the shoulder joint.

Objective

To determine the effectiveness of correcting gluteal amnesia in reducing shoulder pain and improving rotator cuff function in overhead athletes.

Methods

Thirty overhead athletes with shoulder pain associated with rotator cuff dysfunction and signs of gluteal muscle inhibition participated in the study. All participants underwent a gluteal activation exercise program along with conventional shoulder rehabilitation for eight weeks. Outcome measures included the Shoulder Pain and Disability Index (SPADI) and gluteus maximus muscle strength assessment. Pre-intervention and post-intervention measurements were recorded and analyzed using paired t-test.

Results

The results demonstrated significant improvement in shoulder pain, functional disability, and gluteus maximus muscle strength following the intervention. SPADI scores decreased significantly, indicating reduction in pain and improvement in shoulder function. Gluteus maximus muscle strength also improved following the gluteal activation training program.

Conclusion

Correcting gluteal amnesia through targeted gluteal activation exercises may significantly reduce shoulder pain and improve rotator cuff function in overhead athletes. Addressing proximal muscle activation may enhance rehabilitation outcomes and improve functional performance in individuals involved in repetitive overhead activities.

INTRODUCTION

Overhead sports such as badminton, volleyball, tennis, baseball, cricket, and swimming involve repetitive movements of the upper limb performed above shoulder level. These activities require a complex interaction between multiple body segments in order to generate and transfer force efficiently during athletic performance. The shoulder joint plays a central role in these movements due to its wide range of motion and ability to position the arm in various functional positions. However, the same characteristics that provide mobility also make the shoulder joint vulnerable to injury.

Rotator cuff injuries and shoulder pain are among the most frequently reported musculoskeletal problems in overhead athletes. The rotator cuff muscles are responsible for stabilizing the glenohumeral joint and controlling humeral head movement during dynamic activities. Repetitive overhead motions may cause excessive loading of the rotator cuff tendons, leading to inflammation, fatigue, and structural damage. These conditions may ultimately impair athletic performance and limit participation in sports.

Traditionally, rehabilitation strategies for shoulder injuries have focused on strengthening the rotator cuff muscles and improving scapular stability. Although these interventions are effective in many cases, recent research has highlighted the importance of considering the entire kinetic chain when evaluating and treating shoulder dysfunction. The kinetic chain concept suggests that efficient movement depends on coordinated interaction between the lower extremities, trunk, and upper limbs.

During overhead athletic movements, force generation typically begins in the lower extremities and is transferred through the pelvis and trunk before reaching the shoulder and upper limb. If any segment of this chain fails to function properly, compensatory mechanisms may develop in other segments. These compensations can

increase mechanical stress on the shoulder joint and contribute to rotator cuff injury.

The gluteal muscles, particularly the gluteus maximus and gluteus medius, are essential components of the kinetic chain. These muscles contribute to pelvic stability, hip extension, and force generation during dynamic activities. Proper activation of the gluteal muscles allows efficient transfer of energy from the lower extremities to the upper body. When these muscles fail to activate properly, movement efficiency decreases and other structures may be subjected to increased mechanical load.

Gluteal amnesia refers to the reduced or delayed activation of the gluteal muscles during functional movements. This condition is often associated with prolonged sitting, poor posture, and neuromuscular inhibition. When the gluteal muscles are inhibited, other muscles such as the hamstrings or lumbar extensors may compensate for hip extension movements. These compensatory patterns can alter movement mechanics and disrupt the normal kinetic chain.

In overhead athletes, impaired gluteal activation may contribute to shoulder dysfunction by reducing pelvic stability and altering trunk mechanics during athletic movements. This disruption may increase the mechanical demands placed on the shoulder joint and rotator cuff muscles. Over time, excessive stress on the shoulder complex may lead to pain, fatigue, and reduced functional performance.

Gluteal activation exercises are commonly used to restore neuromuscular recruitment of the gluteal musculature. These exercises include movements such as bridges, clamshells, hip extensions, and resistance band exercises designed to improve muscle strength and activation patterns. By improving proximal muscle function, gluteal activation exercises may enhance the efficiency of the kinetic chain and reduce mechanical stress on the shoulder joint.

Despite growing interest in the relationship between proximal muscle function and

shoulder biomechanics, limited research has investigated the direct effect of correcting gluteal amnesia on shoulder pain and rotator cuff function in overhead athletes. Therefore, the present study was conducted to evaluate the effectiveness of gluteal activation exercises in reducing shoulder pain and improving rotator cuff function in athletes involved in overhead sports.

NEED FOR THE STUDY

Overhead athletes frequently experience shoulder pain due to repetitive high-velocity movements performed during sports activities. These movements generate significant mechanical stress on the shoulder complex, particularly on the rotator cuff muscles responsible for maintaining joint stability during dynamic actions.

Traditional rehabilitation approaches primarily focus on the shoulder joint itself, emphasizing rotator cuff strengthening and scapular stabilization exercises. While these interventions are beneficial, they may not fully address underlying biomechanical factors contributing to shoulder dysfunction.

The concept of the kinetic chain suggests that efficient athletic performance requires coordinated activation of multiple body segments, including the lower extremities, trunk, and upper limbs. Dysfunction in proximal muscles, particularly the gluteal musculature, may disrupt the transfer of force through the kinetic chain and increase stress on the shoulder joint.

Gluteal amnesia, characterized by reduced activation of the gluteal muscles, has been associated with altered movement patterns and decreased pelvic stability. In overhead athletes, impaired gluteal activation may contribute to inefficient force transfer and increased mechanical load on the shoulder complex.

Correcting gluteal amnesia through targeted activation exercises may improve proximal stability and enhance kinetic chain efficiency. However, limited research has explored the effect of gluteal activation exercises on shoulder pain and rotator cuff function in overhead athletes.

Therefore, the present study was

undertaken to evaluate whether correcting gluteal amnesia can reduce shoulder pain and improve functional performance among overhead athletes.

RESEARCH QUESTION

Does correcting gluteal amnesia through gluteal activation exercises reduce shoulder pain and improve rotator cuff function in overhead athletes?

HYPOTHESIS

Null Hypothesis (H_0)

Correcting gluteal amnesia will not significantly reduce shoulder pain or improve rotator cuff function in overhead athletes.

Alternative Hypothesis (H_1)

Correcting gluteal amnesia will significantly reduce shoulder pain and improve rotator cuff function in overhead athletes.

OBJECTIVE OF THE STUDY

To evaluate the effect of correcting gluteal amnesia on shoulder pain and rotator cuff function in overhead athletes.

MATERIALS AND METHOD

Study Design

The present study was designed as a single group experimental study to evaluate the effectiveness of correcting gluteal amnesia in reducing shoulder pain and improving rotator cuff function among overhead athletes.

Study Setting

The study was conducted in the Department of Physiotherapy at Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan. All interventions and assessments were carried out under the supervision of qualified physiotherapists.

Study Duration

The intervention program was conducted for a period of eight weeks. Baseline assessments were performed before the intervention, and post-intervention assessments were recorded after completion of the rehabilitation program.

Sample Size

A total of 30 overhead athletes participated in the study.

Sampling Technique

Participants were selected using purposive sampling based on the predefined inclusion and exclusion criteria.

Inclusion Criteria

- Overhead athletes aged between 18 and 35 years
- Athletes involved in sports such as badminton, volleyball, cricket, tennis, or swimming
- Presence of shoulder pain associated with rotator cuff dysfunction
- Evidence of gluteal muscle inhibition or reduced gluteal activation
- Willingness to participate in the study

Exclusion Criteria

- History of shoulder fracture or dislocation
- Previous shoulder surgery
- Neurological disorders affecting muscle function
- Acute inflammatory conditions of the shoulder joint

Outcome Measures

Shoulder Pain and Disability Index (SPADI)

The Shoulder Pain and Disability Index was used to evaluate shoulder pain and functional limitation. It consists of two components:

- Pain scale (5 items)
- Disability scale (8 items)

Each item is scored from 0 to 10, and higher scores indicate greater pain and disability.

Gluteus Maximus Muscle Strength

Gluteus maximus strength was assessed using the prone hip extension manual muscle testing method. Muscle strength was graded using the standard manual muscle testing scale.

Intervention Protocol

Participants performed a structured gluteal activation exercise program along with conventional shoulder rehabilitation.

Gluteal Activation Exercises

- Gluteal sets

- Bridge exercises
- Clamshell exercises with resistance band
- Prone hip extension
- Single-leg bridge
- Lateral band walk
- Hip thrust
- Step-ups with knee drive
- Single-leg squat

Each session lasted approximately 30–40 minutes and was performed three times per week for eight weeks.

The exercises were progressively advanced in intensity throughout the intervention period to enhance neuromuscular recruitment of the gluteal muscles.

Home Exercise Program

Participants were also instructed to perform the following exercises at home:

- Glute bridges – 3 sets of 12 repetitions
- Clamshell exercise – 3 sets of 15 repetitions
- Bodyweight squats – 3 sets of 10 repetitions
- Resistance band lateral walk – 3 sets of 12 repetitions

These exercises were performed five days per week.

Statistical Analysis

Data collected from the participants were analyzed using statistical methods. Mean and standard deviation values were calculated for all outcome variables.

Pre-intervention and post-intervention scores were compared using the paired t-test to determine the statistical significance of the intervention.

A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of thirty overhead athletes participated in the present study. The outcome measures included SPADI scores and gluteus maximus muscle strength. Measurements were recorded before and after the intervention period.

Table 1
SPADI Pain Scores

**Variable Mean Standard
Deviation**

Pre-Intervention 69.73 9.10

Post-
Intervention 41.37 9.08

Interpretation

The results showed a substantial reduction in SPADI pain scores following the intervention program. The decrease in pain scores indicates that the gluteal activation exercise program was effective in reducing shoulder pain among overhead athletes.

**Table 2
SPADI Disability Scores**

**Variable Mean Standard
Deviation**

Pre-Intervention 67.30 9.18

Post-
Intervention 41.63 9.94

Interpretation

The SPADI disability scores also showed a marked improvement following the intervention. This indicates that the participants experienced improved shoulder function and reduced difficulty performing activities involving the shoulder joint.

**Table 3
Gluteus Maximus Muscle Strength**

Figure 1: Comparison of SPADI Pain Scores Before and After Gluteal Activation Intervention.

**Variable Mean Standard
Deviation**

Pre-Intervention 3.35 0.44

Post-
Intervention 4.70 0.39

Interpretation

The results demonstrated a significant increase in gluteus maximus muscle strength after the intervention program. This suggests that the gluteal activation exercises effectively improved neuromuscular recruitment and strength of the gluteal musculature.

Overall Findings

The results of the present study demonstrated significant improvement in shoulder pain, functional disability, and gluteus maximus muscle strength following the gluteal activation exercise program. The reduction in SPADI scores indicates decreased shoulder pain and improved functional ability among overhead athletes.

Additionally, the increase in gluteus maximus strength suggests improved activation of the gluteal muscles, which may contribute to better kinetic chain efficiency during athletic movements.

These findings indicate that correcting gluteal amnesia may play an important role in improving shoulder function in athletes involved in repetitive overhead activities.

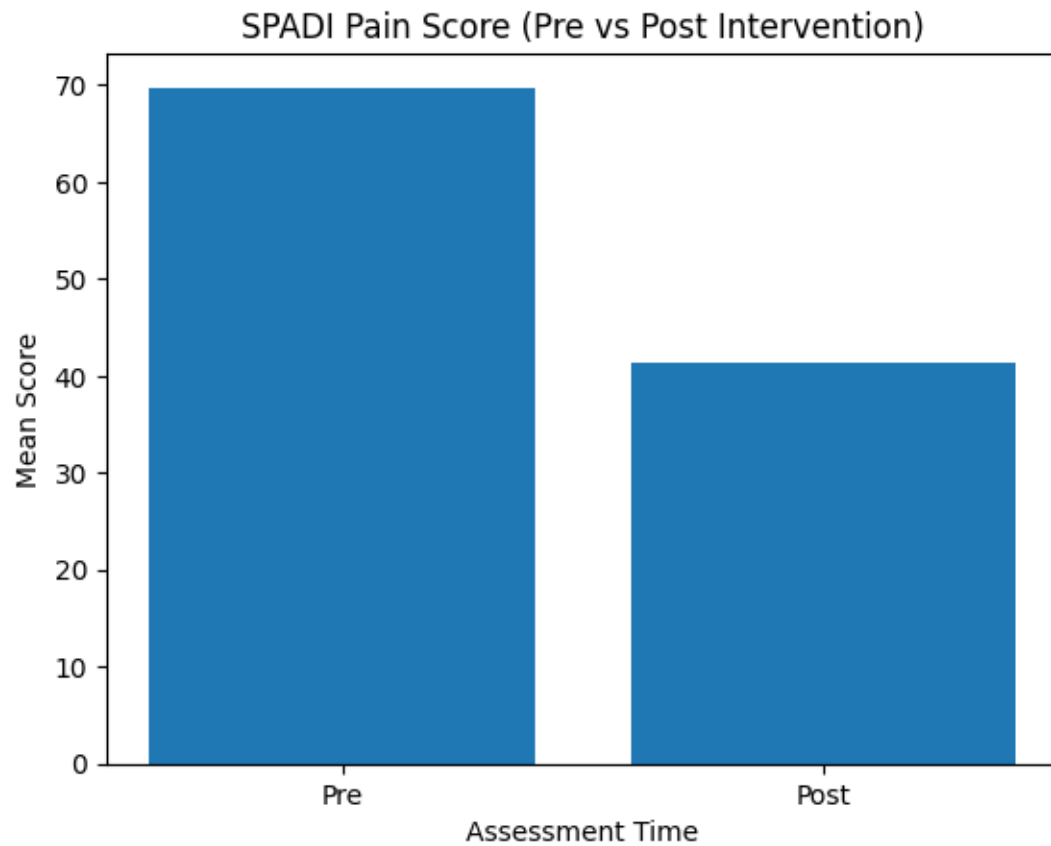


Figure 2: Comparison of SPADI Disability Scores Before and After Gluteal Activation Intervention.

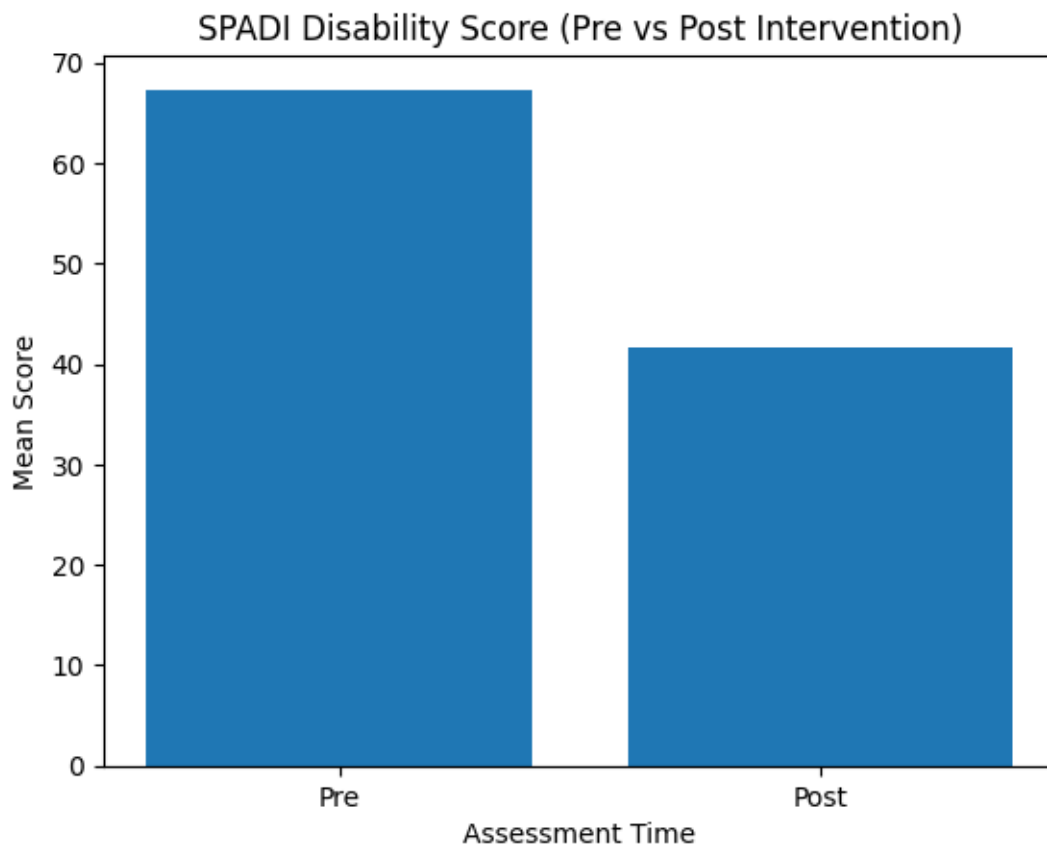
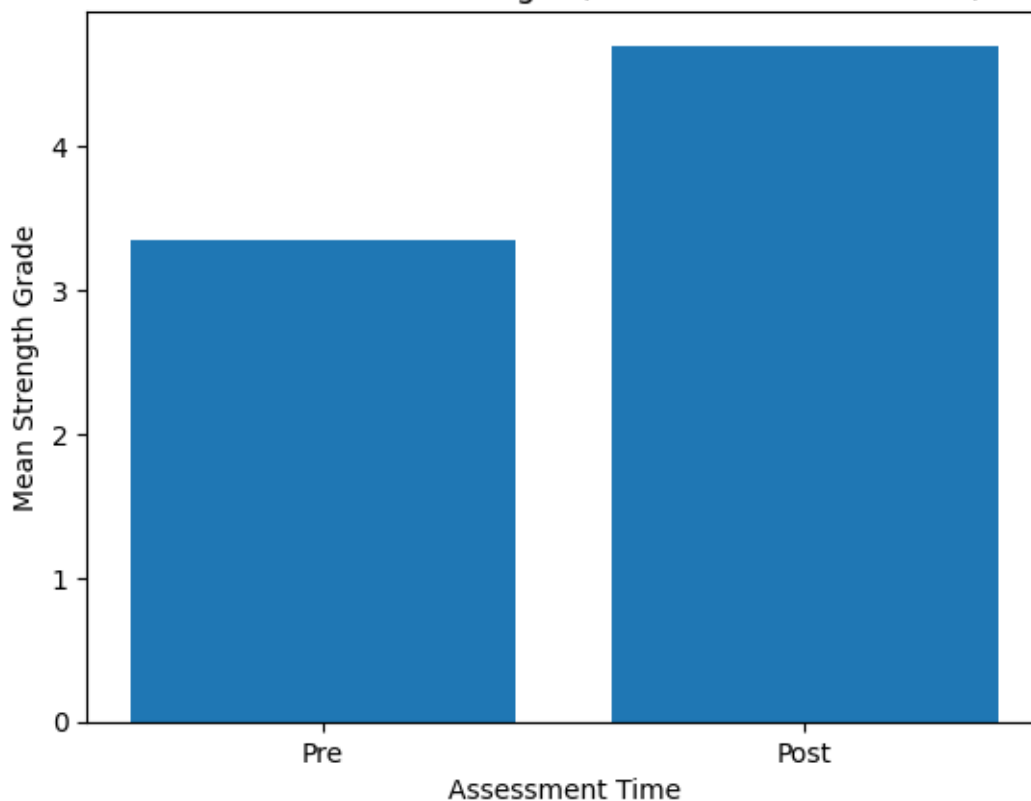


Figure 3: Improvement in Gluteus Maximus Muscle Strength Following the Gluteal Activation Program.

Gluteus Maximus Strength (Pre vs Post Intervention)



The graphical representations illustrate the changes observed in the outcome measures following the gluteal activation intervention. The first graph shows a noticeable reduction in SPADI pain scores from the pre-intervention assessment to the post-intervention assessment, indicating a significant decrease in shoulder pain among the overhead athletes after correcting gluteal amnesia. Similarly, the second graph demonstrates a substantial decline in SPADI disability scores, suggesting improved shoulder function and reduced difficulty in performing daily and sport-specific activities. The third graph presents a clear increase in gluteus maximus muscle strength following the intervention, reflecting improved activation and strengthening of the gluteal musculature. Collectively, these graphs visually support the statistical findings of the study, indicating that gluteal activation exercises contributed to reduced shoulder pain, improved functional ability, and enhanced gluteal muscle strength among the participants.

DISCUSSION

The present study was conducted to evaluate the effectiveness of correcting

gluteal amnesia in reducing shoulder pain and improving rotator cuff function among overhead athletes. The results of the study demonstrated significant improvement in shoulder pain, functional ability, and gluteus maximus muscle strength following the gluteal activation exercise program. These findings highlight the important relationship between proximal muscle activation and shoulder function in athletes performing repetitive overhead activities.

Overhead sports require coordinated movement of multiple body segments to generate force and maintain stability during dynamic activities such as throwing, serving, and smashing. The shoulder joint functions as the terminal segment of the kinetic chain and relies on efficient transfer of energy from the lower extremities and trunk. When the proximal segments of the body fail to contribute effectively to force generation, the distal segments, particularly the shoulder complex, may compensate by producing excessive force. This increased mechanical demand can lead to rotator cuff fatigue, pain, and functional impairment.

One of the major findings of the study was the significant reduction in SPADI pain

scores following the intervention. Shoulder pain is a common complaint among overhead athletes due to repetitive loading of the rotator cuff tendons. In the present study, the reduction in SPADI pain scores indicates that the gluteal activation exercise program contributed to improved shoulder mechanics and reduced mechanical stress on the shoulder joint. The improvement in pain levels may be attributed to enhanced stability of the pelvis and trunk, which allows more efficient transmission of forces through the kinetic chain.

The study also demonstrated a significant reduction in SPADI disability scores following the intervention. The SPADI disability component reflects the ability of individuals to perform functional tasks involving the shoulder joint. Improvement in disability scores indicates enhanced functional performance and greater ease in performing daily and sports-related activities. The improvement observed in this study suggests that gluteal activation exercises may indirectly influence shoulder function by improving proximal stability and movement coordination.

Another important finding of the study was the significant improvement in gluteus maximus muscle strength after the intervention period. The gluteus maximus plays a critical role in hip extension, pelvic stabilization, and force generation during athletic movements. Weakness or delayed activation of this muscle may disrupt the kinetic chain and lead to compensatory movement patterns. By improving gluteal muscle strength and activation, the exercise program likely enhanced pelvic stability and improved the efficiency of force transfer from the lower extremities to the upper limb.

The concept of the kinetic chain supports the findings of the present study. According to this concept, efficient movement requires coordinated activation of the lower extremities, trunk, and upper limb segments. When the gluteal muscles function properly, they help maintain pelvic alignment and contribute to the generation of powerful movements. Improved proximal stability may reduce excessive loading on the shoulder joint,

thereby decreasing the risk of rotator cuff injury and improving overall shoulder function.

The findings of this study are consistent with previous research highlighting the importance of proximal muscle activation in upper limb function. Several studies have reported that deficits in hip strength and trunk stability may alter shoulder biomechanics and increase the risk of injury in overhead athletes. Rehabilitation programs that incorporate exercises targeting the hip and core muscles may therefore provide greater benefits compared with interventions focusing solely on the shoulder complex.

From a clinical perspective, the results of the present study suggest that physiotherapists and sports rehabilitation specialists should consider evaluating gluteal muscle activation when treating overhead athletes with shoulder pain. Addressing gluteal inhibition through targeted activation exercises may enhance rehabilitation outcomes and contribute to improved functional performance. Integrating gluteal activation training into shoulder rehabilitation programs may therefore provide a more comprehensive and effective treatment approach.

Overall, the findings of this study indicate that correcting gluteal amnesia can play a significant role in improving shoulder function in overhead athletes. By restoring proper neuromuscular activation of the gluteal muscles, it may be possible to improve the efficiency of the kinetic chain and reduce mechanical stress on the shoulder complex.

CONCLUSION

The present study evaluated the effect of correcting gluteal amnesia on shoulder pain and rotator cuff function among overhead athletes. The findings demonstrated significant improvement in shoulder pain, functional ability, and gluteus maximus muscle strength following the gluteal activation exercise program.

The reduction in SPADI pain and disability scores indicates that gluteal

activation exercises contributed to improved shoulder function and reduced discomfort during daily and sports-related activities. In addition, the increase in gluteus maximus muscle strength suggests improved neuromuscular activation and enhanced proximal stability.

These results emphasize the importance of considering the entire kinetic chain when designing rehabilitation programs for overhead athletes. Correcting gluteal amnesia may enhance the efficiency of force transfer from the lower extremities to the upper limb, thereby reducing mechanical stress on the shoulder joint.

Therefore, incorporating gluteal activation exercises into rehabilitation programs may be an effective strategy for improving shoulder function and reducing pain among athletes involved in repetitive overhead sports.

LIMITATIONS

The present study had certain limitations that should be considered when interpreting the results. The sample size was relatively small, which may limit the generalizability of the findings to a larger athletic population. The participants were recruited from a specific geographical region and sporting population, which may not represent athletes from different competitive levels or sports disciplines.

The duration of the intervention was limited to eight weeks, and long-term follow-up was not conducted to determine whether the improvements observed in the study were maintained over time. Muscle strength assessment was performed using manual muscle testing, which may be less precise compared with objective measurement tools such as dynamometry or electromyography.

In addition, other factors such as training intensity, athletic experience, and biomechanical differences among various sports were not controlled during the study.

RECOMMENDATIONS

Future studies should include a larger sample size to improve the reliability and generalizability of the findings. Research involving athletes from different sports and competitive levels may provide a broader understanding of the relationship between gluteal activation and shoulder function.

Long-term follow-up studies are recommended to evaluate the sustainability of the improvements observed after the intervention. Future research may also incorporate objective assessment tools such as electromyography, motion analysis systems, and dynamometers to obtain more accurate measurements of muscle activation and strength.

In addition, rehabilitation programs may explore the integration of gluteal activation exercises with core stabilization training and sport-specific functional exercises to further enhance rehabilitation outcomes in overhead athletes.

REFERENCES

1. Kibler WB. The role of the scapula in athletic shoulder function. *Am J Sports Med*.
2. Burkhart SS, Morgan CD, Kibler WB. The disabled throwing shoulder. *Arthroscopy*.
3. Cools AM, Witvrouw EE. Scapular muscle activity in overhead athletes. *J Shoulder Elbow Surg*.
4. Ellenbecker TS, Davies GJ. Rehabilitation of shoulder injuries in athletes. *J Orthop Sports Phys Ther*.
5. Fleisig GS, Andrews JR. Kinetics of baseball pitching. *Am J Sports Med*.
6. Kibler WB, Press J, Sciascia A. The role of core stability in athletic function. *Sports Med*.

7. Sciascia A, Cromwell R. Kinetic chain rehabilitation for the shoulder. *Int J Sports Phys Ther.*
8. Reinold MM, Wilk KE. Current concepts in rotator cuff rehabilitation. *J Orthop Sports Phys Ther.*
9. Putnam CA. Sequential motion in athletic skills. *J Biomech.*
10. Myers JB, Laudner KG. Scapular positioning in throwing athletes. *Am J Sports Med.*
11. Powers CM. Hip musculature influence on lower extremity mechanics. *J Orthop Sports Phys Ther.*
12. McGill SM. Core training evidence and performance. *Strength Cond J.*
13. Distefano LJ. Gluteal muscle activation during rehabilitation exercises. *J Orthop Sports Phys Ther.*
14. Escamilla RF. Shoulder muscle activity in overhead sports. *Sports Med.*
15. Wilk KE, Arrigo CA. Shoulder injuries in overhead athletes. *Clin Sports Med.*
16. Kibler WB, Chandler TJ. Functional rehabilitation of sports injuries. *Sports Med.*
17. Zazulak BT. Core stability and injury risk. *Am J Sports Med.*
18. Sciascia AD. Shoulder rehabilitation and kinetic chain. *Sports Health.*
19. Lewis CL. Musculoskeletal factors influencing shoulder function. *Phys Ther.*
20. Cools AM. Scapular rehabilitation in athletes. *Br J Sports Med.*
21. Oyama S. Lower extremity contribution to throwing mechanics. *Sports Biomech.*
22. Ellenbecker TS. Shoulder rehabilitation principles. *J Athl Train.*
23. Kibler WB. Clinical implications of kinetic chain deficits. *Sports Med Arthrosc Rev.*
24. Thigpen CA. Rehabilitation strategies for overhead athletes. *J Athl Train.*
25. Contreras B. Understanding gluteal muscle activation. *Strength Cond J.*