



EFFECT OF FUNCTIONAL TRAINING ON THROWING PERFORMANCE IN POST ARTHROSCOPIC SHOULDER STABILIZATION IN OVERHEAD SPORTS

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KEYWORDS :

INTRODUCTION

The shoulder joint is considered the most mobile articulation in the human body, permitting an extensive range of motion required for daily functional activities as well as complex athletic performance. This remarkable mobility enables the upper extremity to perform highly coordinated movements necessary for overhead sports such as cricket, volleyball, baseball, tennis, badminton, and handball. However, this mobility is achieved at the expense of intrinsic stability, making the glenohumeral joint highly susceptible to injury, instability, and recurrent dislocation episodes.¹

Although arthroscopic stabilization has demonstrated excellent outcomes in restoring structural stability, return to pre-injury performance levels remains a major challenge, particularly among overhead athletes. Studies have reported that while return-to-play rates following arthroscopic shoulder stabilization range from 62% to 100%, the proportion of athletes returning to their previous level of competitive performance is considerably lower. This discrepancy suggests that anatomical restoration alone is insufficient to ensure complete functional recovery.⁸

Patient-reported outcome measures such as the Upper Extremity Functional Index also provide valuable insight into perceived functional recovery. These measures complement objective performance testing and assist clinicians in making informed return-to-play decisions. Psychological readiness is equally important in successful return to sport. Fear of reinjury, reduced confidence, and movement apprehension can negatively affect athletic performance even after physical recovery has been achieved. Functional rehabilitation, through progressive exposure to sport-specific tasks, may help overcome these psychological barriers and improve return-to-sport confidence.²¹

Throwing performance is a critical determinant of successful return to sport in overhead athletes. Parameters such as throwing distance, power, velocity, accuracy, and endurance.

3. Objectives of the Study

- To find the effectiveness of functional training on throwing performance in post arthroscopic shoulder stabilization in overhead sports.
- To find the effectiveness of conventional training on throwing performance in post arthroscopic shoulder stabilization in overhead sports.
- To compare the effectiveness of functional training versus conventional therapy on throwing performance in post arthroscopic shoulder stabilization in overhead sports. 20

METHODOLOGY

Ethical Clearance: Ethical clearance for the current study was obtained from Review Board on Ethics for Research of Florence college of Physiotherapy, Bangalore.

Source of Data: Florance college of physiotherapy.

Method of Collection of Data

Study Design: Pre-Post Comparative study
Study Type: Experimental study
Target Population: Subjects within age group of 17 - 25 years
Duration of Study: 1 year
Sampling Design: Convenience Sampling
Sample Size: 99

Inclusion Criteria:

- Age between 17 to 25
- Both genders are involved
- Subjects with arthroscopic shoulder stabilization
- Subjects of overhead sports 12

Exclusion Criteria:

- Less than 2 years of follow up
- Prior dislocation
- Posterior instability
- Superior labral tear from anterior to posterior [SLAP]
- Rotator cuff tear 13

Procedure

Subjects were screened based on the inclusion and exclusion criteria. The purpose of the study was explained and written informed consent were obtained from the screened subjects. The subjects were allocated using convenience sampling method into two groups: Group A (Functional Training), Group B (Conventional Training) with 49 subjects in each group.

Intervention

Group A: Functional Training

Procedure for group A includes functional rehabilitation exercises in which week 1 consists of post-surgery is immobilization phase with the help of arm sling. Cryotherapy if necessary for the pain management. Week 2 – 4 was given with Sling is removed only during the exercises. Exercises like passive range of motion for shoulder flexion, extension, adduction, internal rotation, external rotation, and shoulder pendular exercise for- 5 reps 2 sets per day [gradually increase the reps for patient according to the level of pain of the patient].

Group B: Conventional Training

First 4 weeks included arm immobilization with the abduction pillow postoperatively. 4 – 6 weeks consisted of active exercises of the elbow, wrist, hand and cervical spine within the arm sling. Passive ROM exercises gentle oscillations by the therapist. Pendulum exercises can also be performed by leaning the body with the support of a chair actively. Cryotherapy for pain management if necessary.

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis.

Table- 3 Comparison of Seated Medicine Ball Throw Test Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	2.10	.038	3.11	.033	61.18	.001**
Group- B	2.10	.033	2.70	.038	31.18	.001**

Table – 4 Comparisons of Uefi Scale Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	6.35	1.61	73.81	8.52	-63.09	.001**
Group- B	6.21	1.15	58.22	6.66	57.49	.001**

On comparing the Mean Values of Group A & Group B on Seated Medicine Ball Throw Test Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows $3.11 \pm .033$ which has the higher mean value is more effective than (Group B) $2.70 \pm .038$ at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing the Mean Values of Group A & Group B on UEFI Scale Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows 73.81 ± 8.52 which has the higher mean value is more effective than (Group B) 58.22 ± 6.66 at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing Pretest and Post test within Group A & Group B on Seated Medicine Ball Throw Test Score & UEFI Scale Score shows significant difference in the mean values at $P \leq 0.05$.

DISCUSSION

The present study was undertaken to evaluate the effectiveness of functional training on throwing performance in individuals following arthroscopic shoulder stabilization, with particular emphasis on overhead athletes. The results demonstrated that while both rehabilitation approaches contributed to improvement, functional training produced superior outcomes in terms of throwing performance, thereby highlighting its clinical significance. The kinetic chain concept, extensively described by Kibler and Seroyer et al., highlights the sequential transfer of energy from the lower extremities through the trunk to the upper extremity. Disruption at any point in this chain can lead to compensatory mechanisms, increased stress on the shoulder joint, and diminished performance. Escamilla et al. further demonstrated that improper biomechanics during throwing significantly increase joint loading and injury risk. In this context, the superior outcomes observed in the functional training group can be attributed to exercises targeting whole-body coordination, core stability, and dynamic movement patterns, thereby restoring kinetic chain efficiency. Another critical factor influencing shoulder function and throwing performance is scapular mechanics. Scapular dyskinesis has been widely identified as a contributing factor to shoulder dysfunction in overhead athletes. Kibler et al. and Cools et al. highlighted that altered scapular positioning and movement impair the optimal length-tension relationship of the rotator cuff muscles, thereby compromising joint stability.

The inclusion of functional exercises that emphasize scapular stabilization, proprioception, and neuromuscular control likely contributed to improved outcomes in the present study. The findings of the present study, which demonstrated improved throwing performance following functional training, may be explained by enhanced muscle strength, improved joint mobility, and better neuromuscular coordination achieved through multi-planar and task-specific exercises. Functional training, unlike isolated strengthening, engages multiple muscle, Lack of confidence, and anxiety can significantly impact performance, even in the presence of adequate physical recovery. Functional training, which involves progressive exposure to sport-specific tasks, may help address these psychological barriers and enhance overall recovery.

Rehabilitation professionals should consider integrating these evidence-based strategies to optimize recovery and improve return-to-play success. Despite the positive findings, certain limitations should also be considered while interpreting the results. The study population consisted mainly of young overhead athletes within a specific age group, which may limit generalizability to older individuals or non-athletic populations. Additionally, long-term follow-up was not performed to determine recurrence rates or maintenance of functional improvements over time.

CONCLUSION

Based on the findings of the present study, it can be concluded that functional training.... is an effective intervention for improving throwing performance in individuals following arthroscopic shoulder stabilization. Functional training demonstrated superior outcomes compared to conventional rehabilitation by enhancing neuromuscular control, kinetic chain integration, and sport-specific movement patterns.

The incorporation of multi-joint, sports-specific exercises... contributed to improved shoulder stability, strength, and coordination, which are essential for optimal throwing performance. Therefore, functional training should be considered an integral component of post-operative rehabilitation in overhead athletes to facilitate safe and effective return to sport and to minimize the risk of re-injury.

In conclusion, functional training is a valuable and effective approach in the rehabilitation of overhead athletes following arthroscopic shoulder stabilization and plays a crucial role in improving functional outcomes and return-to-sport performance.

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