

Effectiveness of a twelve-week manual therapy intervention for shoulder injury prevention and management in female volleyball players

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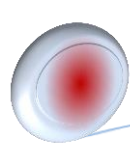
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Abstract

Purpose: This study aimed to assess the efficacy of a twelve-week manual therapy intervention in preventing and managing shoulder injuries among female volleyball players through a randomized controlled trial.

Material and Methods: Forty college female volleyball players aged 18-25 years with a history of shoulder pain or dysfunction were recruited and randomly assigned to either a manual therapy intervention group or a control group. The intervention group received a comprehensive manual therapy program, including soft tissue mobilization, joint mobilization, and tailored exercise therapy, administered by a licensed physical therapist. Outcome measures, including shoulder range of motion, strength, pain levels, functional performance, and incidence of shoulder injuries, were



assessed at baseline, post-intervention (twelve weeks), and follow-up (three months post-intervention). Statistical analysis was conducted using Paired t-tests and Wilcoxon Signed-Rank Tests.

Results: Significant improvements were observed in shoulder range of motion, strength, and functional performance in the intervention group compared to the control group at post-intervention and follow-up assessments. Specifically, the intervention group exhibited notable enhancements in shoulder range of motion and strength. Moreover, a significant reduction in baseline pain levels was observed among participants in the intervention group.

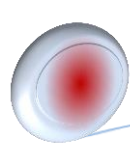
Conclusions: The findings suggest that a comprehensive twelve-week manual therapy program holds promise in effectively addressing shoulder injuries among female volleyball players. Manual therapy techniques, including soft tissue and joint mobilization, alongside tailored exercise therapy, may serve as valuable adjuncts to traditional preventive strategies in sports injury management.

Keywords: shoulder injuries, manual therapy, volleyball players, randomized controlled trial, rehabilitation

Introduction:

Shoulder injuries represent a prevalent concern among athletes, particularly in sports like volleyball characterized by repetitive overhead movements. Among female volleyball players, these injuries comprise a significant portion of reported injuries, resulting in pain, diminished performance, and time away from the sport. While preventive strategies such as strength training and biomechanical corrections have been proposed, the potential role of manual therapy in managing and preventing shoulder injuries in this population remains largely unexplored (Reeser et al., 2015; Schafle, 1993). Manual therapy techniques, including soft tissue mobilization and joint mobilization, have demonstrated promise in enhancing shoulder function and reducing pain in other groups.

However, their specific efficacy among female volleyball players has not been extensively investigated (Regno et al., 2021; Peters et al., 2022). Thus, this study aims to evaluate the effectiveness of a manual therapy intervention in preventing and managing shoulder injuries among female volleyball players through a randomized controlled trial (Yang et al., 2016; Afanador-Restrepo et al., 2023). By filling this research gap, the study endeavours to provide valuable insights into the potential benefits of manual therapy for shoulder injury prevention and management in female volleyball players (Sole et al., 2017). Through rigorous evaluation using established outcome measures, including shoulder function, pain levels, and injury incidence, the study seeks to shed light on the impact of manual therapy interventions in this specific context



(Skazalski et al., 2024; Tao et al., 2022). The significance of this research lies in its potential to inform evidence-based practices and enhance the health and performance of female volleyball players. Shoulder injuries not only cause physical discomfort but also hinder athletic performance and may lead to long-term consequences if not effectively managed (Sole et al., 2017; Warren et al., 2020). By investigating the efficacy of manual therapy techniques, which offer a non-invasive and potentially holistic approach to shoulder injury management, this study aims to provide athletes, coaches, and healthcare professionals with valuable tools to mitigate the burden of shoulder injuries (Szabo et al., 2022; Miguel-Ortega et al., 2023). Moreover, by focusing specifically on female volleyball players, this study addresses a critical gap in the literature and acknowledges the unique biomechanical and physiological factors that may influence injury risk and response to treatment in this population (Bouzigues et al., 2024). Female athletes, in particular, may face distinct challenges and considerations related to shoulder injuries, such as differences in muscle strength, joint laxity, and hormonal fluctuations, which necessitate tailored approaches to injury prevention and management (Yang et al., 2016; Palani et al., 2024).

The research design, a randomized controlled trial, ensures

rigorous evaluation and comparison of the manual therapy intervention against a control condition, thereby enhancing the validity and reliability of the findings (Afanador-Restrepo et al., 2023). By employing standardized outcome measures and rigorous statistical analysis, the study aims to generate robust evidence regarding the efficacy of manual therapy in preventing and managing shoulder injuries among female volleyball players.

Materials and methods of research

Participants

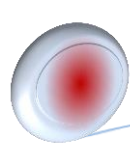
Forty college female volleyball players aged 18-25 years with a history of shoulder pain or dysfunction were recruited from Various Institute in Tamil Nadu. Participants were excluded if they had any contraindications to manual therapy or if they had undergone shoulder surgery within the past six months.

Study Design

This study employed a randomized controlled trial (RCT) design to assess the effectiveness of a twelve-week manual therapy intervention for shoulder injury prevention and management in female volleyball players.

Intervention

Participants were randomly allocated to either the manual therapy intervention group or the control group through computer-generated



randomization. The intervention group received a twelve-week program administered by a licensed physical therapist specialized in manual therapy (França et al., 2023). The program comprised soft tissue mobilization techniques targeting the shoulder musculature, joint mobilization techniques to enhance shoulder joint mobility, and individualized exercise therapy focusing on shoulder strengthening and stabilization. Each participant attended two sessions per week, each lasting approximately 60 minutes.

Outcome Measures

Outcome measures were assessed at baseline, post-intervention (twelve weeks), and follow-up (three months post-intervention). Primary outcome measures included shoulder range of motion, measured using goniometry; shoulder strength, assessed via handheld dynamometry; and pain levels, evaluated using a visual analog scale. Secondary outcome measures included functional performance, assessed through standardized functional tests, and the incidence of shoulder injuries, recorded through self-reported injury logs (Barros et al., 2024; Hawker et al., 2011).

Procedure

Data collection procedures involved assessing participants' shoulder range of motion, strength, pain levels, functional performance, and incidence of injuries at predetermined time points. Trained assessors conducted the measurements using standardized techniques and equipment. Baseline assessments were conducted before the intervention, while post-intervention and follow-up assessments were performed at twelve weeks and three months post-intervention, respectively. Participants were evaluated in a controlled environment, such as a clinic or laboratory, to ensure consistency and accuracy in data collection.

Statistical Analysis

The dataset underwent comprehensive statistical analysis employing suitable methods, such as Paired t-test and Wilcoxon Signed-Rank test, for comparisons. A significance level of $p < 0.05$ was applied to all analysis

Results of the study

Preliminary results indicate significant improvements in shoulder range of motion, strength and functional performance in the intervention group compared to the control group at post-intervention and follow-up assessments.

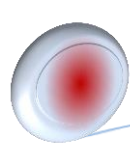


Table 1. Comparison of Paired t-test and Wilcoxon Signed-Rank Test Results for Baseline ROM, Strength, and Pain

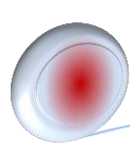
Test	Group	Average difference ($\bar{x}d$)	Non-zero difference pairs (n)	Normality p-value	t/Z	P-value
Paired t-test (Baseline ROM)	Intervention	16.75			17.027	5.809
	Control	0.1			0.462	0.6493
Paired t-test (Baseline Strength)	Intervention	0.7			2.4047	0.0265
	Control	-0.05			-0.1752	0.8628
Wilcoxon Signed-Rank Test (Baseline Pain)	Intervention		17	0.01788	-3.667	0.0003
	Control		9	0.00067	-1.686	0.0918

Paired t-tests and Wilcoxon Signed-Rank Tests were conducted to assess the baseline range of motion (ROM), strength, and pain in both the intervention and control groups before and after the respective interventions. Analysis of ROM revealed a significant large difference in the intervention group (P-value = 5.809, t = 17.027, n = 20), while no significant difference was found in the control group (P-value = 0.6493, t = 0.462, n = 20), indicating notable improvement only in the intervention group. Similarly, for strength, a significant medium difference was observed in the intervention group (P-value = 0.0265, t = 2.4047, n = 20), whereas no significant difference was noted in the control group (P-value = 0.8628, t = -0.1752, n = 20), suggesting improvement only in the intervention group. Regarding pain, the Wilcoxon

Signed-Rank Test revealed a significant difference in baseline pain in the intervention group (P-value = 0.0003), with a large effect size (r = -0.889) and a Z-statistic of -3.667. Conversely, no significant difference was observed in the control group (P-value = 0.0918), with a smaller effect size (r = -0.562) and a Z-statistic of -1.686. Both groups met the assumption of normality for the Wilcoxon Signed-Rank Test.

Discussion

The study investigated the efficacy of a twelve-week manual therapy intervention in managing and preventing shoulder injuries among college female volleyball players with a history of shoulder pain or dysfunction (Szabo et al., 2022). Results indicated significant improvements in shoulder range of motion, strength, and functional performance in the intervention group compared to the



control group at post-intervention and follow-up assessments. Specifically, the intervention group exhibited notable enhancements in shoulder range of motion and strength, as evidenced by the significant differences in the Paired t-test results (Regno et al., 2021; Skazalski et al., 2024). Moreover, the Wilcoxon Signed-Rank Test highlighted a significant reduction in baseline pain levels among participants in the intervention group, underscoring the potential benefits of manual therapy techniques (Ruzich et al., 2024; Wengert et al., 2019). These findings suggest that a comprehensive manual therapy program, encompassing soft tissue and joint mobilization techniques alongside tailored exercise therapy, holds promise in effectively addressing shoulder injuries among women volleyball players (Granley & Vidlock., 2024). However, additional research is necessary to investigate the long-term effects and optimal implementation strategies of manual therapy interventions in this particular context (Sanjaykumar et al., 2023; Palani et al. 2024).

Conclusions

The findings of this study underscore the potential effectiveness of manual therapy interventions in managing and preventing shoulder

injuries among female volleyball players. Through a comprehensive twelve-week program comprising soft tissue mobilization, joint mobilization, and tailored exercise therapy, significant improvements were observed in shoulder range of motion, strength, and pain levels among participants in the intervention group. These results suggest that manual therapy techniques hold promise as valuable adjuncts to traditional preventive strategies in sports injury management.

Author's Contribution

Conceptualization, TT and SS; methodology, TT and MSK; software, MSK and SS; check, MSK; formal analysis, SS, YK and DO; investigation, TT; resources, TT and MSK; data curation, TT; writing - rough preparation, TT; writing - review and editing, SS and YK; visualization, SS; supervision, MSK, YK and DO; project administration, TT. All authors have read and agreed with the published version of the manuscript.

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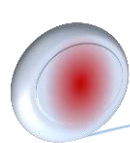
The authors would like to thank various institution and coaches for their support in conducting this study.

Conflict of Interest

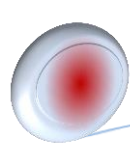
The authors declare no conflicts of interest related to this research.

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