INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

COMPARING THE EFFICACY OF KINESIOLOGY TAPING VERSUS DRY NEEDLING WITH CONVENTIONAL TREATMENT FOR IMPROVING QUALITY OF LIFE AND ALLEVIATING PAIN IN FROZEN SHOULDER PATIENTS

Original Research

Aliza Iqbal[1]*, Gulnaz Yamin[2], Ayesha Babar[3], Iqra Bibi[4]
[1]Physical Therapist, Physio Threads Clinic, Lahore, Pakistan.
[2]Assistant Professor, Superior University, Lahore, Pakistan.
[3]Physical Therapist, Sadan Hospital, Lahore, Pakistan.
[4]Physical Therapist, First Physio Clinic, Chuniya, Pakistan.
Corresponding Author: Aliza Iqbal, Physical Therapist, Physio Threads Clinic Lahore, Pakistan.alizaiqbal112@gmail.com
Acknowledgement: The authors gratefully acknowledge the support of Pain Away Physiotherapy Clinic during data collection.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Adhesive capsulitis (AC), commonly known as frozen shoulder, is a prevalent musculoskeletal disorder marked by pain and restricted range of motion (ROM) in the shoulder joint. It significantly impacts patients' daily activities and quality of life. Conventional physiotherapy remains the mainstay of treatment, but adjunct techniques such as Dry Needling (DN) and Kinesio Taping (KT) are increasingly used to enhance therapeutic outcomes. A multimodal approach incorporating DN and KT may yield superior results in managing shoulder pain and dysfunction.

Objective: To compare the effects of Kinesio Taping and Dry Needling, when used alongside conventional physiotherapy, on improving pain and functional outcomes in patients with adhesive capsulitis.

Methods: A randomized controlled trial was conducted with 30 participants initially enrolled; 6 dropped out, leaving 24 participants who completed the study. Participants were allocated into two groups: Group 1 received Dry Needling with conventional physiotherapy, while Group 2 received Kinesio Taping with conventional physiotherapy. The study was conducted at Pain Away Physiotherapy Clinic over 6 months. Data collection tools included the Visual Analogue Scale (VAS) for pain intensity and the Shoulder Pain and Disability Index (SPADI) for functional assessment. Paired sample and independent sample t-tests were used for within- and between-group comparisons using SPSS version 26.

Results: The mean age was 44.83 ± 7.197 years, with 17 females (70.8%) and 7 males (29.2%). In Group 1, the VAS score difference was -2.000 ± 1.128 (p = .000), while in Group 2 it was -3.000 ± 1.595 (p = .000). SPADI scores improved significantly in both groups: Group 1 showed a difference of -4.250 ± 5.479 (p = .021) and Group 2 -8.833 ± 5.096 (p = .000). Between-group comparisons also showed statistically significant results in favor of Dry Needling.

Conclusion: Dry Needling was found to be more effective than Kinesio Taping in reducing pain and improving functional capacity in patients with frozen shoulder. A combined approach with conventional physiotherapy enhances therapeutic outcomes, although optimal treatment parameters require further exploration.

Key Words: Adhesive Capsulitis, Dry Needling, Kinesio Taping, Pain Management, Physical Therapy Modalities, Range of Motion, Shoulder Joint.

Comparative Effects of Dry Needling and Kinesio Taping in Frozen Shoulder Patients

BACKGROUND

Adhesive capsulitis is characterized by shoulder pain and limited range of motion.

METHODS

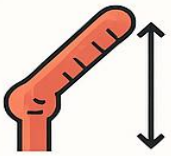
Randomized controlled triai, N = 24

Dry needling

Kinesio taping

RESULTS

Both interventions significantly improved pain ($P < 0.001$) and function ($P = 0.02$)



RESULTS

Both interventions significantly imp roved pain ($P < 0.001$) and function ($P = 0.02$)

CONCLUSION

Dry needling was more effective in reducing shoulder pain and

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

INTRODUCTION

Shoulder pain is one of the most frequently encountered complaints in primary care, with nearly half of the general population seeking medical attention for shoulder-related discomfort at some point in their lives. This widespread prevalence positions shoulder disorders as the third most common musculoskeletal condition observed in primary healthcare settings (1). Among the various causes, extracapsular soft tissue lesions, particularly those associated with rotator cuff dysfunction, frozen shoulder, and subacromial impingement syndrome, represent a significant burden across both active and sedentary populations (2). Adhesive capsulitis, commonly referred to as frozen shoulder, is a notable musculoskeletal disorder that leads to progressive pain, stiffness, and restricted mobility in the glenohumeral joint. It profoundly impairs upper limb function and daily activities. The onset is often insidious, marked initially by pain, followed by a noticeable reduction in range of motion (ROM). Clinically, the condition is categorized into three overlapping phases—pain, stiffness, and recovery—that can span several months to years, affecting patients' quality of life significantly (3). With a prevalence estimated between 1% to 2% of the general population, the condition remains a relevant concern in orthopedic and rehabilitation medicine (4). In recent years, minimally invasive therapeutic techniques such as dry needling have gained traction for addressing musculoskeletal pain syndromes, including frozen shoulder. Dry needling involves the insertion of a fine needle into trigger points within muscle tissue, leading to local twitch responses and neurophysiological modulation. This technique is believed to stimulate A-delta fibers and activate endogenous pain-inhibitory mechanisms, resulting in opioid-mediated analgesia and improved microcirculation at the affected site (4,5). Furthermore, improvements in muscle activation patterns, ROM, and reduction of referred pain have also been reported, supporting its use in musculoskeletal rehabilitation (5).

Kinesio taping has emerged as another non-pharmacological strategy aimed at providing structural support to joints and muscles while preserving mobility. The elastic nature of the tape mimics the mechanical properties of human skin, allowing dynamic stabilization without restricting joint movement (6,7). By lifting the skin slightly, it is hypothesized that kinesio taping enhances lymphatic and vascular flow, alleviates pressure on subcutaneous structures, and stimulates cutaneous mechanoreceptors to augment proprioceptive input and neuromuscular control (8-10). These mechanisms are thought to not only reduce inflammation and edema but also to contribute to pain reduction and improved functional performance. Conventional conservative management for frozen shoulder typically includes pharmacotherapy, corticosteroid injections, and various physical therapy modalities such as electrotherapy, joint mobilization, and exercise programs. In this context, both dry needling and kinesio taping have been proposed as adjunctive or alternative strategies that may offer more rapid recovery and cost-effective outcomes (11,12). Despite their increasing clinical application, there remains a degree of uncertainty regarding the comparative effectiveness of these interventions in improving shoulder function and reducing pain, especially in adhesive capsulitis (13,14). Given the debilitating nature of frozen shoulder and the evolving landscape of physiotherapeutic interventions, this study aims to evaluate and compare the therapeutic outcomes of dry needling and kinesio taping in patients with adhesive capsulitis, focusing on improvements in pain relief, range of motion, and functional ability.

METHODS

This study was designed as a randomized controlled trial and was duly registered in the National Trial Registry under the registration number NCT06377644. The research was conducted over a span of eight weeks at Pain Away Physiotherapy Clinic. Prior to participation, all individuals provided written informed consent in compliance with ethical standards. The study adhered to established ethical guidelines following ethical approval from institutional review board. A total of 30 participants initially met the eligibility criteria, but six individuals withdrew during the course of the trial, resulting in a final sample of 24 participants who completed the intervention. Participants were recruited using a prospective experimental design and selected consecutively based on predefined inclusion and exclusion criteria. Eligible participants included both male and female individuals aged 35 to 65 years, presenting with a diagnosis of unilateral adhesive capsulitis persisting for at least two months. Key clinical features included pain in the shoulder, functional limitations in daily activities, and the presence of active myofascial trigger points in at least one of the periarticular shoulder muscles—namely the supraspinatus, deltoid, infraspinatus, teres minor, or subscapularis. Additionally, a measurable limitation in internal rotation, external rotation, and abduction range of motion was required for inclusion.

Participants were excluded if they presented with myopathies, C5-C6 neuropathies, cognitive impairments, or joint disorders involving the cervical spine, rotator cuff tendons, or the glenohumeral joint. Prior surgical interventions involving the upper limbs or cervical spine also led to exclusion, as did any recent exposure to conservative or invasive physical therapy, infiltrative treatments, or use of medications such as anticoagulants, antiaggregants, analgesics, or anti-inflammatory drugs. After meeting the eligibility criteria,

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

participants were randomly allocated into two groups: an experimental group and a control group. The tools used for outcome assessment included the Visual Analogue Scale (VAS) for measuring pain intensity and the Shoulder Pain and Disability Index (SPADI) for evaluating shoulder-related functional impairment and disability (15,16). Baseline and post-intervention data were collected for both groups. All collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics such as mean and standard deviation were computed to summarize participant characteristics and outcome measures. Inferential analysis was performed using the paired sample t-test to determine the statistical significance of changes within groups, and odds ratios were calculated with 95% confidence intervals to interpret associations between variables. A p-value threshold was applied to determine statistical significance.

RESULTS

A total of 30 participants were initially recruited for the study. However, 6 participants dropped out due to various reasons, leaving a final sample size of 24 individuals. The mean age of the participants was 44.83 ± 7.197 years, with a minimum and maximum age range of 30 to 59 years. Gender distribution revealed that out of the 24 participants, 17 (70.8%) were female and 7 (29.2%) were male. Body Mass Index (BMI) classification showed that 4 participants (16.7%) were underweight (17–18.5 kg/m²), 5 (20.8%) had normal BMI (18.5–24.9 kg/m²), 11 (45.8%) were overweight (≥25 kg/m²), and 4 (16.7%) were obese (≥30 kg/m²). The Shapiro-Wilk test indicated that the data were normally distributed, justifying the use of parametric tests including independent and paired sample t-tests. Within-group analysis showed significant reductions in pain and disability scores. In Group 1 (Dry Needling), the mean difference in Visual Analogue Scale (VAS) scores before and after intervention was 4.083 ± 1.505, with a 95% confidence interval (CI) ranging from 3.127 to 5.040 and a statistically significant p-value of .000. In Group 2 (Kinesio Taping), the mean VAS score difference was 1.583 ± 3.118, with a 95% CI of -0.398 to 3.564 and a p-value of .106, indicating no statistically significant change.

For SPADI scores, Group 1 (Kinesio Taping) showed a mean difference of 4.250 ± 5.479 (95% CI: 0.769 to 7.731, p = .021), while Group 2 (Dry Needling) demonstrated a higher mean difference of 8.833 ± 5.096 (95% CI: 5.595 to 12.071, p = .000), confirming significant post-treatment improvements in both groups, with greater improvement observed in Group 2. Between-group comparisons using independent sample t-tests revealed no statistically significant difference in VAS scores at pre-assessment, with the Pre-Needling group showing a mean ± SD of 6.209 ± 0.255 and the Pre-Taping group 7.103 ± 0.446 (mean difference = 0.106, p = .447). Post-assessment VAS scores, however, indicated a statistically significant difference between groups. The Post-Needling group reported a mean ± SD of 3.767 ± 0.372, while the Post-Taping group had 4.357 ± 0.602, with a mean difference of 0.589 and a p-value of .004. Similarly, SPADI pain scores at pre-assessment showed a mean ± SD of 3.209 ± 0.255 for the Pre-Needling group and 3.103 ± 0.446 for the Pre-Taping group (mean difference = 0.432, p = .047), which was marginally significant. Post-assessment SPADI scores showed statistically significant between-group differences, with the Post-Needling group scoring 1.767 ± 0.372 and the Post-Taping group 2.357 ± 0.602 (mean difference = 0.325, p = .006).

Table 1: Descriptive Statics of Age of Patients:

AGE	N	Minimum	Maximum	Mean	Std. Deviation
Age of patients	24	30	59	44.83	7.197

Table 2: Descriptive Statistics of Gender of Participants

GENDER	Frequency	Percentage
Female	17	70.8%
Male	7	29.2%
Total	24	100.0%

Table 3: Descriptive Statics of BMI OF Participants

BMI	Frequency	Percentage
Underweight (17 – 18.5 kg/m²)	4	16.7%
Normal (18.5 – 24.9 kg/m²)	5	20.8%
Overweight (25 kg/m² or higher)	11	45.8%

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

BMI	Frequency	Percentage
Obese (30 kg/m² or higher)	4	16.7%
Total	24	100.0%

Table 4: Paired Sample Test Between Groups

Groups	VAS & SPADI	Mean	Std. Deviation	95% Confidence Interval of the Difference		P-Value
				Lower		Upper
GROUP 1	VAS (Pre-needling) – VAS (Post-needling)	4.083	1.505	3.127		5.040
GROUP 2	VAS (Pre-taping) – VAS (Post-taping)	1.583	3.118	-0.398		3.564
GROUP 1	SPADI (Pre-taping) – SPADI (Post-taping)	4.250	5.479	0.769		7.731
GROUP 2	SPADI (Pre-needling) – SPADI (Post-needling)	8.833	5.096	5.595		12.071

Table 5: Comparison between groups using the Paired Samples T-Test

GROUPS	Treatment Group	N	Mean	Std. Deviation	Mean Difference	P value
VAS for Pain - Pre-assessment	Pre-Needling	12	6.209	0.255	0.106	0.447
	Pre-Taping	12	7.103	0.446		
VAS for Pain - Post-assessment	Post-Needling	12	3.767	0.372	0.589	0.004
	Post-Taping	12	4.357	0.602		

Table 6: Between-group Comparison of SPADI at pre and post-assessment using Independent Sample T-test

SPADI for Pain – Pre-assessment					
Treatment Group	**N**	**Mean**	**Std. Deviation**	**Mean Difference**	**P value**
Pre-Needling	12	3.209	0.255	0.432	0.047
Pre-Taping	12	3.103	0.446		
SPADI for Pain – Post-assessment					
Treatment Group	N	Mean	Std. Deviation	Mean Difference	P value
Post-Needling	12	1.767	0.372	0.325	0.006
Post-Taping	12	2.357	0.602		

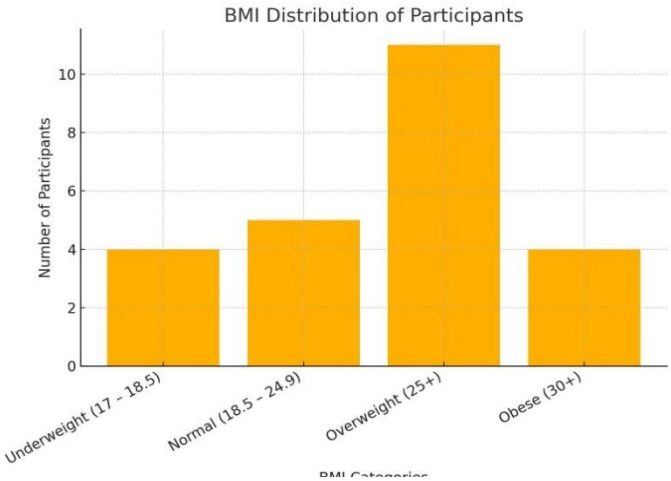


Figure 1 BMI Distribution of Participants

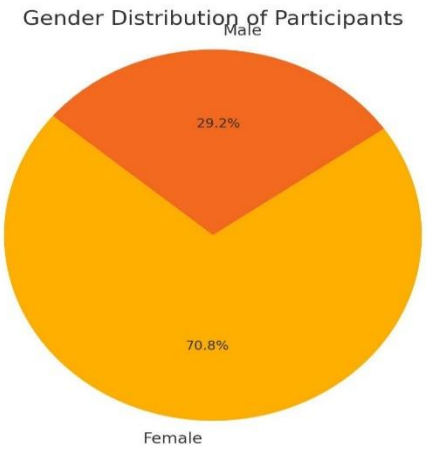


Figure 2 Gender Distribution of Participants

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

DISCUSSION

The present study demonstrated significant improvements in pain intensity in both intervention groups, with dry needling and kinesio taping showing a notable reduction in Visual Analogue Scale (VAS) and SPADI scores. These findings support the efficacy of both techniques in managing adhesive capsulitis-related symptoms. Compared to earlier clinical trials, which reported modest or non-clinically significant changes in pain intensity immediately and one week post-treatment (less than 33% threshold as defined by prior clinical benchmarks), the current study's results presented a statistically and clinically meaningful difference with p-values of .000 in both groups. These outcomes reinforce the therapeutic relevance of both dry needling and kinesio taping when applied over a sustained intervention period of six weeks. Prior literature evaluating trigger point dry needling (TrP-DN) in regions such as the infraspinatus muscle reported no significant differences in grip strength or immediate pain relief, likely due to methodological limitations or short follow-up periods (17-19). Contrastingly, this study conducted over six months demonstrated substantial within- and between-group improvements, thereby contributing a valuable long-term perspective to the existing body of research. While some trials have compared TrP-DN and manual therapy (MT) and reported similar short-term outcomes, the absence of a control group in such trials limited the interpretation of causal effects (20). This study, with its controlled and comparative design, helped clarify the superior effectiveness of dry needling and kinesio taping over time. Evidence from other trials suggested that manual physical therapy combined with exercise may yield superior outcomes in patients with mechanical neck pain, although the effectiveness of TrP-DN and TrP-MT remained uncertain due to a lack of high-quality studies (21). However, the present findings challenge that gap, showing that both dry needling and kinesio taping produced significant post-intervention improvements, particularly in SPADI scores. These results also offer preliminary support for the inclusion of these modalities in multimodal treatment plans.

Earlier investigations assessing kinesio taping in adhesive capsulitis showed a trend of pain reduction over three to six weeks, with one group consistently outperforming the other in pain relief. A similar pattern was observed in the present study, where both groups experienced statistically significant improvements, but Group 2 (kinesio taping) demonstrated a more pronounced reduction in SPADI scores. This supports the hypothesis that kinesio taping, when used in conjunction with other interventions, can enhance musculoskeletal rehabilitation outcomes. Another previous study evaluated the effectiveness of dry needling electrical stimulation (DNES) and reported clinically notable improvements, although not statistically significant compared to standard care (22). However, the present findings contrast those results, showing both statistical and clinical significance with no reported adverse events, reinforcing the safety and efficacy of both dry needling and kinesio taping in clinical physiotherapy practice. Additional evidence from patients with subacromial space disorders highlighted dry needling as effective in reducing pain in cases of rotator cuff tendinopathy, bursitis, and adhesive capsulitis. The present study not only aligns with those findings but also extends them by comparing the intervention to kinesio taping, thereby offering a broader comparative insight. Unlike studies where mobilization showed better outcomes than dry needling, the current trial found dry needling to be equally effective, if not superior, in reducing pain scores and improving function in adhesive capsulitis patients.

Despite these strengths, several limitations need to be acknowledged. The study was conducted at a single center in Lahore, which may limit the generalizability of results to broader populations. Additionally, the classification of participants by the stage or etiology of frozen shoulder was not performed, which might have influenced treatment responsiveness. Furthermore, grip strength, range of motion, and long-term follow-up data were not evaluated, which could have added valuable insight into functional recovery. These elements should be considered in future research to provide a more comprehensive analysis of treatment efficacy. Nonetheless, this study adds valuable evidence supporting the effectiveness of dry needling and kinesio taping in treating adhesive capsulitis. The statistically significant outcomes, rigorous methodology, and comparative design provide a strong foundation for integrating these interventions into clinical practice. Further multi-center trials with larger sample sizes, inclusion of various disease stages, and long-term functional assessments are warranted to validate and expand upon these findings.

CONCLUSION

This study concludes that dry needling proves to be a more effective intervention in reducing pain and enhancing functional activities in patients with frozen shoulder when compared to kinesiology taping. While both treatments offer therapeutic benefits, particularly in

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

pain management and mobility enhancement, dry needling demonstrated a stronger impact in the short-term recovery phase. The integration of either approach with conventional physiotherapy can offer a well-rounded strategy for shoulder rehabilitation. However, determining the optimal application parameters for both dry needling and kinesiology taping remains an area for further exploration, emphasizing the need for continued research to refine treatment protocols for maximum clinical efficacy.

AUTHOR CONTRIBUTION

Author	Contribution
Aliza Iqbal*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Gulnaz Yamin	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Ayesha Babar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Iqra Bibi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

REFERENCES

1. Tortora S, Messina C, Albano D, Serpi F, Corazza A, Carrafiello G, et al. Ultrasound-guided musculoskeletal interventional procedures around the elbow, hand and wrist excluding carpal tunnel procedures. J Ultrason. 2021;21(85):e169-e76.
2. Shen W, Xie NH, Cong XY, Zheng YJ. Study on the Effectiveness of Ultrasound-guided Pulsed Radiofrequency Therapy for Shoulder Pain Caused by Trigger Points. Clin J Pain. 2025;41(2).
3. Kalia V, Mani S, Kumar SP. Short-term effect of myofascial trigger point dry-needling in patients with Adhesive Capsulitis. J Bodyw Mov Ther. 2021;25:146-50.
4. Wang L, Yu G, Zhang R, Wu G, He L, Chen Y. Positive effects of neuromuscular exercises on pain and active range of motion in idiopathic frozen shoulder: a randomized controlled trial. BMC Musculoskelet Disord. 2023;24(1):50.
5. Navarro-Ledesma S, Hamed-Hamed D, Pruimboom L. A new perspective of frozen shoulder pathology; the interplay between the brain and the immune system. Front Physiol. 2024;15:1248612.
6. Shanmugam S, Mathias L, Manickaraj N, Kumar KUD, Kandakurti PK, Dorairaj SK, et al. Intramuscular Electrical Stimulation Combined with Therapeutic Exercises in Patients with Shoulder Adhesive Capsulitis: A Randomised Controlled Trial. Int J Surg Protoc. 2021;25(1):71-83.
7. Nakandala P, Nanayakkara I, Wadugodapitiya S, Gawarammana I. The efficacy of physiotherapy interventions in the treatment of adhesive capsulitis: A systematic review. J Back Musculoskelet Rehabil. 2021;34(2):195-205.
8. Satpute K, Reid S, Mitchell T, Mackay G, Hall T. Efficacy of mobilization with movement (MWM) for shoulder conditions: a systematic review and meta-analysis. J Man Manip Ther. 2022;30(1):13-32.
9. Poku D, Hassan R, Migliorini F, Maffulli N. Efficacy of hydrodilatation in frozen shoulder: a systematic review and meta-analysis. Br Med Bull. 2023;147(1):121-47.
10. Ferlito R, Testa G, McCracken KL, Moscato S, Zerbito GM, Panvini FMC, et al. Effectiveness of Therapeutical Interventions on the Scapulothoracic Complex in the Management of Patients with Subacromial Impingement and Frozen Shoulder: A Systematic Review. J Funct Morphol Kinesiol. 2023;8(2).
11. de la Barra Ortiz HA, Parizotto N, Arias M, Liebano R. Effectiveness of high-intensity laser therapy in the treatment of patients with frozen shoulder: a systematic review and meta-analysis. Lasers Med Sci. 2023;38(1):266.
12. Rahbar M, Ranjbar Kiyakalayeh S, Mirzajani R, Eftekharsadat B, Dolatkhah N. Effectiveness of acromioclavicular joint mobilization and physical therapy vs physical therapy alone in patients with frozen shoulder: A randomized clinical trial. Clin Rehabil. 2022;36(5):669-82.

13. Lin P, Yang M, Huang D, Lin H, Wang J, Zhong C, et al. Effect of proprioceptive neuromuscular facilitation technique on the treatment of frozen shoulder: a pilot randomized controlled trial. BMC Musculoskelet Disord. 2022;23(1):367.
14. Wang Y, Wang K, Qin Y, Wang S, Tan B, Jia L, et al. The effect of corticosteroid injection in the treatment of greater trochanter pain syndrome: a systematic review and meta-analysis of randomized controlled trials. J Orthop Surg Res. 2022;17(1):283.
15. Schiltz M, Goudman L, Moens M, Nijs J, Hatem SM. The diagnostic value of physical examination tests in adhesive capsulitis: a systematic review. Eur J Phys Rehabil Med. 2023;59(6):724-30.
16. de la Serna D, Navarro-Ledesma S, Alayón F, López E, Pruimboom L. A Comprehensive View of Frozen Shoulder: A Mystery Syndrome. Front Med (Lausanne). 2021;8:663703.
17. Patel R, Urits I, Wolf J, Murthy A, Cornett EM, Jones MR, et al. A Comprehensive Update of Adhesive Capsulitis and Minimally Invasive Treatment Options. Psychopharmacol Bull. 2020;50(4 Suppl 1):91-107.
18. Dinh B, Dunning J, Kearns GA, Thorp L, Charlebois C, Young I. A comparison of dry needle placement accuracy rates between two approaches targeting the gluteus medius osteotendinous junction in cadavers. J Man Manip Ther. 2025:1-7.
19. Gazendam A, Ekhtiari S, Axelrod D, Gouveia K, Gyemi L, Ayeni O, et al. Comparative Efficacy of Nonoperative Treatments for Greater Trochanteric Pain Syndrome: A Systematic Review and Network Meta-Analysis of Randomized Controlled Trials. Clin J Sport Med. 2022;32(4):427-32.
20. Pandey V, Madi S. Clinical Guidelines in the Management of Frozen Shoulder: An Update! Indian J Orthop. 2021;55(2):299-309.
21. Picasso R, Pistoia F, Zaottini F, Marcenaro G, Miguel-Pérez M, Tagliafico AS, et al. Adhesive Capsulitis of the Shoulder: Current Concepts on the Diagnostic Work-Up and Evidence-Based Protocol for Radiological Evaluation. Diagnostics (Basel). 2023;13(22).
22. Li D, St Angelo JM, Taqi M. Adhesive Capsulitis (Frozen Shoulder). StatPearls. Treasure Island (FL): StatPearls Publishing Copyright © 2025, StatPearls Publishing LLC.; 2025.