

The impact of physical therapy programs on the quality of life of patients with Adhesive Capsulitis and Myofascial Pain Syndrome

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Abstract

Objective: The aim of this study is to compare the influence of end-range mobilization and therapeutic exercises, combined with ischemic compression, on the quality of life of patients with adhesive capsulitis of the shoulder joint and thoracic myofascial pain syndrome. **Materials and methods:** Seventy-two patients participated in the study. Goniometry and assessment of pain in trigger points were performed before and after physical therapy. The Health Status Survey (SF-36 form) was used to assess the quality of life. The survey was conducted before the intervention and 1.5 months after the end of the physical therapy. The patients from the first group received physical therapy based on end-range mobilization and ischemic compression (the average duration of the program comprised three weeks). The patients from the second group received physical therapy based on therapeutic exercises and ischemic compression (the duration of the program comprised three weeks). **Results:** The comparison of the initial and final results revealed positive changes in all quality of life subscales within the studied groups. At the same time, the results of the final assessment were better in the first group in all subscales except for mental health. The final results of the physical health component were different in patient groups. **Conclusion:** The use of end-range mobilization and ischemic compression was more effective in increasing the range of motion, reducing pain, and improving a number of quality of life indicators compared to the use of therapeutic exercises and ischemic compression among the patients with adhesive capsulitis of the shoulder joint combined with myofascial pain syndrome. The advantages were established in seven quality of life subscales out of eight as well as in the physical health component.

Keywords: rehabilitation, manual therapy, musculoskeletal system, shoulder joint, activity, ergotherapy

Introduction

Adhesive capsulitis of the shoulder joint (ACSJ) is one of the widespread diseases of the musculoskeletal system observed in orthopedics (Pandita, et. all, 2018). It was first described in 1872 as a contracture of the glenohumeral capsule, thickening of the coracohumeral ligament, loss of the synovial layer, and fibrosis (Pelak, et. all, 2023). Patients with ACSJ usually experience hidden or unprovoked pain that progresses along with limited shoulder joint mobility (Patel, et. all, 2020; Fields, et. all, 2019; Rangan, et. all, 2020) and a decrease in the amplitude of both active and passive movements (Fields, et. all, 2019). This disease is more common among females (the ratio is 1.4 to 1) (Rizvi, et. all, 2019), especially those between the ages of 50 and 70 (Pandita, et. all, 2018). Painful stiffness of the shoulder joint leads to a diminished quality of life and disability (Patel, et. all, 2020; Atan, et. all, 2021; Choubey, et. all, 2022; Pelak, et. all, 2023). A deterioration in the quality of life occurs under its influence as a concomitant pathology (Pandita, et. all, 2018). Having difficulties with raising and rotating the shoulder, patients experience problems with everyday activities, especially those related to raising their arms above the head (Patel, et. all, 2020; Waghale, et. all, 2021), such as combing hair, dressing and undressing, reaching into back pockets, or performing activities behind the back (Pelak, et. all, 2023; Mohamed, et. all, 2022). According to some studies, this pathology may resolve without any interventions within 1–3 years. However, other studies show that patients may suffer from a long-term amplitude deficit that can last up to 10 years (Pandita, et. all, 2018).

Though there are many approaches to the treatment of capsulitis, including surgeries, injections, and physical therapy (PT), there is still no generally accepted therapy considered to be the most effective one. Preference is usually given to a complex treatment approach. At the same time, scientific literature notes that anti-inflammatory drugs and corticosteroid injections may provide relief from discomfort during PT but are not

considered as a treatment (Redler, et. all, 2019). PT plays a key role in the treatment of musculoskeletal system diseases (Vitomskyi, et. all, 2019, 2022; Fedorenko, et. all, 2019, 2020, 2021) and pathologies of other systems of the human body (Balazh, et. all, 2020; Junior et al 2019; Vitomskyi, et. all, 2018; Vitomskyi, 2020). PT programs often include stretching exercises, joint mobilization, proprioceptive neuromuscular facilitation, muscle energy techniques, electrotherapy modalities, as well as cold and heat therapies (Nakandala, et. all, 2021; Tedla, et. all, 2019).

Myofascial pain syndrome (MPS) is a widespread disease of the musculoskeletal system and has economic significance for society. The prevalence of MPS currently ranges from 30% to 85% (Shakouri, et. all, 2020; Galasso, et. all, 2020). MPS is characterized by excessively irritable trigger points (TPs) in skeletal muscles (Fernández-de-Las-Peñas & Nijs, 2019; Fernández-de-Las-Peñas, & Dommerholt, 2018). Pressing on these points causes pain, which can be remote and have a specific pattern for a certain affected muscle (Fernández-de-Las-Peñas & Nijs, 2019). Additionally, pain associated with MPS is often accompanied by other complaints such as mental stress, depression, anxiety, diminished social and physical functioning, and a deteriorated quality of life (Roldan, et. all, 2015; Shakouri, et. all, 2020; Galasso, et. all, 2020). MPS is more common in people with conditions or diseases characterized by chronic pain (Galasso, et. all, 2020; Ahmed, et. all, 2018). The presence of latent myofascial TPs has been established for various disorders of the locomotor apparatus (Ahmed, et. all, 2018; Tabatabaiee, et. all, 2019). However, despite its prevalence, MPS is often ignored (Galasso, et. all, 2020). A key factor in treating MPS is PT, which includes different types of massage, ischemic compression (IC), various therapeutic exercises, electrotherapy, heat therapy, and other methods (Galasso, et. all, 2020; Bingölbali, et. all, 2023).

Considering the presence of long-term pain in patients with ACSJ and the high prevalence of MPS, the issue of PT among patients with ACSJ and MPS is highly relevant. However, the problem of restorative treatment and PT for people with ACSJ and concomitant MPS is not sufficiently addressed in the literature (Rusanov, et. all, 2023; Rusanov & Vitomskyi, 2023), especially regarding its effectiveness in improving the quality of life. Previous studies have examined the impact of physical therapy on pain, disability (Rusanov, et. all, 2023), and the formation of a therapeutic alliance (Rusanov & Vitomskyi, 2023).

Connection of the study with scientific programs, plans, topics. The work was carried out according to the plan of scientific research work of National University of Physical Education and Sports of Ukraine for 2021-2025 on the topic "Restoration of functional capabilities, activity and participation of people of different nosological, professional and age groups by means of physical therapy", state registration number 0121U107926.

The aim of this study is to compare the influence of end-range mobilization (ERM) and therapeutic exercises combined with IC on the quality of life of patients with ACSJ and thoracic MPS.

Materials and methods

Participants

The study was conducted at the GI "Institute of Traumatology and Orthopedics of the National Academy of Medical Sciences of Ukraine". Seventy-two patients participated in the study, all of whom underwent diagnostic tests and consultations with an orthopedist-traumatologist before undergoing PT. The participants were divided into two groups based on the PT they received.

Ethical consent was provided by the ethics committee of the local institution (protocol No. 2, dated March 30, 2023), in accordance with the Helsinki Declaration. The patients willingly participated in the study, and their voluntary participation was confirmed by their personally signed informed consents.

Inclusion and exclusion criteria are presented in previous scientific works (Rusanov, et. all, 2023).

Testing methods

Goniometry of the shoulder joint was performed both before and after the PT. The amplitude of active and passive movements (abduction, flexion, and rotation) was assessed following existing guidelines (Clarkson, & Gilewich, 2013). The amplitude of rotation was measured in the supine position with the shoulder retracted by 15°. Pain in TPs was assessed by applying pressure equivalent to 2.5 kg×cm² (measured using a digital force gauge VTSYIQI) and recorded using a numerical pain scale (Markman, et. all, 2020). The highest score among the studied TPs was recorded. Pain assessment was conducted after goniometry.

The quality of life was assessed both before and 1.5 months after PT (i.e., 9 weeks after the start of PT) using the Health Status Survey, specifically the SF-36 form. The results of eight subscales and two summary components were analyzed (Shayan, et. all, 2020; Posada de la Paz, et. all, 2022).

Intervention

The participants were divided into two groups: the first group (G1, n = 36) and the second group (G2, n = 36). During consultations with the G1 patients, the physical therapist provided them with detailed information about the specifics of performing ERM and IC. This included information about potential discomfort during the procedures, the necessity of interacting with the physical therapist during joint mobilization, and measures to alleviate discomfort during the interventions. ERM procedures were conducted five times a week, with each session lasting 20–25 min, aimed at improving the range of motion in the shoulder joint. Intensive ERM was utilized up to and including the V degree. The planned duration of the intervention was three weeks. A

comprehensive description of ERM can be found in previous studies (Rusanov, et. all, 2023). The physical therapist had the flexibility to slightly adjust the number of ERM procedures. The majority of G1 participants (83.3%) received 15 procedures. Other patients received either more or fewer procedures: 2.8% had two procedures fewer, 5.6% had one procedure fewer, 5.6% had one procedure more, and 2.8% had two procedures more. Consequently, the average duration of physical therapy in the G1 group was three weeks.

During their initial consultation, the G2 patients received information from the physical therapist about the specifics of therapeutic exercises and IC. They observed a demonstration of the exercises by the specialist and had the opportunity to perform the exercises themselves for practice. The exercises were also described and illustrated in an information booklet provided to the G2 patients. These patients performed pendulum exercises for a duration of 7–10 min and stretching exercises for 15–20 min at home, twice a day. Additionally, they received two scheduled consultations and a final one. A comprehensive description of the therapeutic exercises can be found in previous studies (Rusanov & Vitomskyi, 2023). The duration of the physical therapy program for G2 patients was three weeks.

Patients in both groups were advised to perform all activities, including household tasks, with the maximum possible range of motion in the shoulder joint.

For the therapy of MPS, both the G1 (in the clinic) and G2 (at home) patients conducted IC without any external assistance. Individual maps of latent and active TPs were created by the physical therapist and provided to the patients. The patients in both groups were instructed to perform IC on TPs located in various areas. Compression of each point was maintained for half a minute, and patients were allowed to reapply compression to the same point if needed. IC was performed once a day for a duration of 15–20 min. A complete description of IC is available in previous studies (Rusanov, et. all, 2023).

Statistical analysis

The study employed the IBM SPSS Statistics 21 program for data analysis. Given that the results of the vast majority of indicators did not conform to the normal distribution (as determined by the Shapiro–Wilk test), the median (Me) and the upper and lower quartiles (25%; 75%) were calculated. Additionally, the mean and standard deviation ($\bar{x} \pm SD$) were computed for key quality of life indicators. The Wilcoxon test was utilized to compare the results of assessments within one of the groups (with the criterion being transformed into a Z value by the program). For comparisons between groups, the Mann–Whitney test was employed (with the criterion being transformed into a Z value by the program). The Pearson's chi-squared test (χ^2) was used for nominal indicators.

Results

The age of the patients was similar in both groups: 54 (50; 58.5) years in the G1 group and 53 (45; 61.5) years in G2 ($Z = -0.496$; $p = 0.620$). The duration of symptoms also did not differ statistically between the groups, with a duration of 5 (3.25; 7) months in the G1 group and 5.5 (3.5; 7) months in G2 ($Z = -0.763$; $p = 0.445$). The proportion of females was 75% in the G1 group and 66.7% in G2, indicating that the groups did not differ in the distribution of patients by gender ($\chi^2 = 0.605$; $p = 0.437$). Furthermore, 55% of the G1 patients and 52.8% of the G2 patients had left-sided ACSJ, and the groups did not differ in the distribution of patients by the side of ACSJ localization ($\chi^2 = 0.056$; $p = 0.813$). The dominant upper limb was affected in 58.3% and 52.8% of the patients in the G1 and G2 groups, respectively ($\chi^2 = 0.225$; $p = 0.635$).

A statistically equal proportion of patients received steroid injections after consultation with an orthopedist–traumatologist: 11 (30.6%) patients from the G1 group and 13 (36.1%) patients from the G2 group ($\chi^2 = 0.250$; $p = 0.617$). Additionally, 5.6% of the G1 patients and 2.8% of the G2 patients ($\chi^2 = 0.348$; $p = 0.555$) took nonsteroidal anti-inflammatory drugs during the therapy.

The amplitude of movement in the shoulder joint was statistically the same in both groups during the first assessment (Table 1). However, the comparison of the initial and final goniometry results revealed positive changes in both groups ($p < 0.001$). Notably, the results of the final assessment were better in the G1 group (Table 1).

Table 1
Me (25%;75%) indicators of the movement amplitude in the shoulder joint during the first and final assessments, degrees

Movement		First assessment		p^*	Final assessment		p^*
		G1 (n=36)	G2 (n=36)		G1 (n=36)	G2 (n=36)	
Abduction	passive	58.5 (40.3; 64.8)	54.5 (47.3; 60)	0.417	126 (124.3; 126)	89.5 (85.3; 101)	<0.001
	active	55.5 (32.3; 61.8)	50.5 (43.3; 56.5)	0.370	125 (123.3; 126)	86 (83; 97)	<0.001
Flexion	passive	68 (55.3; 92)	67.5 (56; 72)	0.656	180 (180; 180)	130.5 (96; 137)	<0.001
	active	63.5 (51; 87)	64 (51.8; 69.8)	0.744	179 (179; 180)	120 (94; 128.8)	<0.001
Internal rotation	passive	15.5 (14; 20.8)	16 (14.3; 18.8)	0.812	90 (90; 90)	48 (46; 50)	<0.001
	active	12.5 (11; 18.5)	12 (11; 14)	0.743	90 (89; 90)	43.5 (42; 45)	<0.001
External rotation	passive	18 (16; 21)	18 (16.3; 20)	0.799	90 (90; 90)	48 (46.3; 50)	<0.001
	active	15 (12.3; 17.8)	14 (12.3; 17)	0.425	90 (89; 90)	45 (43; 46)	<0.001

Note. * – Mann-Whitney test.

Of note, the pain index in TPs statistically improved during the PT, decreasing from 9 (9; 9) points to 3 (3; 4.8) points in the G1 group ($Z = -5.289$; $p < 0.001$). In the G2 group, there were less pronounced but still statistically significant changes, with the pain index decreasing from 9 (9; 9) points to 4 (4; 4) points ($Z = -5.432$; $p < 0.001$). The initial pain assessment results in TPs did not differ between the groups ($Z = -0.677$; $p = 0.499$), but the final results were better in the G1 group ($Z = -2.744$; $p = 0.006$).

The quality of life subscales were statistically the same in both groups during the first assessment (Table 2). The initial indicators of the physical health component did not differ between the groups ($Z = -0.721$; $p = 0.471$). The Me (25%;75%) values were 36.3 (32.5, 39.7) points in the G1 group and 36.58 (35.4, 38.8) points in the G2 group. The $\bar{x} \pm SD$ indicators were 36.31 ± 5.64 and 36.43 ± 5.13 points for the G1 and G2 groups, respectively. Similarly, the initial indicators of the mental health component did not differ between the groups ($Z = -1.557$; $p = 0.115$). The Me (25%; 75%) values were 44.7 (40.1, 48.1) points in the G1 group and 40.7 (38.6, 47.1) points in the G2 group. The $\bar{x} \pm SD$ indicators were 43.56 ± 8.15 and 41.92 ± 10.28 points, respectively.

Table 2

Me (25%;75%) indicators of the quality of life subscales during the first and final assessments, points

Subscale	First assessment		p*	Final assessment		p*
	G1 (n=36)	G2 (n=36)		G1 (n=36)	G2 (n=36)	
Physical Functioning	62.5 (60; 75)	60 (60; 75)	0.779	92.5 (85; 100)	80 (75; 80)	<0.001
Physical Role Functioning	25 (0; 25)	25 (0; 25)	0.540	100 (100; 100)	50 (25; 68.8)	<0.001
Bodily Pain	32.5 (22.5; 45)	22.5 (20; 32.5)	0.133	77.5 (60; 90)	45 (32.5; 45)	<0.001
General Health	60 (35; 70)	55 (50; 63.8)	0.861	75 (65; 85)	50 (45; 55)	<0.001
Vitality	65 (55; 70)	65 (55; 65)	0.369	75 (66.3; 75)	65 (55; 65)	<0.001
Social Functioning	62.5 (50; 75)	50 (50; 62.5)	0.089	75 (62.5; 87.5)	62.5 (50; 75)	<0.001
Emotional Role Functioning	0 (0; 66.67)	0 (0; 66.67)	0.840	100 (75; 100)	66.7 (33.3; 66.7)	<0.001
Mental Health	68 (56; 72)	68 (46; 68)	0.158	74 (68; 84)	78 (53; 84)	0.720

Note. * – Mann-Whitney test.

The comparison of the initial and final results revealed positive changes in all quality of life subscales among the G1 ($p \leq 0.001$) and G2 ($p < 0.05$) patients. However, it is worth noting that the results of the final assessment were better in the G1 group in all subscales except for mental health (Table 2).

The final results of the physical health component differed between the groups ($Z = -6.736$; $p < 0.001$). The Me (25%; 75%) values were 53.4 (50.3, 56.9) points in the G1 group and 40.9 (37.1, 42.8) points in the G2 group. The $\bar{x} \pm SD$ indicators were 52.95 ± 4.97 and 40.05 ± 5.30 points, respectively. Of note, the physical health component statistically improved in both the G1 ($Z = -5.232$; $p < 0.001$) and G2 ($Z = -3.708$; $p < 0.001$) groups.

The final results of the mental health component did not differ between the patient groups ($Z = -1.307$; $p = 0.191$). The Me (25%; 75%) values were 50.8 (44.7, 53.4) points in the G1 group and 47.3 (40.5, 53.5) points in the G2 group. The $\bar{x} \pm SD$ indicators were 49.33 ± 5.60 and 46.77 ± 8.20 points, respectively. Of note, the mental health component statistically improved in both the G1 ($Z = -3.755$; $p < 0.001$) and G2 ($Z = -3.205$; $p = 0.001$) groups.

Discussion

The shoulder joint mobility improved in both groups of patients. Similar results were obtained in the statistical analysis of pain indicators in TPs. The PT based on ERM and IC was more effective in improving these indicators. Similar results were obtained for the quality of life indicators. All quality of life subscales improved in both groups of patients. However, the final results were generally better in the G1 group in almost all subscales. There no significant difference between the groups only in the mental health subscale. The physical health component during the final assessment was better in the group receiving PT based on ERM and IC. The final results of the mental health component did not statistically differ between the groups. The physical health component exhibited more pronounced improvements compared to the mental health component in the G1 group, although changes in both components were significant.

The use of PT improves the quality of life of patients with musculoskeletal diseases and injuries (Vitomskyi et al., 2017). However, there is a lack of studies comparing the impact of PT programs on quality of life indicators among individuals with ACSJ and concomitant thoracic MPS. Previous studies have assessed the quality of life of patients with ACSJ or MPS and examined its dynamics under the influence of PT and other forms of treatment.

For instance, V. Pandita et al. (2018) presented the quality of life indicators in patients with ACSJ and diabetes, revealing that the average value of the physical health component ranged from 34.1 to 46.6 depending on patients' gender and the severity of diabetes. The range of average values of the mental health component in the patient groups ranged from 39 to 49 points.

B.H. Oh and S.Y. Kim (2020) studied the impact of adding home therapeutic exercises to manual therapy (level III mobilization and functional massage) among patients with ACSJ. The researchers revealed improvements in the quality of life, shoulder joint mobility, and disability indicators in both groups of patients. Additionally, the advantages of the group receiving combined therapy were evident based on these indicators. Notably, the total quality of life score (World Health Organization Quality of Life) for patients receiving manual therapy increased from 55.27 to 58.55 points in the third week of therapy and further to 61.31 points in the sixth week. This improvement was statistically significant when comparing the initial and final results. In the combined therapy group, similar dynamics were observed, with scores improving from 57.09 to 62.84 points and then to 67.42 points. These changes were also statistically significant when comparing all pairs of indicators.

T. Atan and Y. Bahar-Ozdemir (2021) compared the effectiveness of a combination of laser therapy with therapeutic exercise, a combination of a sham laser with therapeutic exercise, and exercise alone in the therapy of patients with ACSJ. According to the study results, the therapy in the first group had a more positive effect on pain assessment using the visual analog scale, the pain domain according to the Shoulder Pain and Disability Index, as well as several quality of life domains (vitality, general health, and bodily pain according to the SF-36 questionnaire). Improvements in disability and shoulder joint mobility indicators were statistically significant in all groups, both after the interventions and in the follow-up period. Of note, all patients performed therapeutic exercises under the supervision of a physical therapist, with each session lasting 25 min, conducted five times a week for a duration of three weeks.

G. Choubey et al. (2022) studied the effect of individual homeopathic treatment on the quality of life of patients with ACSJ. Within two months of therapy, the overall quality of life score increased from 44.4 points to 72.3 points according to the SF-12 v2 questionnaire. Notably, the total score of the physical health component improved from 41.4 points to 70.5 points, while the mental health component improved from 49.7 points to 75.4 points. S. K. Shakouri et al. (2020) revealed that most of the SF-36 quality of life scores were lower in the MPS patients compared to the control group. The quality of life of the patients with MPS was also examined by T. Pasin et al (2023). The obtained results complement and confirm the findings of several studies that have explored the role and effectiveness of PT in MPS therapy. For instance, according to the study by S.M. Rayegani et al. (2014), PT improves pain scores in TPs and enhances the quality of life among patients with MPS. Ö. Bingölbalı et al. found that adding deep tissue massage to conventional therapy (including electrotherapy, heat therapy, and ultrasound) for MPS enhances efficiency in terms of pain relief, disability reduction, and improvements in the quality of life (Bingölbalı, et. all, 2023). The conclusions of the study by E. Ata et al. (2019) suggest that the combined use of kinesiotaping and lidocaine injection is more effective than injection alone in terms of pain indicators and assessment of the physical component of quality of life.

A recent systematic review have indicated that numerous therapeutic physical modalities have a positive effect on pain symptoms, psychological well-being, joint mobility, and quality of life in patients with MPS (He, et. al., 2023). A systematic review by H. Vernon and M. Schneider (2009) presented a moderately convincing evidence for the effectiveness of manipulation and IC in providing immediate pain relief in TPs, but limited evidence for long-term pain relief. Additionally, a more recent systematic review recommends IC for the treatment of patients with TPs in the upper trapezius muscle, although it is noted that there is weak evidence regarding its effectiveness in terms of functioning and quality of life (Cagnie, et. all, 2015).

Conclusion

The comparison of the initial and final goniometry results revealed positive changes in both groups. Similar results were obtained in the statistical analysis of pain indicators in TPs. The PT based on ERM and IC was more effective in improving these indicators. All quality of life subscales improved in both groups of patients. The use of ERM and IC was more effective in increasing the range of motion, alleviating pain, and improving several quality of life indicators when compared to the use of therapeutic exercises and IC in patients with ACSJ combined with MPS. Significant advantages were identified in seven out of eight quality of life domains and in the physical health component.

Conflict of interest The authors declare that there is no conflict.

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