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The effectiveness of rehabilitation of persons with periarthritis humeroscapularis

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ABSTRACT

Introduction: Periarthritis humeroscapularis (PHS) is an inflammatory reaction of the muscle tendons of the shoulder joint and other adjacent tissues of the shoulder joint. The main clinical signs are pain and limitation of mobility, which endangers the daily life activities. The aim of this study is to determine the effectiveness of rehabilitation in reducing the pain and the effectiveness of rehabilitation in improving the daily life activities of respondents with PHS.

Methods: This prospective, pre-post study, conducted from May to September 2023, included subjects of both sexes, different age groups, and different occupations, who were part of the rehabilitation program. The data were collected by filling out a questionnaires of the general data of the respondents and a the American Shoulder and Elbow Surgeon Score (ASES) questionnaire on activities of daily life and intensity of pain in the shoulder before and after the rehabilitation program. The rehabilitation program lasted an average of 14 days and included the following physical procedures: Electrotherapy, ultrasound, kinesitherapy, cryotherapy, short-wave diathermy, and manual massage.

Results: Comparison of the average pain score on an ASES pain scale of 1-10 shows that the respondents rated pain with an average score of 7.32 before the treatment and with an average score of 2.14 after the treatment. The average scores on the activities of daily living subscale of the ASES questionnaire were worse before the treatment and amounted to 20.72 ± 10.46 (range 3.33-40.0) compared to the scores after the treatment when they averaged 40.95 ± 7.46 (range 21.67-50). The average total score on the ASES scale before the treatment was 34.10 ± 13.93 (range 8.33-58.33), and after the treatment, it was 80.27 ± 14.7 (range 48.33-100.0).

Conclusion: The rehabilitation showed statistically significant improvement in the average score on the ASES subscales of pain and daily life activities.

Keywords: Periarthritis humeroscapularis; conservative treatment methods; rehabilitation

INTRODUCTION

Periarthritis humeroscapularis (PHS) is a common condition characterized by long-term, repeated pain in the shoulder and a functional reduction in the range of motion, both active and passive. PHS is an inflammatory reaction of the muscle tendons of the shoulder joint and other adjacent tissues of the shoulder joint. The main clinical signs are pain and limitation of mobility, which has a negative impact on the quality of daily life. It usually occurs around the age of fifty. The reason why it is more common in women of that age, as well as the exact pathogenesis of PHS, is still not sufficiently defined. PHS has an incidence of 2–5%, with some typical risk factors such as repeated high-intensity activities, long-lasting activities with hands in position over the head, lack of adequate warm-up before activities, or soft-tissue overstretching. It occurs 4 times more often in women. From 1% to 4% of all emergency patient admissions are due to shoulder pain (1).

The condition can sometimes be misdiagnosed, and therefore, the treatment process is difficult and requires overall risk factors analysis (1).

Shoulder pain can be caused by a wide variety of reasons and conditions such as: Rotator cuff syndrome, biceps brachii tendonitis, calcific tendonitis, impingement syndrome, shoulder bursitis, or adhesive capsulitis (frozen shoulder) (2).

PHS differs from other shoulder diseases in that it has a mechanical restriction of movement in all directions of the glenohumeral joint and requires a specific treatment plan (3,4). Physiotherapy is the main form of rehabilitation in PHS.

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Physiotherapy rehabilitation, including kinesitherapy and physical therapy, focuses on reducing pain, increasing range of motion, increasing strength of the shoulder muscles, and improving the overall shoulder function and daily life activities. A precisely defined range of motion is necessary to perform daily tasks, and due to the presence of shoulder pain, the ability to perform everyday tasks such as styling hair, putting on a jacket, and fastening a seat belt is reduced (4,5).

The aim of this study is to determine the effectiveness of rehabilitation in reducing the pain and the effectiveness of rehabilitation in improving the daily life activities of respondents with PHS.

METHODS

Subjects of both sexes, different age groups, and different occupations with symptoms of shoulder pain were included in the rehabilitation program at the Public Institution Health Center of the Sarajevo Canton. The research was conducted in the period from May to September 2023, in addition to the previously obtained research permit of the Public Institution Health Center of Sarajevo Canton. The criteria for inclusion in the research were respondents of both sexes, different age groups, and different professions with clinically examination-verified PHS, respondents who voluntarily gave their consent to participate in the study, and respondents who were assessed with the American Shoulder and Elbow Surgeon (ASES) questionnaire before the start of the rehabilitation program.

The criteria for exclusion from the research were respondents who were not assessed with the ASES questionnaire before and after the rehabilitation program, non-adherence to the rehabilitation program, and abandonment of the rehabilitation program.

The research was designed as a prospective, pre-post study that compared the condition of the respondents before and after the rehabilitation program. The rehabilitation program lasted 14 days and included the following physical procedures: Electrotherapy, ultrasound, exercise therapy, cryotherapy, short-wave diathermy, and manual massage.

Electrotherapeutic modalities used in this research are TENS and interferential currents. The duration of the TENS program was 15 min, while interferential current program was 10 min.

The duration of therapeutic ultrasound was most commonly 3-6 min, depending on the pain levels. Subjects with higher pain levels had lower intensity therapeutic ultrasound (>0.8 W/cm^2) shorter duration while subjects with lower pain levels had higher intensity therapeutic ultrasound (<0.8 W/cm^2) and longer duration of the treatment.

Cryotherapy was used in forms of ice massage with a small-sized blocked of ice attached to a wooden stick and was used for 3 min or until patients reported the feeling of numbness in the treated area.

Short-wave diathermy was used for 15 min at a low- to mid-level heating intensity.

Manual massage was applied around the shoulder area and the upper trapezius in between 8 and 10 min.

Exercise therapy was tailored according to the need of each patient. The average program consisted of pendular exercises initially for patients who are in a painful stage with range of motion limitation while gradually progressing to more intense exercises which included strengthening and stretching exercises in later sessions.

The research instruments used before and after the rehabilitation program are as follows:

- The questionnaire on the general information of the respondents contained data on the gender and age of the respondents, engagement in recreational activities and their type and duration weekly, presence of shoulder pain, location of shoulder pain, and duration of shoulder pain.
- ASES questionnaire on the activities of daily life and the intensity of shoulder pain before and after the rehabilitation program. The ASES questionnaire is a composite outcome reporting measure for use in a variety of shoulder pathologies. It consists of 17 items. Items are scored from 0 to +3. 0 - impossible to do, +1 very difficult to do, +2 somewhat difficult to do, and +3 not difficult to do. The total score reflects the degree of pain intensity and the ability to perform activities of daily living in individuals with shoulder pain (6).

Approval for this study was gained from the ethical board of the University of Sarajevo, Faculty of Health Studies.

RESULTS

The sample of respondents included a total of 37 patients who were treated at the Public Institution Health Center of the Sarajevo Canton for shoulder pain in the period from May to September 2023.

Analysis of the gender structure of the respondents indicates that there were more women in the sample, 24 (64.9%) compared to 13 (35.1%) men (Table 1).

The average age of the respondents in the sample was 59.24 ± 10.66 years, with the youngest respondent at the age of 35 and the oldest at the age of 83 (Table 2).

The average duration of shoulder pain of the respondents was 5.65 ± 7.64 months, with the shortest duration of 1 month and the longest of 36 months (Table 3).

The largest number of respondents were retired people, a total of 11 (29.73%), followed by housewives, a total of 6 (16.22%), and economists, a total of 6 (16.22%) (Table 4).

Comparison of the average pain rating on the ASES numeric scale from 0 to 10 shows that respondents rated pain intensity with an average rating of 7,32 ± 1,43 before treatment and with an average rating of 2,14 ± 1,78 after treatment. Statistical analysis indicates a significant difference before and after the treatment ($p < 0.05$) (Table 5).

Comparison of the assessment of the ASES overall shoulder function shows that before the treatment, most respondents 19 or 51.4% assessed overall shoulder function as 50%, and after the treatment, most respondents 17 or 45.9% assessed overall shoulder function as 100%. Statistical analysis indicates the existence of a significant difference before and after the treatment ($p < 0.05$) (Table 6).

TABLE 1. Overview of the gender structure of respondents

Sex	n	Percentage
Male	13	35.1
Female	24	64.9
Total	37	100.0

TABLE 2. Overview of the age structure of the respondents

Age	
$\bar{X}$	59.24
SD	10.66
Minimum	35.00
Maximum	83.00

SD: Standard deviation

TABLE 3. Duration of shoulder pain of the respondents

Duration of shoulder pain (months)	
$\bar{X}$	5.65
SD	7.64
Minimum	1.00
Maximum	36.00

SD: Standard deviation

TABLE 4. Review of occupations of the respondents

Occupation	n	Percentage
Administrative workers	4	10.81
Agronomists	1	2.70
Housewifes	6	16.22
Engineers	1	2.70
Economists	6	16.22
Construction workers	3	8.11
Nurses	2	5.41
Retired people	11	29.73
Agricultural technicians	1	2.70
Teachers	2	5.41
Total	37	100.00

TABLE 5. Comparison of the average pain rating by patients on an ASES numeric pain scale from 0 to 10 before and after the treatment

Intensity of pain	N	$\bar{X}$	SD	Minimum	Maximum
Before treatment	37	7.32	1.43	3.00	9.00
After treatment	37	2.14	1.78	0.00	6.00

Z=−5.343; *P*=0.001. SD: Standard deviation, ASES: American Shoulder and Elbow Surgeon

The ASES average score of the overall shoulder function of the respondents was 45.95 ± 19.99% (range 0–100%), and after the treatment, 83.78 ± 16.89% (range 50–100%). Statistical analysis indicates the existence of a significant difference before and after the treatment ($p < 0.05$) (Table 7).

The average scores on the activities of daily living subscale of the ASES activities of daily living of the respondents were also worse before the treatment and amounted to 20.72 ± 10.46 (range 3.33-40.0) compared to the scores after the treatment 40.95 ± 7.46 (range 21.67-50). Statistical analysis indicates the existence of a significant difference before and after the treatment ($p < 0.05$) (Table 8).

The average total score of the respondents on the ASES scale before the treatment was 34.10 ± 13.93 (range 8.33-58.33), and after the treatment, it was 80.27 ± 14.7 (range 48.33-100.0). Statistical analysis indicates the existence of a significant difference before and after the treatment ($p < 0.05$) (Table 9).

TABLE 6. Comparison of the evaluation of the ASES overall function of the shoulder before and after the treatment

Overall function of the shoulder (%)	Before treatment		After treatment	
	n	Percentage	n	Percentage
0.0	1	2.7	0	0.0
25.0	11	29.7	0	0.0
50.0	19	51.4	4	10.8
75.0	5	13.5	16	43.2
100.0	1	2.7	17	45.9
Total	37	100.0	37	100.0

χ^2=41,767; *P*=0.0001. ASES: American Shoulder and Elbow Surgeon

TABLE 7. Comparison of the ASES average score of overall shoulder function before and after treatment

Overall shoulder function	N	$\bar{X}$	SD	Minimum	Maximum
Before treatment	37	45.95	19.99	0.00	100.00
After treatment	37	83.78	16.89	50.00	100.00

Z=−4,894; *P*=0.0001. SD: Standard deviation, ASES: American shoulder and elbow surgeon

TABLE 8. Comparison of the average score on the ASES scale of activities of daily living before and after treatment

ASES ADL	n	$\bar{X}$	SD	Minimum	Maximum
Before treatment	37	20.72	10.46	3.33	40.00
After treatment	37	40.95	7.46	21.67	50.00

Z=−5,236; *P*=0.0001. SD: Standard deviation, ASES: American Shoulder and Elbow Surgeon

DISCUSSION

According to the research inclusion criteria, there were 37 respondents included in the study. Analysis of the gender structure of the respondents indicates that there were more women in the sample (24 or 64.9%) compared to men (13 or 35.1% of men).

The average age of the respondents in the sample was 59.24 ± 10.66 years, with the youngest respondent at the age of 35 and the oldest at the age of 83.

Dias et al. conducted a study on the clinical and functional profile of patients with painful shoulder syndrome and found that of a total of 136 patients who underwent clinical treatment, 74.3% were women. The average age of the respondents was 60 years. These statements are correlated with the results of our research (7).

The average duration of pain in months was 5.65 ± 7.64 months, with the shortest duration being 1 month and the longest being 36 months.

The most common occupations of respondents were retired people in 11 or 29.7% of cases, then housewives in 5 or 13.2%, and administrative workers in 4 or 10.8% of cases.

Comparison of the average pain rating on the ASES numeric pain scale from 0 to 10 shows that respondents rated pain intensity with an average rating of 7,32 ± 1,43 before treatment and with an average rating of 2,14 ± 1,78 after treatment. Statistical analysis indicates a significant difference before and after the treatment ($p < 0.05$).

Turgut et al. (2018), investigating the application of stretching exercises in patients with shoulder pain, came to

TABLE 9. Comparison of average score on the ASES scale – total score before and after treatment

ASES	N	$\bar{X}$	SD	Minimum	Maximum
Before treatment	37	34.10	13.93	8.33	58.33
After treatment	37	80.27	14.70	48.33	100.00

Z=−5,305; *P*=0.0001. SD: Standard deviation, ASES: American Shoulder and Elbow Surgeon

the conclusion that they influenced a significant reduction of pain average score on the VAS scale before treatment from 8.52 to 2.98 after the 15-day treatment, which is in correlation with the results of our research (8).

Assessment of the ASES overall shoulder function showed improvement of the overall shoulder function after the treatment (most respondents 17 or 45.9% assessed overall shoulder function 100%) compared to the condition before the treatment (most respondents 19 or 51.4%, assessed overall shoulder function as 50%).

Tahran and Yeşilyaprak examining the effects of a modified posterior shoulder extension exercise on mobility, pain, and dysfunction in patients with shoulder pain found that there was a statistically significant improvement in overall shoulder function as measured by the ability to rotate the shoulder in degrees and shoulder function and disability, and what is in accordance with our research, which is in correlation with the results of our research (9).

Ylinen et al. focused on the role of exercise therapy in managing shoulder impingement syndrome (SIS). It aims to evaluate whether exercise therapy is an effective, evidence-based treatment for this condition, which is a common cause of shoulder pain, particularly among individuals involved in repetitive overhead activities. The authors affirm that exercise should be considered a first-line, non-invasive treatment to alleviate pain, improve shoulder function, and prevent recurrence. They recommend that healthcare providers increase awareness and adherence to exercise protocols for managing SIS, as it offers a cost-effective and long-term solution to this common condition (10).

The ASES average score of the overall shoulder function of the respondents was 45.95 ± 19.99% (range 0-100%), and after the treatment, it was 83.78 ± 16.89% (range 50-100%). It showed a statistically significant improvement.

The average scores on the activities of daily living subscale of the ASES activities of daily living of the respondents were also worse before the treatment (20.72 ± 10.46) compared to the scores after the treatment (40.95 ± 7.46).

The average total score on the ASES scale was significantly higher after treatment (80.27 ± 14.7) compared to the score before treatment (34.10 ± 13.93).

In a descriptive study published by Karel et al., the goal was to determine the importance of physical therapy diagnostics and rehabilitation in the primary health care of patients with PHS. The study design is observational (prospective cohort study) at the level of primary health care, with a total follow-up time of 12 weeks. A total of 389 patients with an average age of 50 ± 13 years were included in the study. The interventions used in the study are education, kinesitherapy, medical massage, manual mobilization techniques, shock wave therapy, transcutaneous electrical nerve stimulation, and trigger point therapy. After 6 weeks of follow-up, 118 (41%) patients reported improvement in shoulder function and reduction in pain, and at the end of therapy, after 12 weeks, 221 (57%) patients reported improvement compared to the beginning of rehabilitation. One hundred and sixty-seven (43%) patients did not show any improvement after the rehabilitation. The results of the study correlate with the results of our research (11).

When it comes to combined treatments of kinesitherapy with other physiotherapy procedures, the available literature provides conflicting opinions.

Awotidebe et al. examined the use of laser therapy as an addition to kinesitherapy procedures in shoulder rehabilitation. Therapy protocols that indicate increased efficiency are based on wavelengths from 632 to 1,064 nm, with a power of <5 mW (class IIIa) or <500 mW (class IIIb). The total number of trigger points used was 10, with a duration of 90 s, a frequency of 2,000 Hz, or 150 s at 3,500 Hz, or 5 min with a frequency of 1,000 Hz per trigger point (10). The conclusion of the study is that the addition of laser therapy should be taken into account in physiotherapy protocols, but primarily in rehabilitation that is not of the short-term type. These results indicate that the use of laser therapy in short-term rehabilitation protocols lasting 10 treatments is not necessary, given that kinesitherapy shows better results (12).

Kromer et al. conducted a systematic review-type study on a total of 16 randomized controlled trials, with the aim of summarizing the effectiveness of physiotherapy in the rehabilitation of PHS. The first conclusion showed that kinesitherapy conducted under the supervision of physiotherapists has the same effectiveness as surgical procedures. Furthermore, exercise programs in home conditions (previously educated patients by physiotherapists) show similar effectiveness in rehabilitation. The third conclusion is that the application of manual techniques as part of kinesitherapy can reduce pain more than the use of kinesitherapy alone. Furthermore, when it comes to the use of passive physical modalities (for example, electrotherapy and ultrasound), based on this study, their effectiveness was shown to be insufficient (13).

Desmeules et al. published a systematic review study with the aim of examining the effectiveness of kinesitherapy in the working population diagnosed with PHS. The systematic review included randomized controlled trials. A total of three randomized controlled trials concluded that the use of kinesitherapy is superior to the placebo group. Between operative procedures and kinesitherapy, two randomized controlled studies indicate that there are no significant differences. Considering the relatively small number of studies included in this systematic review and the impossibility of performing a meta-analysis of the data due to the overall incongruity of the data and methodological differences of the studies included in the systematic analysis, the overall significance of this study is questionable (14).

Djordjevic et al. compared the effectiveness of two therapeutic interventions – mobilization with movement (MWM) combined with kinesiotaping versus a supervised exercise program in treating painful shoulder conditions. The findings suggest that combining mobilization with movement and kinesiotaping may be more effective

in managing painful shoulder conditions than a supervised exercise program alone. The authors also noted that both treatments were beneficial and that the choice of treatment should depend on individual patient needs and preferences (15).

In cases where physiotherapy treatment does not give the expected results and when other conservative options are insufficient, arthroscopic surgical treatment is recommended.

Dattani et al. researched the outcomes of arthroscopic capsular release for treating shoulder contracture, particularly adhesive capsulitis. The study assesses the impact of this surgical intervention on patients' quality of life. The authors concluded that arthroscopic capsular release is an effective intervention for individuals suffering from adhesive capsulitis. The procedure not only improves shoulder function and range of motion but also results in significant improvements in quality of life (16).

Evans et al. investigated the occurrence of frozen shoulder as a potential complication following simple arthroscopic shoulder surgeries. The study concluded that while the risk of developing a frozen shoulder after simple arthroscopic procedures is low, it is still a possibility. The authors emphasized the importance of careful surgical technique and early rehabilitation to reduce the likelihood of this complication. They also recommended that surgeons should be aware of this risk and educate patients about the possibility of a frozen shoulder as a post-operative complication (17).

Bolia et al. discussed the various treatment strategies for managing shoulder impingement syndrome in athletes, a condition characterized by pain and functional impairment due to compression or irritation of the rotator cuff tendons in the shoulder. Conservative management with physical therapy remains the cornerstone of treatment, but surgical intervention may be necessary for athletes who do not respond to conservative measures. The authors emphasize the importance of individualized treatment plans and early intervention to minimize the risk of long-term complications (18).

CONCLUSION

Based on the conducted research, we came to the conclusion that physiotherapy rehabilitation showed statistically significant improvements, specifically the average score on the ASES pain subscale as well as the total ASES score, and it is significantly lower compared to the period before the treatment.

When it comes to daily life activities, we came to the conclusion that pain, which regularly interfered with daily life activities, has significantly decreased, and we can say that there is a statistically significant difference compared to the period before the rehabilitation program.

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DECLARATION OF INTEREST

Authors declare no conflict of interest.

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