The Effect of Rehabilitative Exercises on Improving Physical Abilities in Individuals with Mild Shoulder Tendonitis among Wheelchair Tennis Players

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Abstract

The importance of the research emerged from the role of special exercises in improving some body composition variables after liposuction procedures in women aged 30-45 years. The problem of the research lies in the lack of attention by some women who have undergone liposuction to engage in sports and physical exercises, believing that liposuction is the ultimate solution for eliminating fats and excess weight. So, the researchers utilize specialized exercises to enhance body composition, aiming to achieve natural body symmetry, muscle toning, and weight reduction. The research aims to investigate the extent to which these specialized exercises can improve body composition variables after liposuction procedures in women aged 30-45 years. The research hypotheses posit significant differences between pre-operative and post-operative assessments in terms of enhancing body composition variables among the research sample. The researchers used an experimental approach, conducting a comparison between the pre-test and post-test for the group after performing the tests and applying special exercises to the women who underwent liposuction, totaling 6 participants. The researchers concluded that the special exercises applied had a positive effect on improving body composition and body measurements after liposuction in women aged 30-45 years, and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Good Health). The researchers recommend using special exercises aimed at acquiring physical fitness and performing exercises that improve flexibility and agility to maintain body weight and achieve a well-proportioned body.

Keywords

Rehabilitation exercises, shoulder tendonitis.

Introduction

Shoulder tendonitis is a common injury that frequently occurs in sports requiring overhead arm movements, such as wheelchair tennis, weightlifting, boxing, badminton, and volleyball. The repetitive stress and continuous pressure on the tendons can weaken them, leading to a decline in physical capabilities. Strength is a crucial physical attribute for athletes as it helps prevent injuries resulting from both external and internal factors. As highlighted in a study by Al-Mudarris, the body's tissues are exposed to various internal and external influences that can lead to physiological and anatomical changes, weakening the affected organ and reducing its function (1). Rehabilitation exercises, including endurance and strength exercises, are among the most crucial exercises that can impact physiological variables and an athlete's physical capabilities. As emphasized in a study by Hassoun, "Physical capabilities and body measurements, such as strength, arm length, and trunk length, are some of the most critical attributes and measurements needed by disabled athletes" (2). Additionally, a study by Dhafer Namoos and others pointed out that the shoulder joint is one of the most crucial joints for performing tasks, and rehabilitation includes exercises with and without weights, indicating a gradual progression in the intensity of the load (3). There are many Paralympic athletes who suffer from upper limb injuries and have not received sufficient attention. This research aims...
to elevate the category of disabled individuals, motivating the researchers to conduct this study to improve physical capabilities, enhance the recovery rate, and assist therapists in developing rehabilitation programs based on the results to serve sports-related upper limb injuries. The research aimed to develop rehabilitation exercises to improve some physical capabilities for individuals with simple shoulder tendonitis among wheelchair tennis players. The research also aimed to assess the impact of diverse rehabilitation exercises on enhancing certain physical capabilities for individuals with simple shoulder tendonitis among wheelchair tennis players. The research hypothesis stated that there would be statistically significant differences between the pre-test and post-test results of the research group in improving some physical capabilities for individuals with simple shoulder tendonitis among wheelchair tennis players. Research Domains: The human domain consists of a sample of individuals with mild shoulder tendonitis among wheelchair athletes. The spatial domain is the Iraqi Paralympic Committee, Diyala branch, and Dr. Safaa Haseeb Murtheri's clinic. The temporal domain is from 1/12/2022 to 29/1/2023.

**Method and Procedures:**
The researchers used the experimental method with a single group design, as it suits the nature of the research. The study of the problem determines the precise method to be followed by the researcher to arrive at a set of solutions that serve the research. As indicated by the study of Hussein and Yaqoub, the study of the problem determines the selection of the appropriate method suitable for the nature of the study (4).

The sample was intentionally selected from wheelchair tennis players who suffered from simple shoulder tendonitis and were affiliated with the Paralympic Committee of Iraq, Diyala Branch. The sample consisted of six players who were examined by a specialized doctor to confirm the type of injury, and it matched the same degree of injury previously determined by the researchers. From previous studies that have emphasized the effectiveness of rehabilitation exercises and their positive role in improvement, Mustafa Muhammad's study suggested that "using exercises and resistance with different angles for rehabilitation can help individuals return to activity in the shortest possible time" (5). However, the exercises and program used for the shoulder had a positive impact on pain relief and improved range of motion. The importance of exercises in shoulder rehabilitation played a positive role in reducing pain intensity and improving muscle strength and flexibility.

<table>
<thead>
<tr>
<th>Seq.</th>
<th>Variables</th>
<th>Measurement Unit</th>
<th>Arithmetic Mean</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Skewness Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chronological Age</td>
<td>Year</td>
<td>29.83</td>
<td>30.000</td>
<td>0.7527</td>
<td>0.313</td>
</tr>
<tr>
<td>2</td>
<td>Training Age</td>
<td>Year</td>
<td>4.333</td>
<td>4.000</td>
<td>0.5164</td>
<td>0.968</td>
</tr>
<tr>
<td>3</td>
<td>Period of Injury</td>
<td>Day</td>
<td>4.166</td>
<td>3.555</td>
<td>1.602</td>
<td>1.354</td>
</tr>
</tbody>
</table>

Table (1) shows the homogeneity of the research sample in terms of variables (chronological age, training age, and the duration of the injury). The data appears to be normally distributed, as evidenced by the coefficient of variation ranging from 0.313 to 1.354. These values are within the range of 3+-,
indicating the homogeneity of the selected sample.

The research utilized various tools and equipment for data collection, including a goniometer for measuring range of motion, a medical bed or examination table, elastic bands, a 5 kg weighted bar, a computer, a timer, 20 tennis balls, and a medicine ball weighing 1.5 kg. Data collection methods included both Arabic and foreign sources, international information networks (the internet), personal interviews, and statistical methods. The tests used in the research are important for evaluating the athletes' performance and determining the effectiveness of any sports program.

One of the tests used in the research is:

First: Medicine Ball Throw (3kg) with both hands from a seated position on the chair Fadhil and Aws (6) "As cited in the book by Qassim Hassan Al-Mandalawi and others (Tests, Measurements, and Evaluation in Physical Education) The purpose of the test: Measuring the explosive strength of the arms. Performance description: From a seated position on the chair with the trunk restrained, the subject holds the ball above the head and tries to throw it with maximum force. Recording: Three attempts are given to the subject, and the best attempt is recorded."

Second: Front Plank Arm Extension Test for 10 seconds (Luay Kadhum Mohammed) (7). The purpose of the test: Measuring the distinctive strength of the arms.

Performance description: The player takes the front plank position with the body in a straight line. Upon the signal, the subject extends the arms fully.

Recording: The number of correct repetitions within 10 seconds is recorded.

Pilot Study:

The rehabilitation unit for the sample individuals suffering from simple deltoid muscle tendonitis for the shoulder joint of the Iraqi Paralympic Committee in Diyala Branch, totaling six individuals, was conducted on Saturday, November 25, 2022, at 3:00 PM, to ensure their ability to perform the diverse rehabilitation exercises aimed at strengthening the joint. It aimed to identify the suitability of the tools and devices used, understand the duration of each test, and ensure the competence of the assisting team. The rehabilitation unit was executed with the assistance of the team members to discover any difficulties faced by the researchers and the team and find solutions.

The Pre-test:
The pre-test was conducted on the research sample on Tuesday, 29/11/2022, at 3 PM at the Iraqi Paralympic Committee, Diyala branch, where the tests were carried out.

The Main Experiment: The main experiment was conducted starting from Thursday, 1/12/2022, until Sunday, 29/1/2023, over (8) weeks, with a frequency of (3) rehabilitation units per week, amounting to a total of (24) rehabilitation units.

The researchers presented the rehabilitation program to experts and specialists in sports medicine and rehabilitation and orthopedic doctors. The program included specific exercises for strengthening the shoulder.

Post-test: The post-test measurements were conducted on Wednesday, 1/2/2023, at 3 PM. The same pre-test examinations were reapplied under the same conditions at the Iraqi Paralympic Committee, Diyala branch, with the assistance of the support team.

Statistical Tools: The SPSS statistical software package was used to process the test results.

Results:

<table>
<thead>
<tr>
<th>Variables</th>
<th>The Tests</th>
<th>Arithmetic Mean</th>
<th>N</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine Ball Throw</td>
<td>Pre-Test</td>
<td>4.587</td>
<td>6</td>
<td>0.538</td>
<td>0.220</td>
</tr>
<tr>
<td></td>
<td>Post-Test</td>
<td>7.053</td>
<td>6</td>
<td>0.936</td>
<td>0.382</td>
</tr>
</tbody>
</table>
Table 3 It shows the mean of differences, standard deviation of differences, the t-value, and the Error Percentage

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-Test</th>
<th>Deviation of differences</th>
<th>Arithmetic mean differences</th>
<th>T-value</th>
<th>Error Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine Ball Throw</td>
<td>8.167</td>
<td>6</td>
<td>1.472</td>
<td>0.601</td>
<td></td>
</tr>
<tr>
<td>Post-Test</td>
<td>15.500</td>
<td>6</td>
<td>2.588</td>
<td>1.057</td>
<td></td>
</tr>
<tr>
<td>Frontal Arm Stretch and Flexion</td>
<td>-7.333</td>
<td>1.211</td>
<td>0.494</td>
<td>14.832</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Discussion:**
The results of the tests in tables (2) and (3) indicate significant statistically meaningful differences between the pre-test and post-test in favor of the post-test. The researchers attribute the observed changes between the pre-test and post-test to the inclusion and diversification of exercises (strength, flexibility, and resistance) within the rehabilitation program for the shoulder joint. This highlights the effectiveness of the prepared program and the significant positive impact of the utilized exercises. The designed exercises contributed to an increase in muscular strength, and pain reduction, are indicative of the healing process. Improving shoulder joint muscular strength helps alleviate pain, as emphasized by McKenzie, who states that "exercises should be carefully performed to include levels that prevent pain" (8). As indicated in the study by Iman Kadhum, it is not possible to establish a fixed rule for every rehabilitation program. Instead, each medical case should have a tailored program, considering the composition of the rehabilitation content and the progression in exercises (9). Gradual progression in providing resistance contributes to increasing muscular strength and improving the range of motion, as mentioned by Athraa and Suaad: "Planning the rehabilitation program and gradually increasing resistance had a significant impact on improving the range of motion" (10). Gradation in exercises serves as a preventive measure against changes and disruptions that occur within ligaments and joints. Exercises should be graduated according to the player's condition, starting from negative and assistive exercises, gradually progressing. Wheelchair tennis, like other sports, requires various capacities (physical, skill-based, and motor skills). This is in line with a study by Zainab and Widad, which emphasized the importance of the integration of physical capacities in players, particularly the arm muscles, to achieve good results (11). Additionally, the study by Alaa and Suaad highlighted the positive impact of using static stretching exercises on developing the range of motion, as gradual increases contribute to increased muscle strength and enhance endurance capacity. Furthermore, these exercises did not leave any negative effects; instead, they yielded positive results (12). Therefore, diversity in the training program and the adoption of modern methods, in line with the latest developments, significantly contribute to improving various physical and skill-based indicators. The researchers believe that diverse rehabilitation exercises have played a crucial and effective role in enhancing the physical capabilities of those suffering from shoulder tendonitis, increasing strength, and alleviating pain.

**Conclusions:**
In light of the research objective, hypotheses, and procedures, the researchers have concluded the following:

1. The varied rehabilitation exercises used in improving physical capabilities and speeding up the recovery of shoulder tendons had a significant positive impact.
2. The effectiveness of practicing the prepared rehabilitation exercises resulted in a positive effect on the speedy recovery of the injured tendons and an improvement in the group members' condition.

3. The diversity of rehabilitation exercises, whether they were physical, skill-based, or movement-based, favored the enhancement of capabilities.

**Recommendations:**
1. It is essential to utilize exercises to enhance physical capabilities.
2. Emphasize the development of rehabilitation programs based on scientific principles that prepare athletes physically, kinetically, functionally, and psychologically.

**Author’s declaration:**
**Conflicts of interest:** None
We confirm that all tables and figures in this article are ours and written by the researchers themselves.

**Ethical-Clearance:** this manuscript approved by local ethical committee of physical education and sport sciences college for women on (October /2023)

**Author’s contributions:**
All contributions of this study were done by the researchers (A.H. and L.A.) who get the main idea and work on writing and concluding also with number of experts, Hussein Hamza Al-Ibady (Ministry of Education/ Babil education directory) in Statistics, Stuart Biddle in revision, Inaam Ghalib in translating, Haifaa Ahmed in proofreading

**Facilitate the task:** this study was supported Iraqi National Paralympic Committee – Iraq.

**References:**


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**Appendix (1)**

Names of experts and specialists whose opinions were surveyed regarding the most suitable test fixation

<table>
<thead>
<tr>
<th>Seq.</th>
<th>Name</th>
<th>Academic Title</th>
<th>Workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prof. Dr. Basel Abdul Sattar</td>
<td>Professor</td>
<td>College of Physical Education and Sport Sciences, Diyala University</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Safaa Haseeb Mutheri</td>
<td>Doctor</td>
<td>Baqubah General Hospital</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Oras Adnan</td>
<td>Professor</td>
<td>The Paralympic Committee</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Ali Hussein Al-Awadi</td>
<td>Professor</td>
<td>Al-Qadisiyah University</td>
</tr>
</tbody>
</table>

**Appendix (2)**

Some of the Used Rehabilitative Exercises

<table>
<thead>
<tr>
<th>Unit</th>
<th>Exercises</th>
<th>Time</th>
<th>Repetitions</th>
<th>Rest</th>
<th>Rest between each set</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Lifting a rod with both hands from a lying down position from below and returning it upwards.</td>
<td>6 seconds</td>
<td>8</td>
<td>5 seconds</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Holding the rod and extending one arm with the elbow bent at a 90-degree angle.</td>
<td>6 seconds</td>
<td>8</td>
<td>5 seconds</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>From a side-lying position, extend the lower part of the arm above the head.</td>
<td>6 seconds</td>
<td>8</td>
<td>5 seconds</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>From a prone position on top of the table, extend the arms and rotate them.</td>
<td>6 seconds</td>
<td>8</td>
<td>5 seconds</td>
<td>2</td>
</tr>
</tbody>
</table>
Pulling the elastic band from a sitting position. 6 seconds 8 5 seconds 2 30 seconds
Pulling the elastic band and rotating the shoulder outward. 6 seconds 8 5 seconds 2 30 seconds
Lift the arm to your side and turn the palm upwards, ensuring that the arm does not rise above shoulder level. 6 seconds 8 5 seconds 2 30 seconds

Holding the medicine ball above the head and then lowering it. 6 seconds 8 5 seconds 2 30 seconds
Spreading the arms to the side by holding dumbbells. 6 seconds 8 5 seconds 2 30 seconds
From in front of the chest, extend the arms holding the weight and pull it up behind the head. 6 seconds 8 5 seconds 2 30 seconds

Appendix (3)
Pain Assessment Form

Visual Analogue Scales

No pain

Pain as bad as it could possibly be

0 1 2 3 4 5 6 7 8 9 10

No pain

Worst possible pain
تأثير التمرينات التأهيلية في تحسين بعض القدرات البدنية للمصابين بالتهاب اوتار الكتف البسيط للاعبي الكراسي المتحركة

آية حسن عبد الأمير1, لقاء علي عناد2

1& 2 جامعة بغداد/ كلية التربية البدنية وعلوم الرياضة للبنات

التهاب الأوتار في الكتف من الإصابات الشائعة للاعبي الكراسي المتحركة والتي تحدث نتيجة للعادات والحركات الخاطئة والغير صحيحة. وتحدد أيضاً بشكل متكرر في الرياضات التي تتطلب تحريك الذراع فوق الرأس مما يؤدي إلى اضعاف اليوتر. إذ أن مفصل اليوتر يعمل في كل الاتجاهات عندما تعاي الأوتار المحيطة بفصل اليوتر من الضغط. وضغط العضل على العضلة. إذ يطلق عليه التهاب اوتار الكتف والتي تحتاج إلى فترة طويلة للشفاء للعودة للممارسة النشاط الرياضي.

وفي اغلب الأحيان تبعد اللاعب عن ممارسة التمارين بسبب فئة تتوزع البرامج التأهيلية في التمرينات العلاجية. لالتهاب اوتار الكتف الكف. أثارت الباحثتان لأعداد تمرينات تأهيلية لإصابة التهاب اوتار الكتف البسيط محاوللا الإفادة منها في تحسين القدرات البدنية وتعزيز نسبة الشفاء ومساعدة المعالجين لإعداد المناهج التأهيلية وتوظيف نتائجها لخدمة الإصابات الرياضية للأطراف العليا للحد من الإصابة. إذ هدف البحث إلى اعداد تمرينات تأهيلية للمصابين بالتهاب اوتار اليوتر البسيط في تحسين بعض القدرات البدنية للاعبي الكراسي المتحركة وقد تم استخدام المنهج التجريبي بنظام المجموعة الواحدة نظراً لملائمته لطبيعة المشكلة. وتم تحديد عينة البحث بالطريقة العددية. وهم من المصابين في اللجنة البارالمبية العراقية والذي يمثلون مجتمع البحث نفسه البالغ عددهم (6) مصابين من اصل (10) وبعد عدة مراجعات قامت بها الباحثتان لعيادة الدكتور صفاء حسيب أخصائي المفاصل والإصابات الرياضية بتاريخ 2022/12/1 إلى 2023/1/1 تم تحديد درجة الإصابة وهي من الدرجة المتوسطة. إذ تم وضع التمرينات التأهيلية على اساس درجة الإصابة. وقد حققت الباختنا من نتائج الدراسة باستعمال الحبيبة الاحصائية SPSS حيث أثبت النتائج إيجابية التمرينات المتنوعة. ومدى فاعليتها في تحسين القوة العضلية والمدى الحركي والشفاء. وكما توصيتنا إلى عدة استنتاجات، وكانت أهمها: إن البرنامج التأهيلي كان له إيجابية في تحسين القدرات وتخفيض الألم، وهذا ما يحقق أحد اهداف التنمية المستدامة للأمم المتحدة في العراق (الصحة الجيدة) وتوصي الباحثتان بضرورة الاهتمام بالتمرينات التأهيلية التي تهدف إلى تقوية عضلات مفصل الكتف.

الكلمات المفتاحية:
- تمارين تأهيلية
- أوتار الكتف

https://jcopew.uobaghdad.edu.iq/