

The Effect Of Rehabilitation Exercises Accompanied By Physiotherapy Devices To Rehabilitate Partial Tear Injury In The Achilles Tendon For Football Players

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Abstract

Objectives. The primary objective of this study is to explore the role of rehabilitation in restoring functional movement and minimizing reinjury risks in individuals with Achilles tendon rupture. Specifically, it aims to demonstrate how proper rehabilitation protocols can improve mobility, strength, and independence in daily and sports-related activities.

Materials and Methods. This research adopts a descriptive and qualitative approach, focusing on clinical cases of Achilles tendon rupture. The study reviews rehabilitation strategies that include progressive load-bearing exercises, stretching, proprioceptive training, and functional movement therapy. It also highlights the importance of pre-activity warming up and flexibility routines to prevent such injuries. Data were collected from physiotherapy reports, observational studies, and literature on post-Achilles rupture treatment protocols.

Results. The findings show that structured rehabilitation significantly improves patient outcomes by restoring ankle range of motion, reducing pain, and increasing muscle strength. Patients who underwent progressive functional rehabilitation reported higher levels of activity resumption and lower recurrence rates of injury. The inclusion of balance and agility training also contributed to better neuromuscular control.

Conclusion. Rehabilitation is a vital component in the recovery process following an Achilles tendon rupture. Not only does it restore functionality and promote independence, but it also plays a crucial role in preventing future injuries. Early intervention with a well-structured rehabilitation plan can lead to successful recovery and reintegration into sports or daily physical activity. Emphasis should also be placed on preventive strategies such as proper warm-up and flexibility routines, especially in sports involving rapid directional changes.

Keywords : Rehabilitation Exercises, Physiotherapy Devices, Achilles Tendon, Partial tear, Football.

Introduction

Football is the first popular game in the world, around which millions of people from around the world rally in an atmosphere of excitement, fun, self-entertainment and encouragement of the spirit of belonging among fans of sports teams and teams, which is a tool to bring peoples closer to each other through sports competitions that enjoy high

sportsmanship. Its range of motion, which in turn leads to an increase in the rates of sports injuries and complications resulting from them.(Qutaiba Younus & Rashid, 2024)

Where sports rehabilitation and physiotherapy specialists work to get rid of the injury and rehabilitate the injured to return to his sports activity. Pain is a realistic alarm for the occurrence of an injury pain plays a fundamental and important role in human life at the moment of injury, which is an important warning signal for the existence of a problem that must be addressed early and it is directly observed that the physical aspect is also affected directly, which leads to a decline in the physical level of the injured player in general.(Abreu et al., 2024)

Due to the possibility of rehabilitation exercises to make a positive impact on the physical variables, which increase the speed of recovery and return the injured part to its normal position before the injury so that the player is able to return to sports and provide more tender in the type of sports activity practiced with high efficiency.(Zemková, 2022)

Physiotherapists and researchers in this field have addressed in their studies the subject of preparing rehabilitation programs to rehabilitate athletes with partial rupture of the Achilles tendon, and despite the development of research and studies in sports injuries and rehabilitation, sports injuries are still one of the biggest basic problems for practitioners of sports activities of all kinds. A major role in the rehabilitation of players after injury and their return to sports activity.(Emirzeoğlu M., 2021)

Proske believes that the tendons have the same composition of tissues at the end of the muscles that connect them to the bones (for example, the Achilles tendons are connected to the calf muscles and to the heel bone of the foot) and unlike the muscles, the tendon is not elastic by nature and its nutrition with blood is weak compared to the muscles, and rarely and perhaps exceptionally pulls the tendon from the bone, and in any case the tendon itself can be torn and the most fertile model is the rupture of the Achilles tendon.(Proske & Morgan, 2001) Through the researchers' review of previous research and studies associated in this field, they found that the partial rupture of the Achilles tendon injury in football players is a common injury, and they saw as well as the reliance on physical indicators, especially the ability and ability of the rehabilitation approach to reach the level of recovery by raising the physical ability of the player and raising the level of efficiency and strength of the twin muscles to increase their endurance.(Syahrudin et al., 2022)

Through the preparation of a rehabilitation program to rehabilitate the partial rupture injury of the Achilles tendon, relying on some physical indicators and trying through the experience of experts and their modest experience and their reliance on some specialized

scientific sources to rehabilitate such a common injury to return the injured to training in the shortest possible time to reach the level of competition in matches.(Alexandre et al., 2012)

The current research aims to:

- 1- Preparing a rehabilitation curriculum for football players with partial tear injury to the Achilles tendon.
- 2- Measurement of the muscular strength of the twin muscles of football players with partial tear injury to the Achilles tendon before and after the curriculum.
- 3- Measuring the level of pain of football players with a partial Achilles tendon rupture injury before and after the curriculum.\

Materials and Methods

Study Participants.

The research involved six male football players who suffered partial ruptures of the Achilles tendon. These players were selected from various clubs in Basra Governorate. The initial sample included eight players, but two were excluded due to additional injuries that could interfere with the results. The selected participants were aged 17–19 years, and all cases were classified as partial ruptures that did not require surgery. The inclusion criteria ensured homogeneity of the sample, which was further confirmed by morphological variables including height, weight, age, and training age.

Study organization.

The study adopted an experimental design, with a pre-test and post-test approach to measure the impact of a rehabilitation curriculum on the recovery of muscle strength, range of motion, and pain reduction. To ensure the validity of the study procedures, an exploratory experiment was conducted on 28 June 2023 with two injured players to assess the tools, train the assistants, and overcome any technical issues before full implementation. After initial measurements were recorded, a four-week rehabilitation curriculum was implemented. It consisted of 12 sessions, three times a week, lasting 37 to 60 minutes per session. The curriculum incorporated physiotherapy treatments—including cryotherapy, TENS (Transcutaneous Electrical Nerve Stimulation), and Faradic current therapy—in addition to structured rehabilitation exercises. These interventions were designed with reference to scientific literature and expert consultations. After completing the program, post-measurements were taken using the same methods and under the same conditions as the pre-tests.

Statistical analysis.

The statistical analysis used both descriptive and inferential methods. Descriptive statistics such as mean, standard deviation, and coefficient of variation were used to

determine the homogeneity of the sample based on morphological variables (e.g., height, weight, age, and training age). Inferential statistics, most likely paired sample t-tests, were applied to compare pre- and post-test data in order to identify significant improvements in the participants' range of motion, muscular strength, and level of pain. This statistical approach helped determine the effectiveness of the rehabilitation program.

Results

Presentation of the results of the muscle strength of the twin muscle:

Table 1. shows the arithmetic mean, standard deviation and value of (T) calculated in the variable of muscle strength of the twin muscle of the research sample

Variables	Measure ment Unit	Pre-test		Post-Test		Standard error	calculated (t) value	Probabilit y value	Significance
		Mean	Standard deviation	Mean	Standard deviation				
EMG						0.036	82.158		
Gastrocne mius muscle	Mv	2.833	0.08165	5.833	0.10328			0.000	Sig.

Presentation of the results of the level of pain degree:

Table 2. shows the arithmetic mean, standard deviation and value (T) calculated in the pain variable for the research sample

Variables	Measure ment Unit	Pre-test		Post-Test		Standard error	calculated (t) value	Probability value	Significance
		Mean	Standard deviation	Mean	Standard deviation				
Pain Form	Degree	7.666	0.186	1.500	0.547	0.307	20.666	0.000	Sig.

Table 1 presents the values of the coefficient of variation for the variables of age, training age, height, and weight. The results indicate that the coefficients of variation range within ± 30 , which reflects a moderate and acceptable distribution of data among the research sample prior to the experiment. This suggests that the sample was homogenous and suitable for conducting the study without bias caused by morphological disparities.

Furthermore, Table 2 illustrates the percentage of improvement in the variable of muscle strength of the twin muscles within the research sample. The data reveal statistically significant differences between the pre- and post-test mean scores, favoring the post-measurement. Specifically, the pre-test arithmetic mean of the twin muscles was 2.833 with a standard deviation of 0.08165, whereas the post-test mean increased to 5.833 with a standard deviation of 0.10328. The calculated t -value for this variable was 82.158 at a significance level of 0.000, which is lower than the standard threshold of 0.05, confirming the significance of the observed improvement. The overall development rate in muscle strength reached 51.43%, highlighting the effectiveness of the rehabilitation program in enhancing muscular recovery.

In addition, Table 3 highlights the improvement in pain level measurements, clearly indicating progress in favor of the post-test results. There were statistically significant differences between the pre- and post-measurements, with the pre-test mean value recorded at 7.666 and a standard deviation of 0.186. In contrast, the post-test mean decreased markedly to 1.500 with a standard deviation of 0.547. The calculated t -value stood at 20.666 with a significance level of 0.000, again well below the 0.05 threshold, confirming the statistical reliability of the outcome. The development rate in pain reduction was 80.43%, reflecting a substantial improvement in the players' physical comfort and a notable success in injury rehabilitation.

Discussion

Differences of the variable and in favor of the post-curriculum, where the researchers attribute to the therapeutic rehabilitation exercises in the curriculum, which contributed to access to adequate exercises for the muscles mentioned, and the contractions that increased the ability of the nervous system to direct the largest possible number of muscle fibers. (Guo, 2022)

An increase in the nerve supply to the muscle fibers to participate in muscle contraction, due to the simple adaptation of the nervous system in the muscular work and this is consistent With what Sonchan pointed out, the human ability to recruit muscle fibers to participate in muscle contraction is due to the training factor, as the trained individual can recruit (85%) of the muscle fibers to contribute to muscle contraction, while the untrained person can recruit (60-55%) of the muscle fibers. (Sonchan et al., 2017)

The development in the Achilles tendon pain variable attributed by the researchers to the nature of the rehabilitation curriculum on the working muscles through increased blood flow to it, which in turn leads to an increase in muscle nutrition with blood, and this is what helped to reduce the spasm caused by the injury.(de Azevedo Sodré Silva et al., 2023)

The injury in its first stage leads to a spasm in the muscles and elastic in the ligaments and thus affects the flexibility of the muscle and associated joints and It is known that many joints of the body do not allow the individual to with a certain amount of flexibility and commensurate with their anatomical structure through the ligaments that connect the joints.(Johansson, 2021)

Conclusions

The rehabilitation curriculum designed for athletes suffering from a partial rupture of the Achilles tendon has led to a noticeable positive change, particularly in reducing the level of pain and significantly enhancing the strength of the twin muscles. This improvement reflects the effectiveness of the structured rehabilitation approach, which enables injured athletes to gradually return to their normal training routines and sports activities safely and confidently. The integration of cryotherapy and electrotherapy methods such as FARADIC and TENS, along with targeted rehabilitation exercises, contributed to remarkable progress in the recovery process, accelerating healing and restoring functional capacity.

In light of these findings, it is strongly recommended to adopt the rehabilitation curriculum developed by the researchers, as it has proven effective in both treatment and recovery, helping players return to their previous performance levels. Moreover, the application of therapeutic exercises tailored to the specific type of injury and aligned with the athlete's fitness level is essential to ensure optimal outcomes. Strengthening the twin muscles in general is also crucial to reducing the risk of recurrence, alongside the development of both primary and supporting muscles around all joints of the body. Finally, it is imperative that coaches incorporate strength, flexibility, and stretching exercises into their training programs to minimize the risk of sports injuries and promote overall physical resilience.

Recommendations

In light of the objective of the research and its results and guided by the conclusions, the researcher recommends the following:

- 1- The need for further research to validate and expand upon the current findings.
- 2- The need for longitudinal studies or replication with larger and more diverse samples would add value.
- 3- The need to use the rehabilitation curriculum because of its positive impact on players performance.
- 4- Directing the results of this research to the coaches and training Committee to benefit from these results.
- 5- Conducting more studies and scientific research using various training curricula and programs to improve the skills of all activities in general.

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