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The Effect of a Rehabilitation Program on Improving Knee Joint Range of Motion in Injured Basketball Players

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Abstract

Sports Medicine is unique as the injuries and treatments require specialized considerations in both diagnosis, treatment, and recovery. The frequency of these injuries has increased in athletes, especially in sports that require contact with the opponent, like basketball. This study is important in that it intends to be able to perform pain-free training until the back to baseline with physiotherapy devices, isometric exercises and moderate progressive load increases from easy to difficult. The following is the central research question: because some injuries are such that a patient cannot have control of a given range of motion, and this will weaken the knee. Precisely, there is a critical demand to develop targeted rehabilitation for restoration of knee function in athletes, mainly on basketball players that meet the game's requirement. One of the suggested approaches is to apply training doses at different intensities to help the joint and surrounding muscles recover their natural strength, build up reserves and get back to normal resistance capacity. Thus the purpose of this study is to create a re- habilitation program with an androgenic/anabolic enhancing effect, helping post trauma basketball players im- prove their knee joint mobility.

Keywords: Knee Rehabilitation, Range of Motion, Basketball Injuries, Physiotherapy.

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Introduction

Basketball players injuries are of special category and require more attention for diagnosis, management and rehabilitation. Contact sports such as basketball, are becoming more popular with the attendant increase in injury rates among athletes. The knee joint, which is complex in structure, insured easily. The angle of the knee joint is a major factor in the amount of stress placed on it, and this is increased by athletic activities. The knee joint can move approximately to 130 degrees but injuries may change the range of motion. This can be modified by a multitude of extrinsic factors such as injuries producing pain during the movement of joint flexion and extension. Pain-free training can be implemented until the range of motion returns to its normal state through the use of physiotherapy equipment, isometric exercises, and gradual loading from easy to difficult. In certain types of injuries, reduced control over the range of motion is one of the consequences that weakens the knee joint. Therefore, there is an urgent need to design rehabilitation programs specifically for basketball players, in line with the specialized performance requirements of athletes. Among these rehabilitation approaches is the application of training doses with varying intensities to help the joint and muscles regain their natural strength, restore function, and return the range of motion to its normal level. Accordingly, the researcher developed a therapeutic program to rehabilitate the range of motion of the knee joint in injured basketball players using physiotherapy devices along with physical and rehabilitation exercises. The main aim is to develop a treatment program to improve the knee joint range of motion in injured basketball players.

Several previous studies have addressed similar issues. One such study is by Muhammad Abdullah Jinjun (2017), which examined the effect of exercises using a specially designed device in the rehabilitation of the anterior cruciate ligament (ACL), some biomechanical variables, and motor abilities in injured athletes. The research method was experimental, with a sample of four individuals with ACL tears, and the rehabilitation program lasted eight weeks. The present study complements previous research but differs in the design of the rehabilitation exercises. The researcher in the current study introduced a pre-surgical phase for complete ACL rupture, which previous studies did not include. Additionally, the previous study used only one phase of rehabilitation, whereas the current researcher employed all rehabilitation phases: pre-surgery (one and a half months) and post-surgery (six months), along with physiotherapy methods appropriate for each rehabilitation stage.

Another relevant study reached is by Wissam Shalal Muhammed (2016) with the title " A Proposed Rehabilitation Program for the Muscles Acting on The Knee Joint After Anterior Cruciate Ligament (ACL) Reconstruction". The problem of this research centered on the

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weakness of muscles around the knee joint after reconstruction of the ACL. The purpose was to assess the effect of the rehabilitation program on these muscles. The null hypothesis was that the experimental intervention would have no influence. The investigator used an experimental design consisting of a control and experimental groups of pre- and prostrating testing. The sample included six athletes with reconstructed ACL. Observation: utilized observation, experimentation, measurement and other tests as research tools. The study concluded that the proposed rehabilitation program developed the strength of the thigh muscle groups after ACL reconstruction more rapidly than the standard program used in hospitals. The present researcher notes that the current study resembles that of Wissam Muhammad in terms of the rehabilitation method used, the type and degree of injury, some of the movements performed during thigh muscle rehabilitation exercises, and certain tests employed in the research. However, the studies differ in program design, sample size, and the additional exercises utilized.

Methodology

The two researchers used the experimental method with a one-group design, as it was appropriate to the nature of the problem. One of the fundamentals of scientific research is selecting a suitable sample, upon which the study is based. The research population consisted of 15 basketball players, from whom the sample was intentionally selected, totaling 10 injured players. Regarding the tools and techniques employed by the researchers, and in light of scientific advancement, the researcher sought to use the latest methods, instruments, and technologies in diagnosis, as well as the most modern physiotherapeutic devices relevant to rehabilitating the injury under investigation. Research instruments are defined as “the means by which a researcher collects data” (Ahmed Hilmi et al., 1999).

The instruments used were as follows:

1. X-ray machine, Philips, German-made, model 1-1 0, 0
2. Spiral CT scan
3. Magnetic resonance imaging (MRI)
4. Laser device, Frared 533 – K3, manufactured in Germany, 2006
5. Short Wave device (Japan), 2007
6. Ultrasound therapy device (Zimmer), German-made, serial no. 77323, 2006
7. Electrical stimulation device (Zimmer), 2007

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Test Name: Measuring Knee Joint Range of Motion

This was performed using a goniometer by fixing the device to the outer side of the knee joint and flexing the joint at each angle starting from 0° up to 180°.

As for the procedures undertaken, the researchers examined the available resources at Ibn Sina Center for Medical Rehabilitation and Physiotherapy in Baghdad. A pilot study was conducted on 10 June 2023 on a group of 15 injured basketball players at the Ibn Sina Specialized Center for Physiotherapy and Medical Rehabilitation in Baghdad. The purpose of this pilot experiment was to identify any obstacles that might accompany the implementation of the test and to address and overcome them if present, in addition to determining the necessary number of assistants and training them in test administration.

The pre-test for the research sample was then administered on 18 June 2023 at the same center. The researchers made every effort to standardize the conditions related to the test (location, tools, equipment, implementation method, and assisting staff) to ensure their availability in the post-test.

The method followed by the researchers was a rehabilitation program for injured basketball players (the research sample as one group), taking into consideration the devices, equipment, tools, and resources available to support the implementation of the proposed rehabilitation program and achieve the goal of restoring the natural range of motion or reducing the impact of injury.

The program was implemented from 25 June 2023 to 25 October 2023, totaling 16 weeks. The number of rehabilitation sessions was 48, equivalent to three sessions per week. Each session lasted 120 minutes and involved therapeutic exercises and devices specialized for injury rehabilitation, with a total of 96 hours.

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Results

Table (1) *shows the mean and standard deviation values for the knee joint range of motion test in the pre-test and post-test, along with the calculated Wilcoxon Z value, its significance level, and the statistical significance of the differences.*

Measured Variables	Pre-test		Post-test		Z Value	Significance Level
Knee Joint Range of Motion	1.140	6.992	1.300	0.00	-2.859	0.004

Table (2) *shows the mean and standard deviation values, the calculated Friedman test value, and the significance of differences for the knee joint range of motion test across the pre-test, mid-test, and post-test.*

Measured Variables	Test	Mean (S)	Standard Deviation (SD)	Friedman Value	Significance Level
Knee Joint Range of Motion	Pre-test	1.140	6.992	17.688	0.00
	Mid-test	1.270	4.830		
	Post-test	1.300	0.00		

Discussion

The results of the knee joint range of motion test, as shown in the table above, indicate that the mean value for the post-test was higher than that of the pre-test, while the standard deviation for the pre-test was greater than that of the post-test. This is because the full range of motion of the knee joint is from 0° to 130°, and the injured participants achieved a full range of motion in the post-test. The calculated Wilcoxon value of -2.859, compared to the significance level of 0.004, indicates a statistically significant effect, demonstrating that the therapeutic program had a positive impact on knee joint range of motion.

The table also shows that the mean for pre-test was 1.140, with a standard deviation of 6.992. On the other hand, the mid-test yielded a mean of 1.270 and standard deviation of 4.830 indicating a significant difference in favor of middle test. The post test results showed that there was mean score 1.300 plus or minus zero. The Friedman test was used to compare the observed differences, and the obtained value was 17.688. Compared with the level of 0.00, this result validated that the differences were significant in statistics by supporting more post-test.

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The researchers attributed these results to the positive effect of the therapeutic program using physiotherapy devices. These interventions enabled the knee joint to reach its normal range of motion of 130°, which was fully achieved in the post-test, as all participants exhibited a normal range of motion. The use of rehabilitation equipment, such as stair and treadmill devices, laser therapy, ultrasound, and electrical stimulation, contributed to restoring joint flexibility. Increasing flexibility stretches the elastic tissues beyond their natural limits and maintains them in this position for a few moments. Repetition of this process allows the tissues to adapt to their new limits. Greater body flexibility reduces the risk of injury during sports or physical activities and enhances skill performance (Nahida Abdul Zaid, 2008).

Conclusions

The therapeutic program has a positive effect on improving the range of motion of the knee joint and restoring it to its normal state.

Recommendations

1. Apply the proposed therapeutic program to other samples.
2. Utilize more advanced therapeutic devices for rehabilitating the knee joint in athletes.

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