

THE EFFECTS OF USING A REHABILITATION EXERCISE PROGRAM THAT COMBINES STATIC AND DYNAMIC EXERCISE TO IMPROVE KNEE JOINT HEALTH AND EXPAND PATIENTS' RANGE OF MOTION

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Abstract

This study aims to determine the impact of applying Static Exercise (SE) and Dynamic Exercise (DX) to rehabilitate and increase the range of motion for individuals with knee joint problems. Due to its applicability to the nature of the research, the experimental design is used in the pre- and post-measurement method, and the study population is made up of patients with knee joints in the years 2020–2021. The research sample is purposefully chosen from (10) people with injured knee joints, and there is only one experimental study. The study's results indicate that there are post-test advantages over pre-test differences that are statistically significant.

Keywords: Static exercise. Moving exercises. Rehabilitative exercises. Dynamic exercise.

Introduction

Rehabilitative Exercises (RE) have gained popularity recently to the point where some therapeutic schools solely rely on them to treat postural abnormalities and sports injuries, with no additional interventions like medication, injections, or refractories, with the exception of situations where surgery is required, such as cartilage rupture. When it comes to recovering from surgeries and resuming daily activities for non-athletes and athletes alike, the ruptures are the most crucial, if not the most crucial factors. Thus, RE are considered one of the means of movement therapy, and they play their role in maintaining the health and fitness of the injured individual, by reducing the complications of the vital systems in the body (Husseini et al., 2023). Exercises for rehabilitation are a crucial component of integrated injury treatment because they serve as the central axis and unifying factor in the management of injuries. Through a program consistent with the method used in rehabilitation, rehabilitation depends on exercises of all kinds, and it depends on the type of injury and diagnosis, in order to restore the injured part to its condition prior to the injury and increase its functional efficiency as soon as possible (Karmajouna et al., 2021).

Therapeutic exercises, both negative and positive, are one of the means of motor rehabilitation, and it is one of the most important steps of motor therapy for the injured. In order to prevent complications with the body's vital systems and the effects this has on the injured person's psychological state, physical exercise is crucial to maintaining the health and fitness of the injured person (Maitham et al., 2021). The selected exercises don't have to be uncomfortable or painful, but they do need to be planned out so that he can benefit from them and accomplish their intended purpose, which is to rehabilitate the various body systems, including the muscular system by training healthy muscles above the level of injury, the nervous system by creating new sensory and

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nervous pathways, and the heart, circulatory system, and respiratory system. Through the rehabilitation of motor functions and their development as kinesthetic and physical factors to enhance motor skills, all of this would help to rehabilitate the moving parts of the body as well as the parts of the body with physiologic defects (Mohammed et al., 2021).

One of the most common sports injuries is the knee joint, as it is considered one of the most common areas. The body is susceptible to injury, and this may be due to the anatomical characteristics of this joint despite the stabilizing factors surrounded by ligaments and muscles.

In the field of injury rehabilitation, the researcher noticed the frequent incidence of injury at this age, especially in the shoulder joint, and through the researcher's follow-up of the physiotherapist for sports injuries, their work, and their follow-up to analyze the current rehabilitation programs for the injury of the anterior cruciate ligament of the knee joint, in addition to the continuous change in the method of physical therapy accompanying the program. The development of medical devices has led us to the fact that there is no player's use of RE during treatment for sports injuries, and this leads to the occurrence of some pathological manifestations for them after the end of their hospitalization period, such as infections accompanied by limited and difficult movement of the joints (Bezucha et al., 1982). As a result, RE must be viewed as a means to activate the player's motor system (muscular and articular) on the one hand, and a means to maintain the appropriate level that allows the rest of the physiological organs of the body to work with on the other. The study aims to develop a program of RE that used static and DXs to rehabilitate and increase the range of motion in patients with knee joint problems. The purpose of this study is to determine the effect of a rehabilitative exercise program that used static and DXs to rehabilitate and increase the range of motion in patients with knee joint problems.

Methodology

Research hypotheses

Based on what came from presenting the research problem and its objective. We assume the following: H: There are statistically significant differences between the results of the pre and post-tests of the research variables and in favor of the post tests.

In order to match this type of scientific research methodology with the nature

of the research problem and its goals, the researcher used the experimental approach to test the research hypothesis. In addition, it is the type that produces the most accurate and efficient results because "it is based on the scientific experiment to detect the causal relationships between the variables, in light of controlling all the factors affecting the variable or the dependent variables, except for one factor that the researcher controls and changes for the purpose of measuring its impact on the variable or dependent variables.", (Kandilji, 1999). It was an experimental design (one group with a pre and post-test), and the research community, which included (10) knee osteoarthritis patients, was chosen intentionally.

Tools and devices used in the research: The researcher used tools, devices, and some scientific means that allow him to gather information and data in order to come to accurate scientific conclusions. Regarding the equipment and devices utilized for the study (Suha & Abeer, 2023):

- **Research tools:**

- ✓ Data registration forms.
- ✓ Measuring tape.

- **Used devices:**

- ✓ A device for measuring height and weight
- ✓ Electronic calculator.
- ✓ Stopwatch.
- ✓ The goniometer device is used to measure the range of motion of the knee joint (angles).

The researcher selected the next test (Maas et al., 1989):

Measurements of the knee joint's range of motion angles: A clear indicator of the presence of an injury in the knee joint is the range of motion. In order to do this, the researcher used the following test to gauge the knee joint's range of motion.

Measurement of knee flexion angles:

The purpose of the test: measuring the range of motion of the knee joint by

Table 1: Showing the means, standard deviations, and significance of differences between the motor range test results from the pre- and post-test.

Tests		Pre-test		Post-test		average variances	deviation of variances	sig	significancy
Kinetic range (degree)	forward flexion	92	1.8675	97	1.2343	5	1.4345	0.000	significant

Significant (sig) ≤ 0.05 at degree of freedom (9).

the movement of the leg towards the thigh, i.e. flexion of the joint.

Tools used in the test: a goniometer, a flat chair.

Description of the performance: the injured person extends his injured leg and then bends the joint as far as he can go while sitting in a flat chair. The researcher uses a goniometer to measure the injured person's range of motion as they perform the test.

Keeping track: The value is determined by reading the angle that the goniometer pointer indicates after making two attempts to take the best reading. The program of rehabilitation exercises that involves both applying and moving exercises restores the knee joint's fundamental functions. And increase the muscle strength of the injured muscle groups. It improves the movement of the affected joint, increases the flexibility of the muscles that support it, and lessens pain perception as much as possible. The exercises must be in line with the general objective of the program, with a gradation from easy to difficult and a gradation in the severity of the load, for the purpose of restoring the basic functions of the muscles working on the knee joint and the return of the primary functions of the joint and the muscles that support it to the player who is the closest to being in good health. The injured person should as soon as possible return to his regular daily activities and engage in specialized activity in the same level of functional and physical fitness that he did prior to the injury (Hietanen, 1984). The two types are typically combined in a single session, beginning with SE, then using moving exercises to increase muscle tone by immobilizing the joints. SEs are used to prepare the muscles around the knee because, while performing them, muscle fibers press against the capillaries that pass through it.

Kinetic exercises

1. Work out while the concentric muscle fibers are getting shorter.
2. Exercise of the muscles while the eccentric muscle fibers' lengthening.
3. Measured muscular contractions performed with the aid of special isokinetic apparatus.

The curriculum is applied in (2) units per week over the course of eight weeks and includes (18) rehabilitative units (Sunday-Thursday). Several techniques are used in the rehabilitation unit, which are listed in the following order during the performance:

1. Utilizing the following physical rehabilitation techniques:

Results and Discussion

Discussion

Table 1 makes it evident that there are large differences between the pre- and post-tests. The findings revealed a distinct development among the participants in the research sample. The knee joint's kinetic range and muscle strength can be maintained by performing RE while using both static and movable equipment. This has a positive impact on the knee joint's rehabilitation as well as its strength and kinetic range. The development of exercises based on practical foundations that suit the range of motion, strength, and nature of the muscles working on the joint and its mechanical effect in particular is perhaps one of the most significant reasons for this development because it takes into account the strength and range of motion of a joint in a manner similar to and gradual to the natural movement (Nelson et al., 1974). Researchers in this field advise that the contraction last for a duration of between 6 and 10 seconds, that the number of contractions be allowed to increase each time when the patient feels his ability to do so, and to repeat the same number of 3: 5 times a day. SE causes a noticeable increase in the size of the muscle. When stabilizing the joint for any therapeutic purpose, this kind of exercise helps to prevent muscle atrophy and weakness. This SE aids in hastening your recovery (Balady, 1993). It was also observed that the blood circulation increased in the left side of the injured person when SE was used for the uninjured right side. The rehabilitation exercise program must start with SE before gradually introducing exercises with assistance, exercises without assistance or resistance, and finally exercises against resistance. Gravity (body weight), the use of weights, springs, etc. are all examples of resistance. Resistance training is crucial for developing a muscle that has been hampered by deficiencies and for gradually raising the resistance to the highest level possible while avoiding any complications (GONZLEZ-CAMARENA et al., 2000) (Table 1).

The following conclusions were reached as a result of the information presented:

1. Static and kinetic exercises increase the range of motion in the knee joint when used for therapeutic exercises.
2. Static and DXs have a significant impact on preserving the shoulder joint's range of motion, in accordance with the proper scientific methodology.
3. After an injury, rehabilitation is crucial to assisting the patient in returning to their pre-injury level of health as soon as possible.

The researcher suggests the following through the findings:

1. To rehab the injured knee joint, perform therapeutic exercises in a targeted manner using a variety of tools.
2. Stressing the importance of both static and DX due to its beneficial effects on the healing of the injury.
3. Encourage those who sustain injuries to enroll in a rehabilitation program after they are hurt because it will enable them to recover more quickly and maintain the necessary level of fitness and range of motion.

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