Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XVIII, ISSUE 1, 2018 Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XVIII, ISSUE 1, 2018
January 2018, 18 (1): 10-16
Original article

EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) METHOD ON FUNCTIONAL ABILITIES FOR GYMNASTS WITH CRUCIATE LIGAMENT

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Abstract

Aim. Proprioceptive Neuromuscular Facilitation is an excellent method to achieve a rapid and effective improvement of flexibility. The NFP emerged as a therapeutic method of muscle rehabilitation in victims of blows and accidents, then was adopted by sports and physical activity, to increase the flexibility levels of athletes. The purpose of this study was to investigate the effect of proprioceptive neuromuscular facilitation (PNF) method on functional abilities for gymnasts with cruciate ligament.

Methods. The sample comprised from elite gymnasts in El-Maady club. (three) gymnasts, (Surgery was performed for the treatment of the frontal cruciate ligament) and was diagnosed by magnetic resonance imaging and flexibility tests. the subjects participated in proprioceptive neuromuscular facilitation (PNF) training program for eight weeks.

*Results***.** the improvement rates ranged from 27.95% to 55.39% for the three gymnasts.

Conclusions. the findings indicated that the proprioceptive neuromuscular facilitation (PNF) training for eight weeks could an improvement rate in functional abilities for gymnasts with cruciate ligament.

Keywords: PNF, Cruciate Ligament, Gymnasts.

Introduction

Flexibility is one of the most necessary elements of physical fitness to improve other physical elements. It may have a significant impact on the rest of the other physical elements. The athlete may suffer many injuries due to lack of elasticity. Insufficient flexibility can cause difficulty and slow performance of motor skills. When performing competition exercises. Lack of flexibility also leads to a disability in the mechanical performance of the movement.

Talha et al., (1997) indicated that flexibility is a component of general fitness that affects the rest of physical abilities and is defined as the ability to move in a wide range of mobility.

Flexibility can be defined as the ability to move the muscles and joints during its full range of motion. It thus includes two components, namely the motor mobility of the joint and the ability to lengthen

In recent years, there has been a major development in the training of flexibility, and it is common practice to use the terms Flexibility, Stretching, Range of motion, Joint mobility, all of which are used to describe the type of exercise that requires moving the joints and muscles in a wide range.

Talha et al., (1997) adds that when performing flexibility exercises, the exercises must perform at the same level and in the same dynamic range of the athlete's specialization and the same number of angles in the moving limb as is already done in skill performance.

New exercises have recently been developed to develop flexibility, which is the neuro-muscular facilitation of sensory receptors, which increased during the late 1980s and 1990s. It has been praised by many scientists around the world who are trained in various kinds of sports training. These methods are based on the use of consecutive isometric contractions with muscle relaxation. Inhibition of the activity of sensory organs kinetic muscle resistance to the operation of the incident of the muscle, which increases the range of movement of the muscle when performing the movement in the full term of the joint, and this method needs to be trained athlete.

Edward et al., (2005) states that the sensory receptors in the muscles, tendons and joints send sensory nerve signals that carry information about the

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Received 04.10.2017 / Accepted 10.11.2017

extent of the muscle's shortening or lengthening, the extent of its tension and relaxation, the speed and strength of muscle contraction, the different parts of the body, and the accuracy of movement in the surrounding space and the time of its performance, thus helps this information on the accuracy of the player's performance of motor control through the control of the nervous system in the performance of movements acquired and mastery during the processes of learning and motor sports training.

The word neurotransmitter (PNF) is the abbreviation of Proprioceptive, which means sensory receptors that provide information about the conditions and movements that emanate from the body to the brain. Neuromuscular means neuromuscular muscle, which is concerned with muscles and nerves.

Essam, (2001) states that the methods of neuromuscular facilities for sensory receptors are based on a physiological principle, namely the association of neuromuscular facilities with the sensory receptors that are reflected in the structural system. The principle of proprioceptive neuromuscular facilitation (PNF) was built on Neuromuscular Mechanization (Facilitation Inhibition, Muscular Resistance, Irradiation, Successful Induction Reflexes.

According to (Abul-Ela, 1999) the work of sensory receptors is of great importance in increasing the motor range of the joint and increases the level of muscular-muscular compatibility of the muscle groups working on it. This is explained by increasing the motor range by using flexibility training based on sensory receptors, improve other physical abilities such as the speed, strength and compatibility required for physical performance.

Essam (2001) states that training based on sensory receptors depends on a variety of methods in their methods and procedures. These methods may be very similar to the quality of the exercises used, but the differences are the procedures for implementing these methods through the use of these receptors during Muscle work. However, the basis for this type of exercise is the effectiveness of muscle contraction used in the performance of workouts, which depend on the rotation of work between constriction fixed and moving in both the basic motor muscles and anti-muscles working on the joint meaning.

Proprioceptive Neuromuscular Facilitation is an excellent method to achieve a rapid and effective improvement of flexibility. The NFP emerged as a therapeutic method of muscle rehabilitation in victims of blows and accidents, then was adopted by sports and physical activity, to increase the flexibility levels of athletes.

The use of the sensory receptor system is also important in taking advantage of reflexes resulting from prolongation, and the occurrence of reflex actions performed by both muscle spindles that respond to the change in muscle length and rate of change.

The frontal cruciate ligament is one of four knee ligament ligaments that prevent excess knee movement. The cruciate ligament is located inside the knee and the cleft bone reaches the femur and prevents the bone of the slit from crawling forward.

Despite the tremendous progress in the field of sports medicine and specifically in the field of sports injuries and take all the factors of security and safety factors as much as available in an attempt to reduce injuries, but we note the high incidence and continuously, due to enthusiasm generated by the players or the intensity of competition and try to win centers Developed at different athletic levels making players more vulnerable to injury.

And by reviewing the different aspects of the nature of sports performance and the required friction and cohesion between players in addition to the speed of motor performance with the continuous and rapid change of the body conditions according to the conditions of the game. The biggest obstacle to the weight of the body during the rotation and change the situation located on the knee joint, so it was recently noted that the most joints of the body to be injured, especially the injuries of ligaments and ligaments side and side cartilage injury.

The knee joint is one of the most exposed parts of the body. The anatomy of the joint may be a major income, although it appears to be safe, located between the two longest bones in the body - the thigh and the lobe. Not only that, but the strength of the ligaments and muscles surrounding it make it the strongest joints in the body and may be injuries to the knee joint the main cause of early retirement is due to the lack of joint to the presence of fatty pillows and the placement of articular surfaces.

As a result of this and the importance of this joint, a global medical organization, the International Association of Knee Injuries, was established. Its first meeting was held in 1979 to develop methods of medical examination, diagnosis and treatment of diseases as well as ways to develop surgical procedures and use effective treatment methods and the best and fastest methods of rehabilitation of the joint in order to ensure return to normal movement in the shortest possible time.

Anterior cruciate ligament injury is one of the most serious injuries to the athlete's future as a whole due to the importance of anterior cruciate ligament in

maintaining the frontal stability of the joint, in the sense that it prevents the frontal lobe of the trachea on the femur. It also prevents the enlargement of the knee joint.

Brandi (2006) points out that 80% of Athletes with cruciate ligament injury because the trainers rely on regular training doses are tactical, technical and only on the pitch. This is not the ideal way to win the players what they need for fitness. He added that clubs fitted with gymnasiums do not perform their full functions to put the player in a good physical condition.

Bruhn et al., (2004) pointed out that cruciate ligament injuries are often caused by the negligence of trainers and players to the importance of resistance training, which is particularly important in the formation of the optimal strength of the players as resistance training gives them flexibility that cannot be done by normal exercises.

Suzanne (2000) believes that cruciate ligament injuries directly control the player to leave the game, even if we look at the players who left the stadium at an early age, before their retirement, most of them came out due to injury in a cruciate ligament.

Allaan (1980) confirmed that the return of the knee joint to its normal function largely depends on the post-operative rehabilitation program. He emphasized that the minor, uneducated rehabilitation, which lacks further study, leads to many complications after surgery, which will not return the joint to his state of nature.

Based on the above, the researcher will address this study under the title of the impact of training of sensory receptors PNF on the level of functional competence of patients with cruciate ligament cut

Methods

The sample comprised from elite gymnasts in El-Maady club. (three) gymnasts, (Surgery was performed for the treatment of the frontal cruciate ligament) and was diagnosed by magnetic resonance imaging and flexibility tests. the subjects participated in proprioceptive neuromuscular facilitation (PNF) training program for eight weeks.

Sample conditions:

- The diagnosis should be performed by a specialist doctor and magnetic resonance imaging, so that all players in the experimental group have a simple cut in the front cruciate ligament accompanied by a defect in athletic performance.
- There are no other injuries in the experimental team.
- Ability to regularize the application of different stages of research.
- The safety of the players of the control group from any other injury and regularity in the daily exercises.
- All sample not participate in any other treatment programs.

Instruments.

- Medical balance to measure weight in kilograms.
- Tape measure.
- Stopwatch for measuring time.
- Isokinetic Test Rehabilitation System to measure the muscle strength of the two legs.

PNF program:

The exercises were explained and how to perform each training separately, as well as the experience of the devices used in the performance of the exercises and the optimal performance of each training.

Prior measurements were carried out for all members of the research sample before starting the exercises.

- The exercises used in the research were chosen based on the previous scientific studies and references, as well as after a group of experts specialized in physical education and physiotherapy.
- The exercises were chosen so that these exercises are the same as a means of measurement to determine the actual improvement in the stability and stability of performance of the work of the injured joint and the extent of improvement in the work of self-receptors of this joint.
- Apply the exercises for 8 weeks and 4 days a week.
- The application of individual exercises in performance was adopted.
- Exercises are performed within pain limits.
- The performance of the exercises within the stability of the joint and does not exceed the limits of the sense of pain.
- PnF sensory receptor exercises are performed for the infected man.
- The injured player stops training at the beginning of the feeling of pain or sensation of the beginning of the vibration or the displacement and the instability of the joint or the beginning of the feeling of stress.

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- Exercises are applied individually and not collectively, ie, each player is injured individually.
- The post-measurement of all members of the research sample is done to determine the impact of the training exercises.

Method used:

The researchers will use the Hold & Relax method. This method begins with a short lengthening that lasts until the beginning of feeling or feeling of pain or pain for 8 seconds. Then the injured player learns to try to stretch the thigh muscle. The athlete will resist the movement and thus cause an isometric muscle movement that lasts for 8 seconds. The athlete is then asked to relax and work for a negative lengthening of 20 seconds. The final lengthening rate should achieve the maximum possible movement rate due to the autogenic result

Break the qualification periods using PNF drills

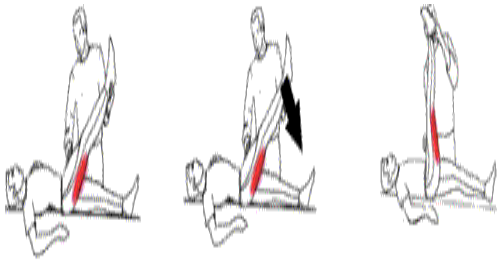

Fig (1) Hold & Relax method

The program was divided into (4) periods:

First Period: First Week

The focus is on exercises that strengthen the muscles surrounding the knee in the stability and exercises to soften the knee joint and use ice to reduce swelling and moving the knee by the CPM device with a maximum of 90 degrees, negative movement.

Second Period: 2-4 weeks

Allowing the knee to move positively from 40-90 degrees

Third period: 5-6 weeks

It starts with 40-100 degrees of strength training, as well as walking exercises and bike exercises.

Fourth period: 7-8 weeks

The exercises are focused on PNF exercises and balance exercises and a full range of movement of 150 degrees.

Fig (2)

Biodex Isokinetic dynamometer

Statistical analyses

All statistical analyses calculated by the SPSS 21 statistical package. Improvement rate between the pretests and posttests were reported.

Results

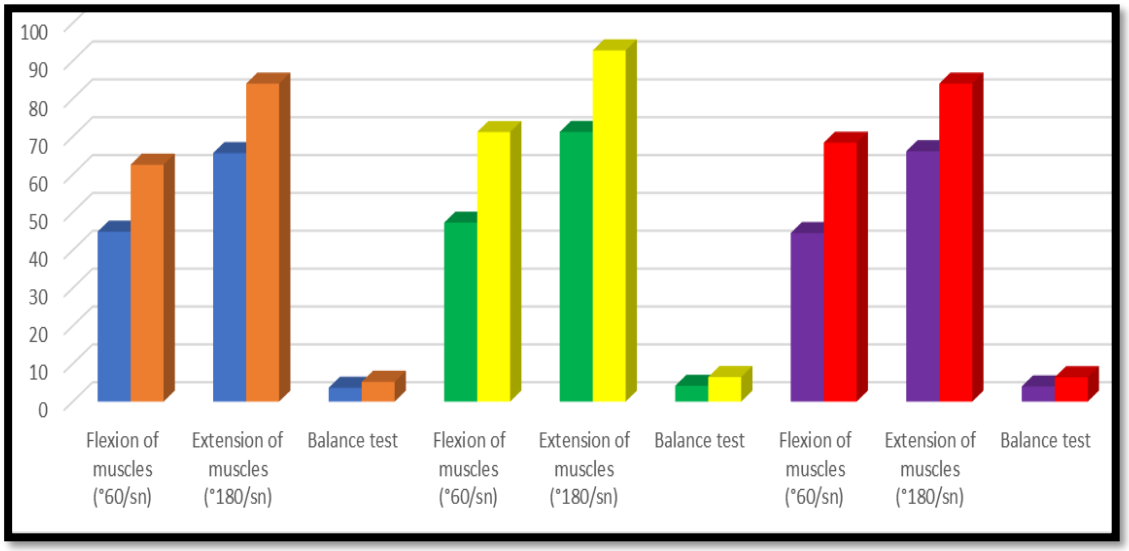

Fig (3) show the improvement rates ranged from 27.95% to 55.39% for the three gymnasts.

Discussion

The resulting improvement in the study variables of the group of patients is due to the positive effect of the proposed program using PEF exercises, which include the work of sensory receptors that reflect the development of strength, balance, and motor range of the knee joint, indicating that the proposed program has had a positive effect on flexibility.

This is consistent with the study of (James et al., 2003) which is the most important results the greater the time of contractual muscle contraction, the greater the range of movement in the manner of the work of sensory receptors reflected (PNF).

Abu El-Ela (1999) points out that the method of facilitating sensory neuromuscular sensory receptors is a pattern of flexibility training that combines muscle contractility and relaxation with negative extinctions accompanied by short elongation. Improve the range of movement in the structural joints to a greater extent than the conventional extinction of the known muscle.

Jeffrey (2004) believes that deep sensory receptors greatly affect the stability of the body and that the decrease in the capacity of these receptors is evident during the aging period, leading to an increase in the tendency of the body to the elderly and the use of stability training leads to stimulation of sensory receptors to maintain The balance of the elderly and the adaptation to the various sports of athletes. The purpose of these exercises is to create and restore the activity of the nature of the work of the musculoskeletal system and the ability to transfer information from the surrounding receptors.

As (Laskowski et al., 2007) indicated that there are incoming and outgoing pathways to and from the nervous system that enable the body to balance during exercise and daily sports activities.

Smith & Arnold (2002), Edward et al., (2005) found that there are many factors involved in controlling muscle movement, stability and stability of performance, such as sensory and kinetic endings, neurotransmitters and Gulgi receptors in ligaments and tendons, and the nature of these factors contribute to the ability to maintain balance when the person performs various activities.

Massara and Scoppa (1995) emphasizes that balancing exercises not only depend on the strength in performance but depend on many of the muscle processes, which are activated by nerve receptors and that the impact of these exercises on the nervous system, which is the main engine of the muscles leads to accuracy and consistency to activate the work of all muscles related to the movement Neuronal compatibility leads to greater strength in the intended direction of movement.

Eills and Rosen (2001) show that the lack of control of the accuracy of the performance of muscle contractions indicates poor communication of information by muscle contraction of the autonomic receptors of the nervous system. Thus, the work of the nervous system moves from controlling the production of force to trying to produce movement in the right direction and angle and the required amount to maintain the movement of body parts and the arrival of nerve signals to a high level of perception.

The results of the study are consistent with the results of.

Study (Indelicato et al., 1990) in which the players got the results between the good and excellent and the average rate of return to the arena of competition (2, 9 weeks), and the most important results that the success of non-surgical treatment of the internal ligament of the knee joint depends on not being associated with the injury of the front cruciate ligament.

Study of (Bruce Reider et al., 1994) the knee ligament and was surgically treated. Non-surgical treatment by early functional rehabilitation was found to be faster in the player's return to competition.

Hillard-Sembell et al., (1996) found that there were no significant differences in the internal instability of the knee joint in most cases by 87% in the performance of the test and the various measures agreed upon, and also had significant differences in the internal instability of the knee joint by 13%.

Essam (1999) studies that the method of neural facilities has an effective effect on the development of both increasing the motor range of the pelvic joint and also has a positive effect on the development of tolerance of strength and maximum strength of the muscles working on the pelvic joint.

The study of (Warren & Simon, 2001) found that the combination of running and lengthening had a clear effect in increasing the extent of the joint movement, while the length of the joint did not add anything to reduce the stiffness of muscles and tendons.

Sherine (2004) study suggests that stretching and flexibility exercises reduce the incidence of muscle ruptures by reducing the rate of free radicals.

Study (Davis et al., 2005) Three lengthening techniques were performed along the femur of the thigh during a 4-week training program. The most important results were that the three techniques increased the length of the thigh muscles at varying rates and the second group achieved the best results during the four weeks compared to the control group.

Study of (Kofotolis et al., 2005) showed that the average surface area for fibers (IIB) decreased markedly while IIA (fiber) quality increased markedly as a result of training in neural-muscular facilitation methods for sensory receptors.

The study of (Omar, 2014) that the method of neuromuscular facilities has an effective effect on the development of both increase the motor range of the ankle joint.

Conclusions

The findings indicated that the proprioceptive neuromuscular facilitation (PNF) training for eight weeks could an improvement rate in functional abilities for gymnasts with cruciate ligament.

Aknowledgements

Thank you for all of subjects who participated in my experiments. No funding was used for this study.

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