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THE EFFECT OF STRETCHING LOWER EXTREMITY AND CORE STABILITY ON THE DYNAMIC BALANCE OF UMS BASKETBALL PLAYER : A CASE STUDY

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Abstract

Introduction : The components of physical condition are speed, strength, endurance, flexibility, strength, coordination, balance, and agility in improving the performance of basketball players. one is that the relationship between the ability to balance and the risk of sports injury has been determined in most cases, but the relationship between ability and balance between athletics is less clear. The importance of balance for basketball players itself reduces injuries and improves performance during the game.

Case Presentation : Respondents with criteria aged 19-22 years, male and female, work as basketball players. With balance problems who want to follow an exercise program that will be given to improve dynamic balance abilities.

Management and outcomes : The patient underwent a treatment consisting of stretching and core stability. Before exercise, patients are asked to perform stretching and core stability independently under the supervision of a physiotherapist. The instrument used is the Y balance test. The results of the paired sample t-test show the mean in pair 1 is 2.35824 with a significant value of 0.000 where $p < 0.05$ then H_a is accepted and pair 2 is 1.67059 with a significant value of 0.005 where $p < 0.05$ then H_a is accepted, it can be concluded that the lower extremity stretch and core stability affect increasing dynamic balance

Discussion : The subjects in this study have dynamic balance disorders because the importance of balance for basketball players can reduce injuries and improve performance during matches. Stretching and core stability can increase flexibility and activate core muscles in athletes to improve balance.

Conclusion : Supporting lower severity stretches and core stability can improve the dynamic balance of basketball players.

Keywords : stretching, core stability, balance



Introduction

Basketball is a game played by two teams. Each team consists of five players. The basketball game has the basic techniques of the game, namely: (1) passing and catching (throwing the ball and catching the ball), (2) dribbling (dribbling the ball), (3) shooting (shooting the ball into the basket), (4) pivot (resting on one leg). In the basic technique, a basketball player must be able to master it properly because it can affect the occurrence of injuries (Mirdayani et al., 2012).

Several factors cause injury, namely: (1) internal factors including body posture (alignment), excess load, physical condition, muscle imbalance, incorrect movement coordination, and lack of warm-up, (2) external factors such as sports equipment, environmental conditions, body contact sports, and (3) overuse due to excessive muscle use or being too tired. The percentage results that allow the occurrence of injuries in body contact sports are 45% consisting of 20% rugby, 23% football, and 2% judo, 16% non-body contact sports consisting of tennis 9%, gymnastics 3.5%, sports athletics, and weightlifting 11%, and 9% miscellaneous sports. Injuries that occur and are described above are also experienced by basketball players both in training and competing. Physical conditions can also affect a player in competing, good physical condition can maximize performance in competition (Puspitasari, 2019).

The components of physical condition, namely speed, strength, endurance, flexibility, power, coordination, balance, and agility affect the achievement of basketball players. One is that the relationship between balance ability and risk of sports injury has been established in most cases, but the relationship between balance ability and athletic performance is less clear. There are limited data on the effect of balance training on the motor skills of elite athletes. When the effectiveness of balance training was compared with resistance training, it was found that resistance training resulted in superior performance results for high jump and running time (Hrysomallis, 2011). The importance of balance for basketball players themselves can reduce injuries and improve performance during the game. In this study, researchers conducted a balance test on basketball players using an instrumental measurement in the form of the Y Balance Test (Brachma & Kamienia, 2017).

The Y Balance Test (YBT) is a dynamic stability test that has been considered efficient and clinically applicable to provide an accurate assessment of neuromuscular control in the lower extremities intraclass correlation (2.1) from 0.80 to 0.85 with a standard error of measurement ranging from 3.1 to 4.2 cm for 3 directions of reach (anterior, posteromedial, and posterolateral) (John et al., 2013). YBT is a measuring tool available to measure balance using 3 directions Anterior (A), Posteromedial (PM), and Posterolateral (PL). The respondent stands on one foot at the midpoint of the prepared Y-shaped track with the other leg hanging or non-weight-bearing and hands on the waist. Respondents were instructed to reach each direction (anterior, posteromedial, and posterolateral), with 3 trials. The assessment failed when the patient's hands were not on the waist, the heels were lifted when the assessment was carried out, the respondent lost his balance, then the rater measured the 3 directions that the respondent succeeded in achieving. Y-direction assessment Balance Test is the average value of each direction divided by the length of the leg, which is measured from the AIS to the medial malleolus, multiplied by 100 as the normalized value. The composite direction value is calculated by the formula: [(anterior mean + posteromedial



mean + posterolateral mean) / (leg length x 100] (Neves et al., 2017).

The role of physiotherapy is important in improving balance in athletes by providing interventions in the form of stretching and core stability to these athletes. Stretching is commonly used to stretch muscles and increase ROM around joints and is theorized to improve balance performance. The normal function of the musculoskeletal system is very important for the maintenance of balance (Reddy & Alahmari, 2016). Dynamic Stretching has been found to improve muscle performance and sprints, while Static Stretching has been found to reduce performance and decrease muscle contractile strength (Sullivan et al., 2009). Core stability is a training that can be useful for improving balance by strengthening core muscles most often associated with lumbar spine control and improving dynamic balance (Sadeghi et al., 2013). Core stability has many exercises including plank, crush, superman, Double-Leg Lowering With Bent Knees, and Sliff-Leg Ankle Hop (Contreras, 2014).

Case Presentation

sRespondents with criteria aged 19-22 years with male and female sex, with the number of respondents as many as 22 people. The sampling technique in this study was random sampling conducted by the researcher. By being made into one group and measured pre and post, with the inclusion criteria of having participated in a district level competition, with balance problems who want to take part in the training program that will be given with the aim of improving dynamic balance skills, there is no difference in leg length. There is no history of pain, the shape of the legs is not varus and valgus. The patient is a basketball athlete. Respondents were selected based on the conditions determined by the researcher and respondents were willing to participate in the study by carrying out a predetermined exercise program. At the beginning and end of the treatment, a dynamic balance test was carried out to determine the pre and post values as an evaluation with a measuring instrument in the form of a Y Balance Test which aims to measure dynamic balance.

Management and Outcome

Table 1.1 Effect Test with paired sample test

	Mean	SD	p-value
Pre left leg			
Post left leg	2,35824	1,72334	0,000
Pre right leg			
Post right leg	1,67059	2,75064	0,005

The results of the paired sample t-test in the treatment group showed that the mean in pair 1 was 2.35824 with a significant value of 0.000 where $p < 0.05$ then H_a was accepted and pair 2 was 1.67059 with a significant value of 0.005 where $p < 0.05$ then H_a is accepted, it can be concluded that giving stretching lower extremity and core stability affects increasing dynamic balance.



Patients are given an exercise program in the form of stretching which will often be done during the warm-up before exercising for improvement, with various stretching techniques, one of which is dynamic stretching which is often done during the warm-up to help avoid muscle injury, increase joint flexibility, and optimize performance. Dynamic stretching is done in 8 meetings with a frequency of 2 times a week. Performed for 3 sets of 30-second walking lunges with a rotation, lateral shuffle, Frankenstein walking, and heel-up. Core stability exercises can be given for 8 meetings with a frequency of 2 times a week, performed 3 sets with a time of 40 seconds using a front plank, side plank, crunch, and double leg lowering with a knee-bending technique.

The instrument used is the Y Balance Test (YBT) which is a dynamic test that is considered efficient and clinically applicable to assess the accurate assessment of the lower extremity intraclass correlation (2.1) from 0.80 to 0.85 with a standard error of measurement. ranging from 3.1 to 4.2 cm for the 3 directions of reach (anterior, posteromedial, and posterolateral). YBT is a measuring tool available to measure balance using 3 Directions Anterior (A), Posteromedial (PM), and Posterolateral (PL). The respondent stands with one foot at the midpoint of the prepared Y-shaped track with the other leg. hanging or not bearing weight and hands-on waist. Respondents were instructed to reach each direction (anterior, posteromedial, and posterolateral), with 3 trials. Assessment when the patient's hands are on the waist, the heels are lifted when not done, the respondent loses balance, then assesses the 3 directions that the respondent has achieved. The Y-Balance test is the average value of each direction on the length of the leg, measured from the AIS to the medial malleolus, multiplied by 100 as the normalized value. The directional composite value was calculated by the formula: [(anterior mean + posteromedial mean + posterolateral mean) / (foot length x 100)].

Discussion

Core stability exercises activate the deep muscles and integrate the deep muscles and global muscles to work optimally to maintain posture, support, and support the body. This exercise provides a pattern of proximal stability that is used for distal mobility. This pattern is a continuous movement that protects the distal joint that is used for mobility (Fredericson and Moore, 2017).

According to (Kibler, Press, and Sciascia, 2017) the abdominal muscles consist of the transverse abdominus, internal and external obliques, and the rectus abdominus. Transverse abdominal contractions increase intra-abdominal pressure and tension of the thoracolumbar fascia. The transverse abdomen is very important in stabilizing the lumbar spine. Abdominal muscle contractions help create a straight line, increasing the tone or strength of the lumbar spine. It is important to note that the rectus abdominus and oblique abdomen are activated in a certain directional pattern concerning limb movement, thus providing postural support before limb movement. Contractions that increase intra-abdominal pressure occur before the initiation of movement of large segments of the upper extremity. In this way, the spine (and core) is stabilized before limb movement occurs to allow the limb to have a stable base for movement and muscle activation.

Clinically, it has been shown that only very small increases in abdominal and multifidus muscle activation are required to strengthen spinal segments (5% of maximal voluntary contractions for activities of daily living and 10% of maximal voluntary contractions for vigorous activity). Core stability requires trunk motion control. To provide



stability in all areas of movement, muscles can be activated in different patterns from their primary function. For example, the quadratus lumborum (QL) muscle functions primarily as a stabilizer of frontal flexion and extension activity. However, the QL attaches from the transverse process of the spine and the 12th rib to the iliac crest. This orientation allows activation of the QL muscle that occurs simultaneously with flexion, extension, and lateral flexion activities to support spinal shear in the plane of motion, making it more than just a plane of stabilization of the frontal muscles.

Stretching and effectiveness, the neurophysiology of the muscle-tendon unit will be affected, which plays a role when the muscle is stretched from the sensory organs of the muscle-tendon unit, namely the muscle spindle and Golgi tendon organs, acting as mechanoreceptors that convey information to the central nervous system and responds to muscles when they are stretched. The muscle spindle organ is one of the sensory organs that is sensitive to stretch and functions to receive and convey changes in muscle length and the speed of changes in elongation. The intrafusal muscle fibers are the part of the muscle spindle that communicates with the extrafusal muscle fibers at the intrafusal ends. When a muscle is stretched, the intrafusal portion of the muscle fiber is stimulated only at the tip, while the middle portion is not stimulated.

In the middle, if stimulated will cause a longitudinal contraction effect on the muscle. Intrafusal muscle fibers are innervated by gamma motor neurons. There are 2 types of muscle fibers, namely, type Ia fibers (primary stretch receptors) which are sensitive to fast movements and stimulate the stretching of tonic-type muscle fibers, and type II fibers (secondary stretch receptors) which only stimulate tonic-type muscle fibers. The Golgi tendon organ is a sensory organ that functions to monitor changes in the tension of the muscle-tendon unit. Golgi Tendon Organ is formed from collagen strands and provides sensory information via Ib nerve fibers. Golgi Tendon The organ is sensitive to changes in tension in the muscle-tendon unit during both passive stretching and active contraction during normal movement.....

Conclusion

Based on the results of research and discussion, it can be concluded that there is an effect of lower extremity stretching exercises and core stability on increasing the dynamic balance of basketball players.

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