

Comparison of Jack Knife Stretching and Myofascial Decompression on Increasing Hamstring Muscle Flexibility in Football Players

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ABSTRACT

Background: Flexibility plays an important role for athletes, especially football players. The greater a person's level of muscle flexibility, the lower the risk of injury. Jack Knife Stretching (JKS) and Myofascial Decompression (MD) are treatments that help promote flexibility, particularly for the hamstring muscles. This study aimed to examine the effect of Jack Knife Stretching and Myofascial Decompression in enhancing hamstring muscular flexibility in futsal players.

Subjects and Method: This was a randomized controlled trial. The study was conducted at the Kendal Football Club, Kendal, Central Java, Indonesia, on June 2023. A sample of 20 football players was selected and divided into two groups randomly. The dependent variable was hamstring muscle flexibility. The independent variables were Jack knife stretching and myofascial decompression. Hamstring muscle flexibility was examined using V sit and reach test. Data were compared using independent t test.

Results: Before intervention, hamstring muscle flexibility score between groups were comparable ($p= 0.708$). After intervention, hamstring muscle flexibility score in the MD group (Mean= 22.41; SD= 0.61) was higher than JKS group (Mean= 20.42; SD= 1.36), and it was statistically significant ($p= 0.026$).

Conclusion: Myofascial decompression is more effective to increase hamstring muscle flexibility than Jack knife stretching.

Keyword: muscle flexibility, Jack knife stretching, myofascial decompression

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BACKGROUND

Futsal is a dynamic sport that requires constant movement of players and requires good technical ability and determination (Syafaruddin, 2018). This sport requires four basic physical components, namely agility,

flexibility, strength, speed and good endurance (Rahim et al., 2014). Futsal players must train these four basic physical components to perform optimally on the futsal field. Flexibility is a very important factor in futsal because futsal is a very dynamic sport.

Joint tissue is closely related to flexibility. Flexibility is the ability to make movements in several joints or groups of joints and muscles to move completely and freely without any obstacles and without pain. Several factors that determine flexibility are physical activity, obesity, age and gender (Yudhaningrum et al., 2023). The muscles that play a very important role in futsal are the hamstring muscles.

The hamstring muscles are a group of muscles located on the back of the thigh which include *M. Biceps Femoris Caput Longum*, *M. Semitendinosus*, and *M. Semimembranosus*. This muscle group is usually used for running, making quick turns when running, and jumping (Mahandra et al., 2022).

Hamstring muscle flexibility can be increased with stretching exercises. There are two stretching exercises that are often used, namely static stretching and dynamic stretching. Static stretching exercises are stretching exercises that are done without moving the part of the body being trained. Meanwhile, dynamic stretching is a stretching exercise by moving body parts rhythmically without maintaining the stretching position (Suharjana, 2010).

Jack Knife Stretching is a combination of static and dynamic stretching exercises called active-static stretching for the hamstrings (hamstring muscles). This stretching exercise can be done alone without using any tools (Nishimoto and Takasaki, 2019). Jack Knife stretching aims to increase the flexibility of the hamstring muscles which has been tested by Michelle Hamiton. The benefits of Jack Knife Stretching include increasing blood flow to the lower extremities, relaxing the hamstring muscles and much more (Weerasekara et al., 2013). This movement begins with a squatting position and both hands holding the back ankles, then straighten the knees and hold this

position for a count of 5 then repeat 5 times for 1 set (Kabra et al., 2020). Previous study by Kabra et al. (2020) showed that Jack Knife Stretching had a direct effect on hamstring muscle flexibility compared to Proprioceptive Neuromuscular Facilitation (Hold Relax).

Apart from stretching, hamstring flexibility can also be improved with manual therapy. One of the manual therapies that can be done is Myofascial Decompression (MFD) or commonly called Cuptherapy. This therapy is an ancient treatment that uses suction on the skin. Myofascial Decompression uses cupping glasses which provide negative pressure so that blood and other body fluids come out of the skin (Lauche et al., 2013). Previous research conducted by Lauche et al. (2013) showed that Myofascial Decompression could increase local blood circulation and relieve muscle tension.

Jack Knife stretching and Myofascial Decompression have the same benefits, namely increasing the flexibility of the hamstring muscles. Therefore, research is needed to prove that these two interventions are more effective in increasing hamstring muscle.

SUBJECTS AND METHOD

1. Study design

This was a randomized controlled trial carried out at the Kendal football club, on June 2023.

2. Population and sample

20 football players from a total of 29 were selected for this study. They were divided into 2 groups randomly.

3. Study Variables

The dependent variable was hamstring muscle flexibility. The independent variables were Jack knife stretching and myofascial decompression.

4. Operational Definition of Variables

Jack knife stretching (JKS) is a combination of static and dynamic stretching exercises called active-static stretching for the hamstrings (hamstring muscles). JKS aims to increase the flexibility of the hamstring muscles which has been tested by Michelle Hamiton. This movement begins with a squatting posture and both hands holding the back ankles, then straighten the knees and hold this position for a count of 5 then repeat 5 times for 1 set.

Myofascial decompression (MD) is an ancient treatment that uses suction on the skin. This therapy uses cupping glasses which provide negative pressure so that blood and other body fluids come out of the skin.

Muscle flexibility is the ability of muscle tissue to stretch optimally to the full range of joint movement without pain. The hamstring muscles flexibility was measured using the V sit & reach test.

5. Study Instruments

Table 1. Age (years old) difference between groups

Groups	N	Mean	SD	Min.	Max.	p
JKS	10	18.5	1.87	17	21	0.807
MD	10	19.2	1.72	16	21	

2. Bivariate Analysis

Table 2 showed that there was no difference of hamstring muscle flexibility score before intervention (Mean = 17.93; SD= 0.73) vs. (Mean= 17.64; SD= 0.83), with p= 0.708. It indicates that randomization was distributed equally.

Table 2. An independent t-test of hamstring muscle flexibility score between groups, before and after intervention

Groups	n	Mean	SD	p
Before intervention				
MD	10	17.93	0.73	0.708
JKS	10	17.64	0.83	
After intervention				
MD	10	22.41	0.61	0.026
JKS	10	20.42	1.36	

The research instrument used was the V sit and reach test.

6. Data Analysis

Hamstring muscle flexibility between groups were tested before and after intervention. Before intervention, flexibility is measured to ensure that randomization is sufficient. The data were examined using independent t-test.

7. Research Ethics

This study provided informed consent to the participants before enrolling data collection. The ethical permission letter for this research was obtained from the Research Ethics Committee at TK.II Hospital 04.05.-01 dr. Sudjono, Magelang, Central Java, Indonesia, with letter number 112/EC/-V/2023.

RESULTS

1. Sample Characteristic

Age distribution between groups was comparable (p= 0.807).

After intervention, mean of hamstring muscle flexibility score in the myofascial decompression group (Mean= 22.41; SD= 0.61) was higher than Jack knife stretching (Mean= 20.42; SD= 1.36), and it was statistically significant (p= 0.026).

DISCUSSION

1. Hamstring muscle flexibility in the jack knife stretching group

Before Jack knife stretching, hamstring muscle flexibility score was 17.64. After intervention, hamstring muscle flexibility score was 22.42.

Sairyo et al. (2013) reporting that Jack knife stretching is effective in increasing the flexibility of the hamstring muscles because there is contraction of the agonist muscle which produces relaxation of the antagonist muscle, this is caused by reciprocal inhibition (static-active stretching).

According to Paramitha et al., 2014, the static stretching mechanism is related to joint flexibility. This stretching will slowly stimulate mechano growth factor (MGF), which is an insulin in the muscles that has similarities to growth factor (IGF-1). MGF enters muscle fibers and repairs muscle tissue and prevents muscle cell death. MGF stimulation will increase plastic substances which act as precursors to stimulate GAG (glycoaminoglycans) which will help in reducing the formation of abnormal adhesives such as stiffness (Paramitha, Mertha and Swedarma, 2014).

Kataura et al. (2017) reported that high-intensity static stretching was the most effective for reducing hamstring muscle stiffness (Kataura et al., 2017). High-intensity static stretching for 20 seconds significantly reduces hamstring muscle stiffness, even if short stretching durations (<20 s) are still able to reduce tendon muscle stiffness (Takeuchi & Nakamura, 2020a; Takeuchi & Nakamura, 2020b).

According to Nakase et al. (2021), doing jack knife stretching at least once a day for 3 days can increase hamstring muscle flexibility in pre-teen male soccer players. Jack Knife Stretching done twice a day can increase hamstring flexibility (Nakase et al., 2021).

2. Hamstring muscle flexibility in the myofascial decompression group

Before myofascial decompression, hamstring muscle flexibility score was 17.93. After intervention, hamstring muscle flexibility score was 22.41.

Lauche et al. (2013) reported that Myofascial Decompression can relieve pain due to muscle tension. Myofascial Decompression works by increasing microcirculation, encouraging capillary endothelial cell repair, accelerating granulation and angiogenesis in local tissue. This helps to normalize the patient's functional state and gradually relaxes the muscles (Lauche et al., 2013).

Thompson et al. (2016) define mechanotherapy as “an intervention that introduces mechanical forces with the aim of altering molecular pathways and inducing cellular responses that promote tissue growth, modeling, remodeling or repair.” Soft tissue expansion therapy is a type of mechanotherapy that involves excessive stretching of the skin in a controlled mechanical manner to exploit viscoelastic properties of skin (Huang et al., 2013). These mechanical stimuli include compression, tension, vibration and hydrostatic pressure (Thompson et al., 2016). This stimulating effect can reduce adhesive properties within and between tissue structures and increase fascia mobility (Stecco et al., 2013).

3. Comparison of hamstring muscle flexibility between groups

After intervention, mean of hamstring muscle flexibility score in the myofascial decompression group is higher than Jack knife stretching.

Flexibility is the ability to move a joint or a series of joints smoothly and easily through an unlimited range of motion (ROM) without pain (Pristianto et al., 2018). Lack of hamstring flexibility can increase vulnerability to musculoskeletal injuries

(Pradipta et al., 2022). Hamstring tension can limit hip flexion and extension movements, which can cause muscle imbalance (Pristianto et al., 2021).

Stretching is a movement that stretches soft tissue to increase muscle flexibility and joint range of motion (Monayo and Akuba, 2019). Increased hamstring flexibility in Jack Knife Stretching occurs due to static-active stretching due to contraction of agonist muscles and relaxation of antagonist muscles due to reciprocal inhibition (Takeuchi et al., 2021).

There are several theories that explain the effects of Myofascial Decompression, one of which is increasing circulation around the treated area, removing toxins from the inner layers of soft tissue, loosening adhesions, lifting connective tissue, and stimulating the peripheral nervous system (Rozenfeld & Kalichman, 2015).

AUTHOR CONTRIBUTION

Achid Muyassar Arsifanto as the main researcher carried out data collection and data analysis and wrote the publication manuscript. Wahyuni as a research member assists in preparing publication manuscripts.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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