ACUTE EFFECT OF DIFFERENT SEQUENCE OF COMBINED STRETCHING ON SPEED AND AGILITY AMONG UNIVERSITY SOCCER PLAYERS

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Abstract

The purpose of this study was to evaluate the acute effect of different sequence of combined static and dynamic stretching (CSD) and combined dynamic and static stretching (CDS) on the speed and agility of soccer players (N=20). A randomized group design was utilized for the design of the study. For the CSD group, the subjects performed static stretching followed by dynamic stretching and vice versa for the CDS group. The results showed non-significant differences in both variables measured (speed and agility) after CDS and CSD stretching. However, the result shows a faster and agile mean score for CSD stretching. Speed was reduced to -5.6% while, agility was -0.8%. For the CDS group the time taken increased for speed (+ 11.9%) and agility (+20.6%). In conclusion, soccer players can perform better with respect to speed and agility after performing static stretching followed by dynamic stretching as they were able to produce more force for a faster execution. Coach is suggested to design a warm-up protocol which implementing the dynamic stretches after initiating the static stretches prior to the activities in soccer, especially in games.

Key words: Combined stretching, soccer, speed, agility, warm-up

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Football is one of the very well-known sport in the world. Football is played by not less than 200 million professional and amateur players. Football can be categorized as a high intensity sport, contact sport and intermittent sports. It is played in a long time of period with a fast-moving game in 90 minutes of continuous action that consist two halves (45 minutes per halves) by not including the extra time. This high intensity sport demands the player's skills, accuracy to make the game more interesting and enjoyable to watch the match. This game required of precision and endurance rather than brute force. It is because, football is not allowed to do the unusual physical attributes. The game should be fair play.

There are one over four of football injuries are from musculoskeletal lesions. Based on Engebretsen (2010), the injuries mainly located 17% in the thigh and 8% in the groins. In professional football match, the game must be performed at maximum speed, and the functional activities including acceleration, decelerations, jumping, cutting, pivoting, turning, and kicking of the ball. It has been proven that 68% to 80% of all football injuries occur in the lower part of the body. Poor flexibility of hamstrings is one of the predisposing factor for injury of this muscle group (Chomiak, 2016).

Stretching is a needed exercise modality that can enhance the improvement of the joint range of motion (ROM). There were a lot of study about the different stretching programs that can affect the productivity of flexibility (Knudson et al.,

2000). Stretching is one of the exercises that can increased the length of the muscle that were used. Each muscle have their own stretch receptor that connected to the muscle used (muscle fibres) during the stretching process. The stretch receptors measure the degree of the stretch and sending the messages through the spinal cord to the nerves that control the contraction of the muscle which located the receptors. The acute effect of stretching on flexibility is pretty clear. Stretching creates an acute increase in joint range of motion that tends to persist for 60 to 90 minutes (Moeller et al., 1985).

There are many different types of stretching, which include ballistic stretching, featuring bobbing up and down (bouncing) the body and forcing a muscle outside of its normal range of motion. Passive stretching is another type of stretching that needs to perform with two person. The intensity of the stretch will increase as if the partner giving extra force.

Static stretching is an exercise that stretch your muscle during standing, sitting or lying still and holding the part of the body for few seconds (up to 60 seconds) for a single position. The other type is the dynamic stretching and the most effective among the others that consists of controlled leg and arm swings that take us to the limits of our range of motion. These two types of stretches are consistently discussed and examine in this study.

1.2 Problem statement

It is widely believed that pre-exercise static stretching will decrease the risk of injury and improve performance (Egan, 2006). Static stretching (SS) also reduces muscular performance (Curry et. al., 2009). Whereas other studies have reported that dynamic stretching (DS) improves performance compared with SS (Little & Williams, 2006). Some researcher suggested that players should perform SS and DS together for a better adaptation (Amiri-Khorasani & Sotoodeh, 2013). It was observed that any stretching protocol followed by DS will increase speed and acceleration (Amiri-Khorasani, 2016).

Stretching has acute effects on neuromuscular system. For example, there were found a decreases in maximal strength immediately after a single bout of static stretching (Opplert, 2017). A combination of type of stretching was said that it can give an improvement in speed and agility among soccer players. However, which type of the combination stretching are better in improving agility and speed are still unclear. Thus, this study examined the acute effect of two different combination stretching on agility and speed of soccer player.

1.3 Research Question

1. Is there any significant effect of CSD stretching exercises on speed and agility of UiTM soccer players?
2. Is there any significant effect of CDS stretching exercises on speed and agility of UiTM soccer players?

3. Is there any differences between CSD stretching and CDS stretching on speed and agility on UiTM soccer players?

1.4 Research Objectives

1. To identify the effect of CSD stretching exercises on speed and agility of UiTM soccer player.
2. To identify the effect of CDS stretching exercises on speed and agility of UiTM soccer player.
3. To identify the effect between CSD stretching and CDS stretching on speed and agility on UiTM soccer player.

1.5 Hypothesis of the study

1.5.1 Null Hypothesis

HO1: There is no significant effect of CSD stretching on speed performance among UiTM Sarawak soccer players.

HO2: There is no significant effect of CDS stretching on speed performance among UiTM Sarawak soccer players.

HO3: There is no significant effect of CSD stretching on agility performance among UiTM Sarawak soccer players.

HO4: There is no significant effect of CDS stretching on agility performance among UiTM Sarawak soccer players.

HO5: There is no significant difference between CSD stretching and CDS stretching on speed performance among UiTM Sarawak soccer players.

HO6: There is no significant difference between CSD stretching and CDS stretching on agility performance among UiTM Sarawak soccer players.

1.5.2 Alternate Hypothesis

HA1: There is a significant effect of CSD stretching on speed performance among UiTM Sarawak soccer players.

HA2: There is a significant effect of CDS stretching on speed performance among UiTM Sarawak soccer players.

HA3: There is a significant effect of CSD stretching on agility performance among UiTM Sarawak soccer players.

HA4: There is a significant effect of CDS stretching on agility performance among UiTM Sarawak soccer players.

HA5: There is a significant difference between CSD stretching and CDS stretching on speed performance among UiTM Sarawak soccer players.

HA6: There is a significant difference between CSD stretching and CDS stretching on agility performance among UiTM Sarawak soccer players.

1.6 Significance of study

This information shared through this study can give the benefits towards the soccer players on how to perform correct technique stretching related to the sports. The results obtained from this study also can give information to coaches on how to maximize the soccer players performance through types of stretching and their protocols to execute them.

1.7 Limitation of the study

The limitation of this study is the injury that happened to the participants. The other limitation is the weather. The experiment have been delayed a few times because of the raining season. This study was not being able to give incentives to the participants because lack of budget which made the participants demotivated to do the test.

1.8 Delimitation of the study

The delimitation of this study are participants must be in a good health condition and status. Participants also must free from any present injury especially at lower body parts. The participants' age ranged from 19 to 23 years old. The test that were used in this study is 20-m sprint test and Illinois agility test. Finally, all the participants were active soccer players.

1.9 Definition of terms

1.9.1 Agility

Agility has traditionally been thought of as simply the ability to change direction quickly. In team sports agility is an important quality to evade opponents when attacking or to place pressure on opponents when defending (Young & Willey 2010; Young & Farrow, 2006)

1.9.2 Acute effect

The acute affects means the changes are due to acute neural inhibition, resulting in an increase in autogenic inhibition which decreases neural drive to the muscle, leading to a decrease in muscle activation (Knudson, 2011).

1.9.3 Combined Stretching

By isolating the static stretching (SS) following a general warm-up or the combination with sport specific warm-up or dynamic stretching components (Young & Behm, 2003).

1.9.4 Speed

Speed is classically defined as the shortest time required for an object to move along a fixed distance, which is the same as velocity, but without specifying the direction Harman (2008). In practical terms, it refers to the ability to move the body as quickly as possible over a set distance.

In sports, speed is the process of an athlete sprinting in order to cover distances in the shortest amount of time possible (Bompa & Buzzicheli, 2019)

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the researcher review previous studies that conducted by other researchers. There were studies conducted to investigate the effect of combined stretching toward speed and agility in soccer players. However, there is limited study that examine directly the effect of combined stretching on agility performance among soccer players. Thus, this chapter reviews about previous studies regarding combined stretching on speed and agility performance among soccer players.

2.1 Stretching

Stretching is an effective form of therapy and exercise training to improve the joint motion range. Extensive research has been carried out on effect of various stretching programs recording the clinical effectiveness of these strategies in improving flexibility (Knudson et al. 2000; Harvey et al., 2002; Shrier, 2004; Decoster et al., 2005). Strethcing is the physical activity that expands the use of the muscle. Muscle contains stretch receptors during the stretching process, which bind to the working part of the muscle called muscle fibres. The stretch receptor calculate the strength of the stretch and send messages to the nerve through the spinal cord that regulate the muscle contraction that located the receptors. The acute effect of stretching on flexibility is pretty clear. Stretching creates an acute increase in joint

range of motion that tends to persist for 60 to 90 minutes (Moeller et al., 1985; Kirsch et al., 1995; Zito et al., 1997).

Stretching is often done as part of a pre-physical activity warm-up. Stretching can be characterized as the application of tensile strength to lengthen the muscles and connective tissues. Usually, stretching is used to enhance the range of motion (ROM) of joint flexibility. There are many stretching method such as static, ballistic, proprioceptive neuromuscular facilitation, and dynamic stretching (Hedrick, 2000). Definition of ballistic stretching is activity that involves bobbing up and down the body and pulling a muscle beyond its normal movement range. Passive stretching is another form that increase the strength of the stretch as a partner exerts additional pressure. Static stretching, is where a position is held for a certain amount of time by another part of your body (or some other device). Static stretching was considered an essential component of a warm-up for decades (Young and Behm, 2002). Static stretching typically involves shifting a limb to the end of its range of motion (ROM) and maintaining the extended position for 15 seconds to 60 seconds (Norris 1999; Young and Behm 2002). SS has been demonstrated as an effective means to increase ROM about the joint (Bandy et al. 1997; Power et al. 2004). Nonetheless, pre-sport static stretching has been shown to decrease the output of force compared to the increasing popularity of dynamic methods of warm-up (Bishop, 2013).

Dynamic stretching (DS) is the fourth type of stretching and the most effective and or most common form of stretching. It consist a synchronized movement of the legsand arms that carry us to the limit of the movement. DS is not only in sport, but also in physical education as we warm-up for fitness tests, fun games and dance. Since

FIFA developed and evaluated its injury prevention programs, "The 11" and "FIFA 11+", it has been demonstrated in several scientific studies how simple exercise-based programs can decrease the incidence of injuries in amateur soccer players (Bizzini et al., 2013).

A studies have showed that SS reduces muscular performance (Curry et al., 2009;Faigenbaumm et al., 2005; Behm et al., 2001; Church et al., 2001; Nelson et al., 2001). This study measures the acute effects of combined foam rolling and static stretching program on hip flexion and jumping ability in soccer players. The result shows that static stretching induced the range of motion (ROM) but not to countermovement jump (CMJ). In other studies reported that DS improves performance compared with SS (Herda et al., 2008; Little & Williams, 2006; Mcmillian and Moore, 2003). This study was to examine the acute effects of static versus dynamic stretching on peak torque (PT) and electromyographic (EMG), and mechanomyographic (MMG) amplitude of the biceps femoris muscle (BF) during isometric maximal voluntary contractions of the leg flexors at four different knee joint angles. The result shows that PT decreased after the static stretching at 81° ($p = 0.019$) and 101° ($p = 0.001$) but not at other angles. PT did not change ($p > 0.05$) after the dynamic stretching. EMG amplitude remained unchanged after the static stretching ($p > 0.05$) but increased after the dynamic stretching at 101° ($p < 0.001$) and 81° ($p < 0.001$). MMG amplitude increased in response to the static stretching at 101° ($p = 0.003$), whereas the dynamic stretching increased MMG amplitude at all joint angles ($p \leq 0.05$). Several researchers have suggested that DS will replace SS due to reduction in performance caused by SS. While the showed positive result of DS, they indicated that players should perform SS and DS together to adapt better.

Although previous studies (Amiri-Khorasani and Sotoodeh, 2013; Amiri-Khorasani et al., 2010; Faigenbaumm et al., 2005; Mikolajec et al., 2012) have investigated that the combined effect of DS and SS on strength, agility and speed but the findings were uncertain as to the impact of the order on fitness output within each stretching combination. Although the necessity of a warm-up might be obvious, the specific elements that should be included in the warm-up may be less clear. Static stretching is often performed before exercise and athletic performance, as pre-exercise static stretching is widely believed to reduce the risk of injury and improve performance (Egan, 2006). However, some researcher found that static stretching decreases muscle strength, and others have shown that dynamic stretching improves performance. On the other hand, some researchers (Faigenbaum, 2005) have investigated the combination effects of static and dynamic stretching on power, agility, and speed, but the results were not clear to what effect the different combinations have on agility and other performance.

2.2 Agility

Traditionally, agility has been defined as simply the ability to quickly change direction. Agility in team sports is an important quality when attacking opponents or when defending opponents (Young & Willey 2010; Young & Farrow 2006). (Miller et al., 2001) mention that agility is the ability to execute fast movements which is stop and restart rapidly. Agility was defined by (Roozen, 2008) that, agility is the capability to controlled and maintain the body position during rapidly changing the direction without unbalance failure and effecting the speed. Balanced, coordination, power and speed are the components of agility that have been defined by (Angeli, 2006). It is

essential for elite, recreational, and "tactical" athletes who require the ability to rapidly change directions in all planes for sport or work. As the agility increased, the balance of the body during immediate fast movement and the muscular flexibility will also increase. It also can reduce risk of injury and avoiding from re-injury based on (Miller, 2006; Pauole, 2000; and Gabbet, 2002). Next evaluations examined one or more agility elements, including any directions of the movements, which might or might not affecting the acceleration and deceleration while changing direction based on (Pauole, 2000; and Sassi, 2009). Agility has no universal meaning, but is often known as being able to change direction and rapidly start and stop (Gambetta, 1996). In the study of (Little & Williams, 2005), the researcher observe about the specificity of acceleration, maximum speed, and agility in professional soccer players. It can be said that these components are specific qualities and cannot be relate to one another. The agility performance is affected by two terms preparations, they are long- and short-term preparations. The long-term preparations are involving the effectiveness of the agility training while the short-term preparations should include warm up. (Behm, 2001; Burkett, 2005; Stone, 2006).

2.3 Speed

High-speed actions during soccer competition can be categorized into actions requiring acceleration, and maximal speed. Acceleration is the rate of change in velocity that allows a player to achieve maximum velocity in a minimum amount of time. Maximum speed is the maximal velocity at which a player can sprint. The range of sprint distances observed during games (1.5 m –105 m) implies the acceleration requirements as well as the maximum speed capability (Bangsbo, 1994). Even though

the maximum sprint distance is low (17 m; 2), players frequently sprint at moderate speeds (Young, 2001). The highest speed is therefore achieved more frequently than distance or time framework would otherwise be predicted. However, research on the interrelationship of speed quality has been inconsistent in its findings, and some areas still need to be investigated (Delecluse, 1997) In sprint athletes, the maximum speed and acceleration were found specifically. Therefore, there are a big different in running mechanics of the field athletes compared with the sprinter (Sayers, 2000). In able to improve speed, stretching is one of the factor that can contribute the effectiveness of that skill related fitness.

Based on one of the study about effects of static stretching following a dynamic warm up on speed, agility and power, it has been proven that the stretching absolutely effecting the speed performance (Bishop, 2013). Based on the study's result, it stated that when static stretching were involved, the subject shows 48% of the subject decreased in performance, 8% did not having any improvement and drop in performance and 44% show increasing in performance. As to conclude the study, it have been proved that static stretching really can inhibit the speed performance. From the previous study, the results proof that there is a numerical differences in performance while it shows that there is no significant different in agility and jumping performance after adding static stretching to dynamic warm up protocol (Sim et al., 2009; Chaouachi et al., 2010).

However the past study have showed that combined stretching give a significant different (Amiri-Khorasani, 2016). The result of this study proved that

combined static and dynamic stretching giving an improvement toward speed performance.

Thus, in this recent study, it will proof which one is good to improve speed and agility performance either combined static and dynamic stretching, or combined dynamic static stretching.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This study aimed investigate the acute effect of different sequence of combined stretching on speed and agility in soccer player. The description of the research design, research framework, samples, research instruments, data collection and procedure are discussed in this chapter.

3.2 Research Design

This experimental study was using true experimental design where the researcher was applying randomized group design. The randomized group design is a method used in experiments in which the subjects are assigned randomly to either a control group or experimental group without referring to certain context variables. This design is used to compare the acute effect of two different combined type of stretching which are CSD stretching and CDS stretching. By dividing participants into two groups, each group performed two different warm-up protocols in two non-consecutive days.

The 20 M sprint test and Agility T-Test were performed to test the acute effect of different combined stretching methods on speed, acceleration and agility in among the subjects. The specific objective of this study was to identify which sequence of combination of stretching exercise that gave effect on speed and agility of the

subjects. Figure 3.1 illustrates the Independent Variables and Dependent Variables of the study.

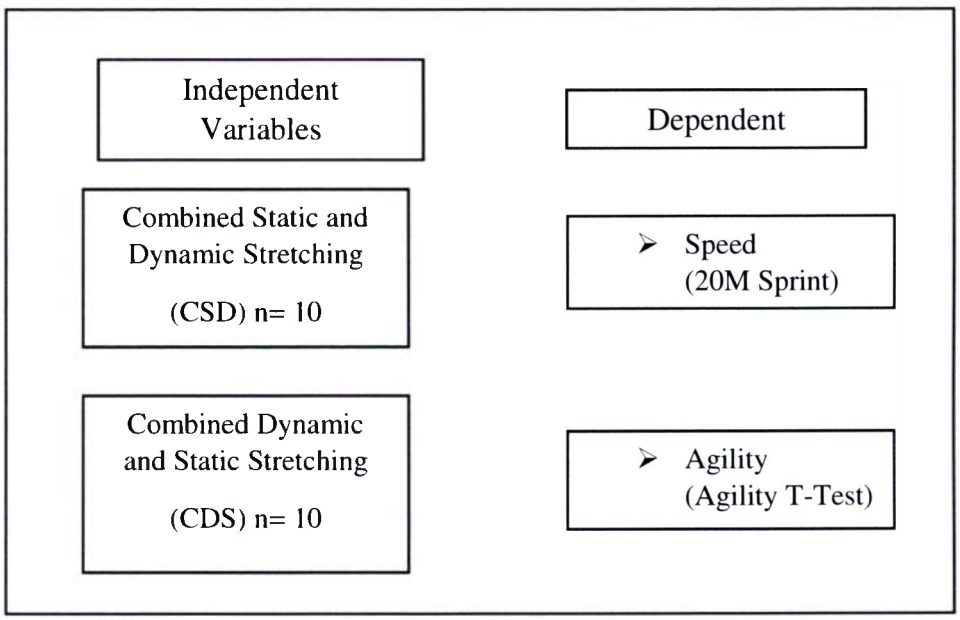

Figure 3. 1 Shows the independent variables and dependent variables of the study

3.3 Population

Researcher has decided the population for this study was based on sport that have been chosen, that was soccer. The population for this study was university soccer players.

3.4 Sampling

This study involved N = 20 male soccer players from UiTM Kampus Samarahan, Sarawak with the age ranged from 19 to 22 years old. The sampling technique for this study was the non-probability sampling which is convenience sampling. A convenience sampling is a type of non-probability sampling method where the sample is taken from a group of people easy to contact or to reach that are

conveniently available for this study. The participants were intermediate athletes that consist of male soccer players. Criteria requirement for this study was age ranging between 19-22 years old and have experienced and currently active in playing football at least one year. The participants must be free from any injuries especially lower body part and does not suffer from any health diseases.

The subjects were randomly assigned to one of two groups. Each group performed different warm-up protocols in two non-consecutive days. The protocols consisted of 4 minutes general warm-up jog, a 1-minute stretch protocol, and 2 minutes rest periods, followed by the 20 m sprint test and agility T-test on the same day. Scores were recorded for analysis.

3.5 Instrumentation

3.5.1 Intervention Protocol for CSD and CDS

The participants for group CSD and CDS must performed 4 minutes of jogging as a general warm up. Next the participants need to do a static stretching and dynamic stretching programs that designed by (Bishop, 2016) (Table 3.1 and 3.2) The CSD group will perform the static stretching then followed by dynamic stretching. Then CDS group will perform dynamic stretching first before performing static stretching. The dynamic stretching protocol used a series of specific progressive exercises over 20M with a jog recovery. The static stretching protocol were stretched to a point of discomfort for a 20 seconds (Young, 2007).

Table 3.1 The dynamic stretching programs

Dynamic Stretching Protocol	**Distance x set**
Ankle flicks	20m x 1
Jogging skip	20m x 1
High knees	20m x 1
Kick butt	20m x 1
Lateral run	20m x 1
Russian walk	20m x 1
Open close gate	20m x 1
Lunges	20m x 1
Sprint	20m x 3

Table 3.2 The static stretching programs

Static stretching protocol	
Gastrocnemius	20 seconds
Hamstring	20 seconds
Hip extensors	20 seconds
Hip flexors	20 seconds
Quadriceps	20 seconds
Hip adductor	20 seconds

3.5.2 Static Stretching

3.5.2.1 Gastrocnemius

From a push-up position, the subject moved his hands closer to his feet to raise his hips and form a triangle. At the highest point of the triangle, the subject slowly pressed his heels against the floor, or alternated slowly flexing one knee while keeping the opposite leg extended (Figure 3.2). Refer to the figure below.

Figure 3. 2 shows how to perform gestrocnemius stretching

3.5.2.1 Hamstrings

The subject sat on the floor with both legs extended in front of the body, back straight, and flexed at the hips, before reaching to touch the feet with the hands (figure 3.3). Refer to the figure below.

Figure 3. 3 shows how to perform hamstring stretching

3.5.2.3 Hip extensors:

The subject flexed the hip, by raising the knee toward the chest with the assistance of the force applied by the hands, which were interlocked behind the raised knee. Hip flexion was synchronized with inhalation (Figure 3.4). Refer to the figure below.

Figure 3. 4 Shows how to perform hip extensor stretching

3.5.2.4 Hip flexors

The subject stood upright with the legs spread apart and the hands on the hips (or one hand on the front knee), and during exhalation flexed the front knee to a 90-degree angle while keeping the rear knee extended (figure 3.5). Refer to the figure below.

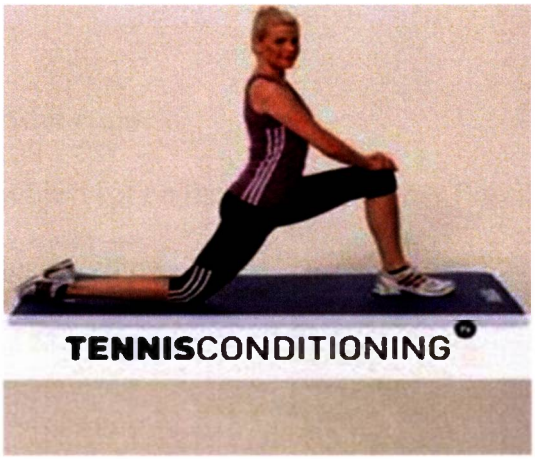

Figure 3. 5 Shows how to perform hip flexor stretching

3.5.2.4 Quadriceps:

The subject slightly flexed the supporting leg, exhaled, and grasped the raised foot with one hand before pulling the heel towards the buttocks during inhalation (figure 3.6). Refer to the figure below.

Figure 3. 6 Shows how to perform quadriceps stretching

3.5.2.5 Hip Adductors:

The subject sat on the floor with knees flexed so that the feet touched before placing the elbows on the inner thighs and pushing the legs towards the floor during exhalation (figure 3.7). Refer to the figure below.

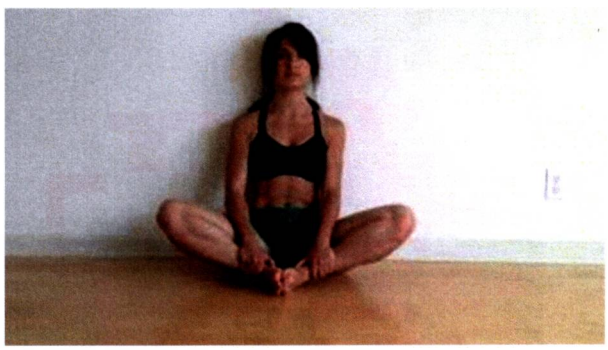

Figure 3. 7 Shows how to perform hip adductors stretching

3.5.3 Dynamic Stretching

3.5.3.1 Ankle flicks:

The subjects gently flexing their ankles and moving forward (figure 3.8). Refer to the figure below.

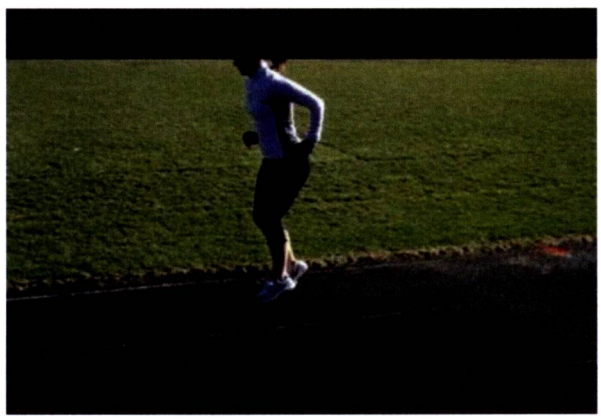

Figure 3. 8 Shows how to perform the ankle flicks

3.5.3.2 Jogging skip

The subjects rise the toes and maintaining the good body postures by using the arm as counterbalance (figure 3.9). Refer to the figure below.

Figure 3. 9 Shows how to perform jogging skip

3.5.3.3 Kick Butt

The subjects running forward by exaggerate the knee flexion with driving the arms. Doing fast leg and slowing the travel is more effective (figure 3.10). Refer to the figure below.

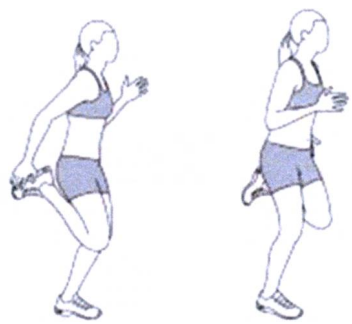

Figure 3. 10 Shows how to perform kick butt exercises

3.5.3.4 High knee

The subjects running forward by exaggerate the knee lift with driving the arms. Doing fast leg and slowing the travel is more effective (3.11). Refer to the figure below.

Figure 3. 11 Shows to to perform high knee exercise

3.5.3.5 Lateral run

Step laterally and driving the arms and legs by ensuring the feet do not cross.

Repeat the run with opposite side (3.12). Refer to the figure below

Figure 3. 12 Shows how to perform lateral run exercise

3.5.3.6 Russian walk

The subjects flexing the hips followed by extending it at the knee until the leg is fully extended and will form 90 degree of their both legs (3.13). refer to the figure below.

Figure 3. 13 Shows how to perform Russian walk exercise

3.5.3.7 Open and close gate

The subjects abducting their thigh laterally from the hip and rotate the thigh forwards. Following the same movement with the different leg. Doing another stretching by flexing the knee and rotating the hips to an abduct position followed by the same action on opposite leg (figure 3.14). Refer to the figure below.

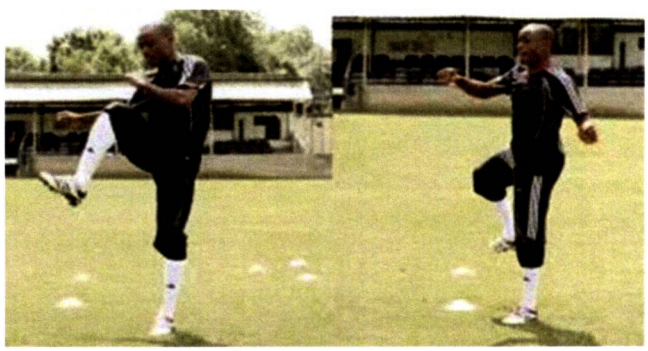

Figure 3. 14 Shows how to perform open and close gate exercise

3.5.3.8 Lunges

The subjects step through with one foot in front by flexing the knees and lowering the body towards the floor. Maintaining the good body posture and extend to a standing position. Repeating the same movement by changing the other leg.

Figure 3. 15 Shows how to perform lunges exercise

3.5.3.9 Sprint

The subject will sprint 3 times with increasing the intensity from 70% to 80% to 90% in different reps (figure 3.16). Refer to the figure below.

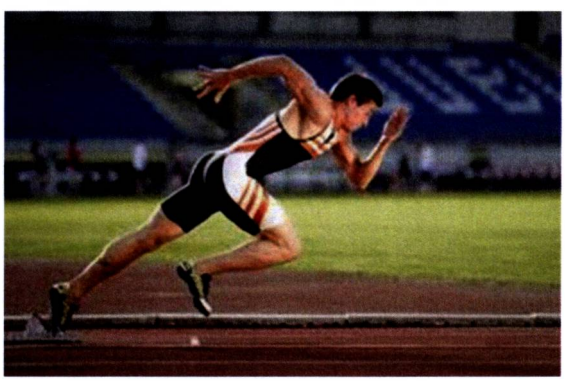

Figure 3. 16 Shows the sprinting activity

3.5.4 20 M sprint test

The test that have been used in this study was 20M sprint to measure the speed of the soccer players based on (Amiri-Khorasani & Sotoodeh, 2013; Little & Williams, 2006; & Faigenbumm et al., 2005). A 20M print distance have been recommended for this kind of sport because it is believed that the players rarely run more than this distance in a game stated by (Ellis, Gastin, & Lawrence, et al., 2000). The apparatus that have been used in this test was measuring tape, stopwatch, and cone markers.

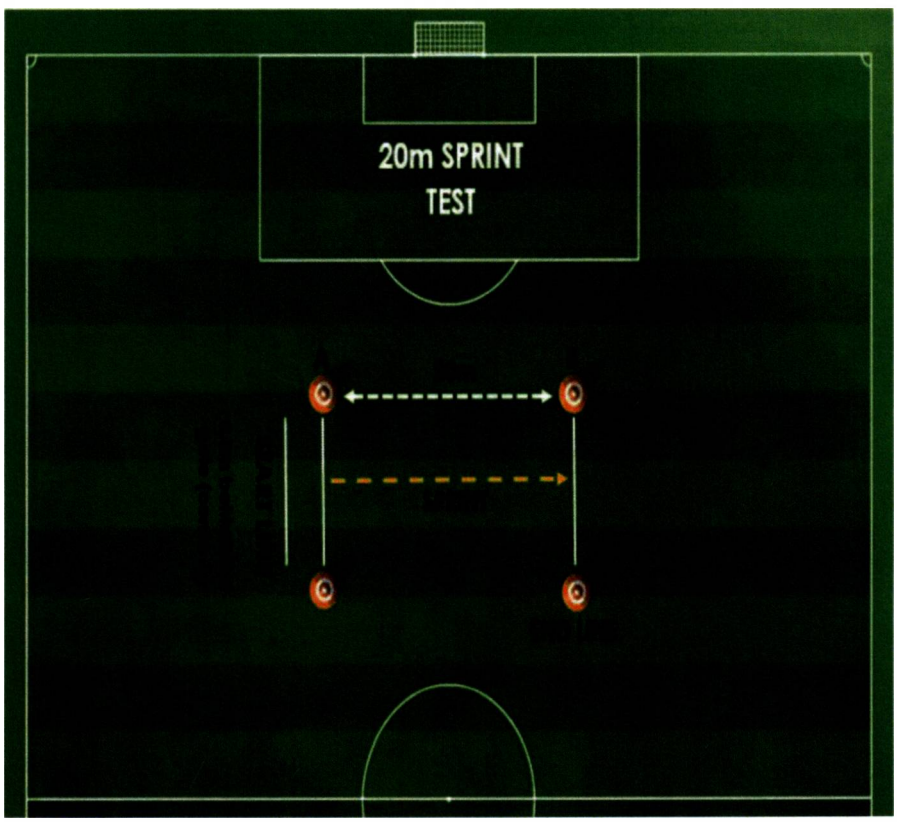

Figure 3. 17 Shows the layout of 20M sprint test

Procedure:

The test involves running a single maximum sprint over a set distance, with time recorded.

1. Participants' ready themselves on the start-line (positioned 0.3m behind the cones A) in a standing split-stance start position. It is important for reliability that the participant always uses the same starting stance.
2. Participant should be counted down '3 – 2 – 1 – GO '.
3. If the test administrators are using a stopwatch, then the timekeeper must stand at the finish line and perform the countdown and time the sprint.
4. On the 'GO' signal the participant must accelerate maximally to the finish line as quickly as possible.
5. The participants must sprint for three trials and the time taken for every trials will be recorded.

Table 3.3

Norms for 20 M sprint

Percentile	**Time (second)**
99	2.58 S
95	2.61 S
90	2.64 S
75	2.70 S
50	2.76 S
25	2.83 S
10	2.89 S

3.5.5 Agility T-test (agility)

This study also used the agility T-test run to measure the agility performance for pre-test and post-test. The agility T-test was a reliable and valid measure of sprinting speed, lower body power, and agility (Pauole et al., 2013). Based on (Raya, 2013), the reliability for agility T-test is high ($r = 0.97 - r = 0.99$). Figure 3.18 illustrates the agility t-test.

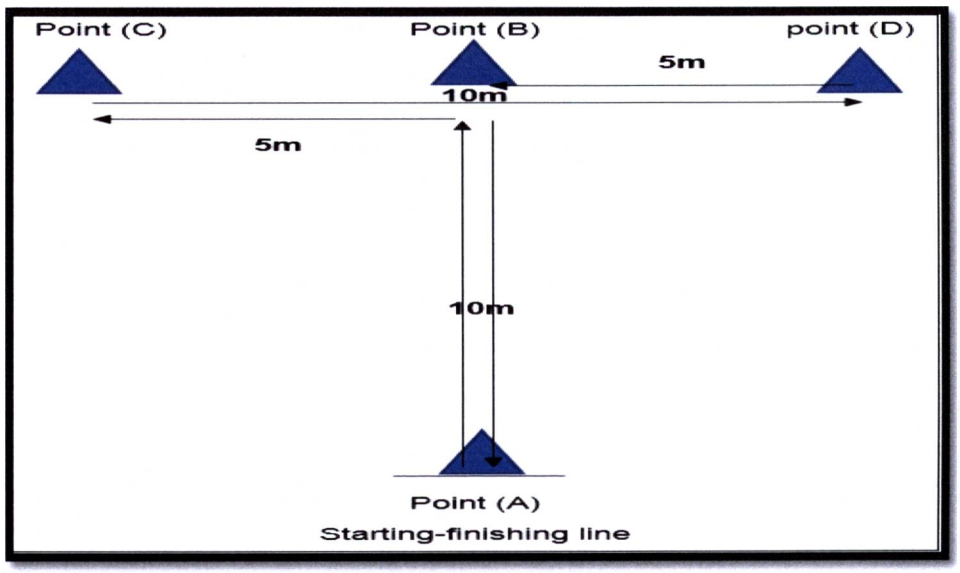

figure 3. 18 Shows the layout for Agility T-test

Procedure:

1. Subjects began with both feet behind the starting point (A).
2. At their own discretion, each subject sprint 10M to point (B) and touched a cone with the right hand.
3. Then shuffled 5M to theft point (C) and touched the cone with the left hand.
4. Shuffled 10M to the right, point (D) and the the cone with the right hand.
5. Shuffled to the left 5M back to point (B) and touched the cone with left hand.
6. Subjects finally run backward passing the finishing line at point (A).
7. The subjects must completed this test for three trials. Every time taken for all trials must be recorded.

Table 3.4

Norms for Agility T-Test

Category	Time
Excellent	< 9.5 Seconds
Good	9.5 to 10.5 Seconds
Average	10.5 to 11.5 Seconds
Poor	>11.5 Seconds

3.6 Data Collection

Firstly, the study proposal has been presented for faculty research and ethics committee for approval. After passed the research proposal, the researcher sought for approval from university sports unit for the soccer players' involvement as subjects of the study.

Familiarization was conducted among the subject before performing the actual data collection. Consent form was gathered from all subjects. Physical Activity Readiness (PAR-Q) was completed by the subjects for the screening purpose. Those who passed the PAR-Q could took part in the study. Fortunately, all of them were healthy.

The N=20 subjects were randomly assigned to one of two groups; CSD stretching (n = 10) and CDS stretching (n = 10). Skill tests; the 20m sprint test and agility t-test were performed after the intervention and scores were recorded at the best times. Data were analysed and discussed for hypothesis testing (Figure 3.19).

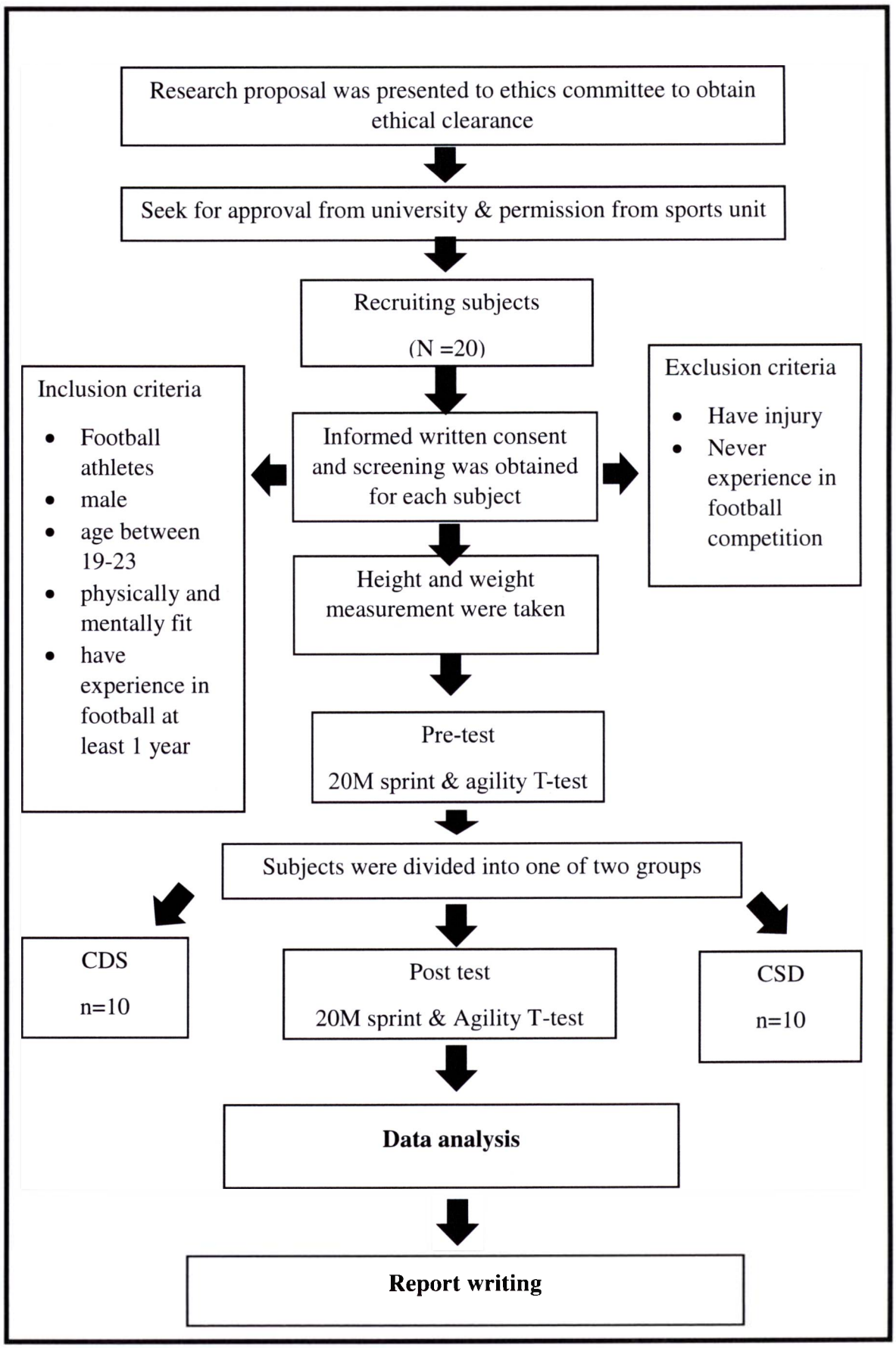

Figure 3. 19 shows the study flow chart of the investigation.

3.6 Data analysis

The data collected were analysed by using Statistical Package of Science (SPSS) version 22.0. Descriptive data were presented in mean and standard deviation (M + SD). Paired sample t – test was employed to measure the acute effect of CSD stretching and CDS stretching on speed and agility. A repeated measure ANOVA was performed to measure the different effect of these two stretching protocols. Statistical was set as 0.05 ($p < .05$).

CHAPTER 4

RESULTS

4.1 Introduction

The present study was carried out to examine the acute effects of CSD and CDS on speed and agility among UiTM soccer players. Therefore, the data analysis and results of this study was presented in this chapter.

4.2 Normality

Table 4.1 below illustrates the test to the normality for pre-test and post-test for speed and agility performance between two groups of potentiation among soccer players.

Table 4.1

The normality test for pre- and post-test for speed and agility

	Variables	Skewness	Kurtosis
Pre-Test	Agility	.526	-.726
	Speed	-1.053	3.257
Post-Test	Agility	.396	-.251
	Speed	-.851	1.474

Normality test was conducted to test the statistical assumption. The normality for pre and post for the speed and agility performance was tested using Skewness and

Kurtosis. The result showed the Skewness and Kurtosis values were ranged between -1 to 3 respectively. Thus the data were in not normal distribution.

4.3 Subjects' Characteristics

Table 4.2 showed that the data characteristics of the subjects. It showed that the mean and standard deviation for age was 19.25 ± 1.618 years. The weight was 58.66 ± 6.695 kg and their height was 167.40 ± 6.660 cm.

Table 4.2

Subjects' characteristics

	N	Mean	± SD
Age (Years)	20	19.25	1.618
Weight (kg)	20	58.66	6.695
Height (cm)	20	167.40	6.660

4.4 Descriptive Statistics

4.3.1 Speed

Table 4.3 represents descriptive statistics for pre-test and post-test from CSD and CDS group for 20M sprint. For the CSD group, the subject mean score for pre-test were 2.876 seconds. After the post activation potential, the mean score decrease to 2.820 seconds. For the CDS group, the subjects mean score for pre-test were 2.947 seconds. After the post-test the mean score were increase to 3.066 seconds.

Table 4.3

Descriptive statistics for variable test

Group	Test	Mean	±SD	Mean Difference	N
CSD	Pre-Test 20M Sprint	2.876	.16406	0.056	10
	Post-Test 20M sprint	2.820	.1672		
CDS	Pre-Test 20M Sprint	2.947	.3319	-.119	10
	Post-Test 20M Sprint	3.066	.36207		

4.3.2 Agility

Table 4.4 represents descriptive statistics for pre-test and post-test from CSD and CDS group for agility T-test. For the CSD group, the subject mean score for pre-test were 11.251 seconds. After the post activation potential, the mean score decrease to 11.243 seconds. For the CDS group, the subjects mean score for pre-test were 11.502 seconds. After the post-test the mean score were increase to 11.708 seconds

The subject's mean score for group CSD

Table 4.4

Descriptive statistics for variable test

Group	Test	Mean	±SD	Mean Difference	N
CSD	Pre-Test Agility T-test	11.251	.65237	0.008	10
	Post-Test Agility T-test	11.243	.52863		
CDS	Pre-Test Agility T-test	11.502	.49602	-0.206	10
		11.708	.58160		

Post-Test Agility T-test	

4.5 Inferential Statistics

4.4.1 Speed

HO1: There is no significant acute effect of CSD stretching on speed performance among UiTM Sarawak soccer players

HO2: There is no significant acute effect of CDS stretching on speed performance among UiTM Sarawak soccer players

HO3: There is no significant difference between CSD stretching and CDS on speed performance among UiTM soccer players.

A paired sample T-test was conducted to measure the acute effect of CSD stretching on speed performance (Table 4.5). There was no significance decrease in speed time from pre (2.876 ±0.164 second) to post (2.820± .167 seconds), $t(9) = 1.516$, $p = .164$ ($p > .05$). Thus, null hypothesis 1 is accepted. There is no significant acute effect of CSD stretching on speed performance among UiTM Sarawak soccer players.

Table 4.5

The pair sample T- test of CSD stretching on speed performance

		N	M	±SD	t	Df	Sig
	Pre	10	2.876	.16406	1.516	9	.164
speed							
	post	10	2.820	.16720			

*Significant level is at .05 ($p < .05$)

A paired sample T-test was conducted to measure the acute effect of CDS stretching on speed performance based on table 4.6. There was no significance decrease in speed time from pre (2.9470 ± .331 second) to post (3.066 ± .362 seconds), $t(9) = -2.233$, $p = .052$ ($p \geq .05$). Thus null hypothesis 2 is accepted. There is no significance acute effects of CDS stretching on agility performance among UiTM Sarawak soccer players.

In comparing between CSD and CDS on agility performance, the result shows that there was no significant different; $F = 1.826$, $P = .193$ ($p > .05$). Thus, this supports the acceptance of null hypothesis 3.

Table 4.6

Pair sample T- test of CDS stretching on speed performance

		N	M	±SD	t	Df	Sig
	Pre	10	2.9470	.33190	-2.233	9	.052
speed							

post	10	3.0660	.36207

*Significant level is at .05 ($p < .05$)

Table 4.7 furthers the hypothesis 3 testing shows that there was no significant difference in comparing the sprint performance between two types of stretching following acute stretching intervention F= 1.826, p= .229 ($p > .05$). It shows that the CSD reduce in time of speed performance in the post test. However, CDS increase in time of speed performance in the post test. Thus, CSD gave improvement of acute effect on the speed performance.

Table 4.7

Test of between groups effects (speed performance and group)

Source	Type III sum of squares	*df*	Mean square	*F*	*Sig.*
Intercept	342.752	1	342.752	2491.808	.000
Group	.251	1	.251	1.826	.193
error	2.476	18	.138		

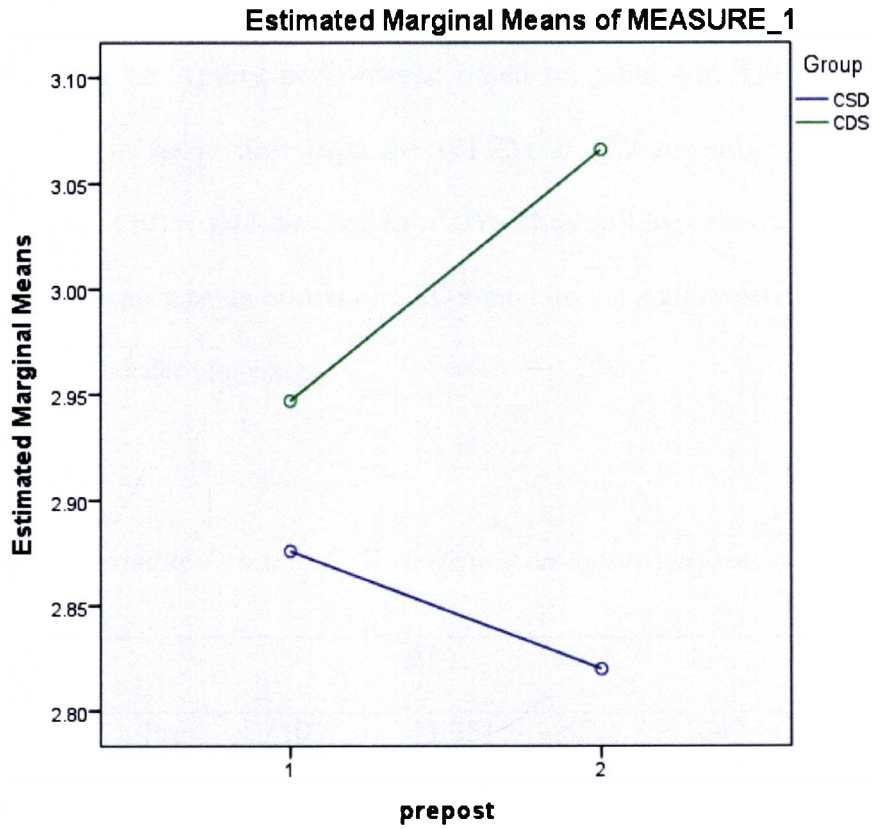

figure 4. 1 The differences in pre and post-test of the speed performance between CSD and CDS stretching

4.4.2 Agility

HO4: There is no significant effect of CSD stretching on agility performance among UiTM Sarawak soccer players.

HO5: There is no significant effect of CDS stretching on agility performance among UiTM Sarawak soccer players.

HO6: There is no significant difference between CSD stretching and CDS stretching on agility performance among UiTM Sarawak soccer players.

A paired sample T-test was conducted to measure the acute effect of CSD stretching on Agility performance based on table 4.8. There was a significance decrease in speed time from pre (11.251 ± .652 second) to post (11.243 ± .528 seconds), t (9) = .047, p= .963 (p > .05). Thus null hypothesis 4 is accepted. There is no significance acute effects of CSD stretching on Agility performance among UiTM Sarawak soccer players.

Table 4.8

The pair sample T- test of CSD stretching on agility performance

		N	M	±SD	t	Df	Sig
Agility	Pre	10	11.251	.652	.047	9	.963
	post	10	11.243	.528			

*Significant level is at .05 (p < .05)

A paired sample T-test was conducted to measure the acute effect of CDS stretching on Agility performance based on table 4.9. There was no significance decrease in speed time from pre (11.502 ± .963 seconds) to post (11.708 ± .581 seconds), t (9) = -1.767, p= .111 (p > .05). Thus null hypothesis 5 is accepted. There is no significance acute effects of CDS stretching on Agility performance among UiTM Sarawak soccer players.

Table 4.9

The pair sample T – test of CDS stretching on agility performance.

		N	M	±SD	t	Df	Sig
Agility	Pre	10	11.502	.496	-1.767	9	.111
	post	10	11.708	.581			

*Significant level is at .05 (p < .05)

Table 4.10 shows that there was no significant difference in comparing the agility performance between two types of stretching following potentiation intervention F= 2.376, p= .141 (p > .05). Thus, this support the acceptance of null hypothesis 6.

Table 4.10

Test of between groups effects (speed performance and group -CSD and CDS)

Source	Type III sum of squares	Df	Mean square	F	Sig
Intercept	5222.139	1	5222.139	9682.861	.000
Group	1.282	1	1.282	2.376	.141
error	9.708	18	.539		

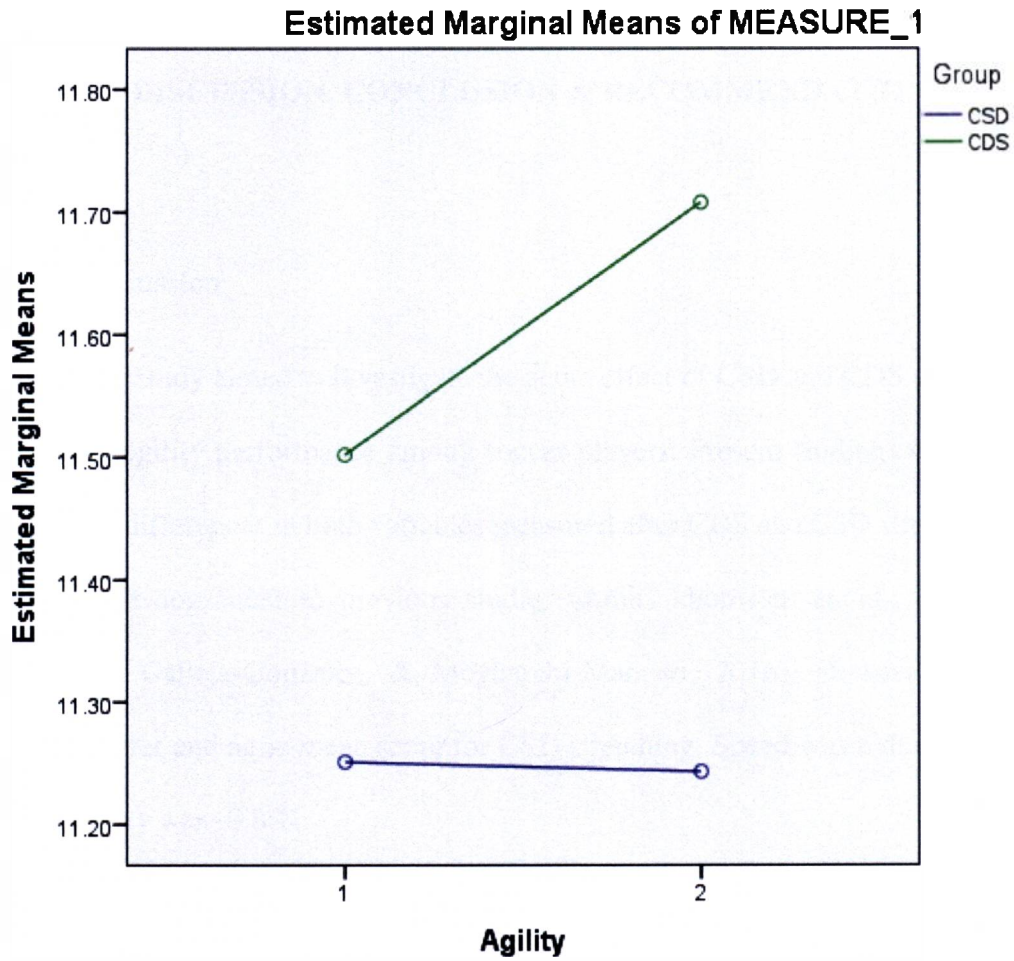

Figure 4. 2 The differences in pre and post-test of the agility performance between CSD and CDS stretching

Figure 4.2 further illustrates the differences in pre and post- test of the agility performance between CSD and CDS stretching. It shows that CSD reduce slightly in agility time in post- test. However, CDS increase in agility time in post-test. Thus, CSD gave slight improvement in agility performance.

CHAPTER 5

DISCUSSION, CONCLUSION & RECOMMENDATION

5.1 Discussion

The study aimed to investigate the acute effect of CSD and CDS stretching on speed and agility performance among soccer players. Present findings showed non-significant differences in both variables measured after CDS and CSD stretching. This findings are consistent to previous studies (Amiri khorosani et. al., 2010; Amiri Khorosani, Calleja-Gonzalez, & Mogharabi-Manzari, 2016). However the result shows a faster and agile mean score for CSD stretching. Speed was reduced to -5.6% while, agility was -0.8%.

Regarding the CSD induced performance improvement, reason suggested was some level of Post-activation potentiation (PAP) (Amiri Khorosani et al., 2011). CSD protocol involved stretching muscles by doing static stretch followed by dynamic stretching. Thus through PAP and optimal muscle temperature, cause a better force production, which in turn caused a faster and agile performance. In contrast , the slower speed (+ 11.9%) and less agile (+20.6%) following CDS stretching protocol, leads to less muscle stiffness and decreased muscle activation.

This CDS protocol involved performing dynamic stretching followed by static stretching. Even though plenty studies have shown that combination of types of stretching produce a faster time for speed and agility, the static stretching following

after a dynamic stretching does not beneficial. This is a consistent with a study by (Amiri-Khorosani et. al., 2010).

5.2 Conclusion

Based on the results, the research objectives were met, and hypothesis were tested. There were no significant acute effect of CSD and CDS stretching on agility and speed performance among soccer players. In comparing both interventions, there were no significant difference of the variables measured. However, only CSD stretching gave slight improvement in speed and agility performance. This conclude that dynamic stretching following a static stretching is beneficial for these two skill-related fitness performances.

5.3 Recommendation

From this study, all the subjects were in a poor level from the norms structure in 20m sprint and agility T-test. This result suggests that soccer team in UiTM Kota Samarahan need to train more in speed and agility training. In addition, a different combination of stretching giving a slight improvement towards their performance.

Thus, we suggest to coaches, trainers, fitness coach and physical educators to use combined static and dynamic stretching (CSD) instead of combined dynamic and static stretching (CDS) during warm up for soccer players.

Future studies should examine these differences between players in different playing positions and at different seasonal times.

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APPENDICES

APPENDIX A:

Application for Research Ethical Approval

Appendices A

UNIVERSITI TEKNOLOGI MARA

FACULTY OF SPORTS SCIENCE AND RECREATION
UNIVERSITI TEKNOLOGI MARA SARAWAK

Application form for Ethics Approval

Ethics Committee of Research Project

Part A : Details of Research Project

Title of Research Project	:	**ACUTE EFFECT OF DIFFERENT SEQUENCE OF COMBINED STRETCHING ON SPEED AND AGILITY AMONG UNIVERSITY SOCCER PLAYERS**
Name of Student	:	**MUHAMAD ALI BIN KHAIRUDIN**
Matric no.	:	**2017721037**
Programme	:	**BACHELOR OF SPORTS SCIENCE (HONS.)**

Supervisor Approval of Research Project:

✓	Agree to grant the Research Ethics Approval for the said study. Submission to the ethics committee is required.
	Agree to grant the Research Ethics Approval for the said study with minor amendments. Resubmission to the supervisor is required.
	Disagree to grant the Research Ethics approval for the said study. Resubmission to the ethic committee is required.

Name of Supervisor and stamp

Signature

27/6/19
Date

Ethics Committee Approval of Research Project:

✓	Agree to grant the Research Ethics Approval for the said study.
	Agree to grant the Research Ethics Approval for the said study with minor amendments and without resubmission.
	Disagree to grant the Research Ethics approval for the said study. Resubmission to the ethic committee is required.

Signature

Chairperson of the Ethics Committee

30/7/19
Date

APPENDIX B:

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

APP B

SOAL-SELIDIK KESEDIAAN AKTIVITI FIZIKAL
PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

Sila baca soalan di bawah dengan teliti dan jawab dengan jujur: YA atau TIDAK
Read the question below carefully and answer honestly: YES or NO

	Ya *Yes*	**Tidak** *No*
1. **Pernahkah doktor mengatakan bahawa anda mempunyai masalahjantung dan hanya boleh melakukan aktiviti atas saranan doktor?** *Have your doctor said that you have heart problems and can only do exercises recommended by your doctor?*		
2. **Adakah anda berasa sakit di bahagian dada apabila melakukan aktiviti fizikal?** *Do you feel pain in the chest area when doing any physical activity?*		
3. Dalam tempoh sebulan yang lalu, pernahkah anda mengalami sakit dada ketika tidak melakukan sebarang aktiviti fizikal? *Since last month, did you have any pain in the chest area even when not doing any physical activity?*		
4. Adakahandahilangkeseimbangandisebabkanpeningataupernahkahandapengsan? *Have you ever fainted before?*		
5. Adakah anda mempunyai masalah tulang atau sendi yang boleh menjadi lebih kritikal dengan perubahan aktiviti fizikal anda? *Do you have any bone or joint injuries which can become more severe when you change your exercise routine?*		
6. Adakah doctor anda sedang mempreskripsi sebarang jenis dadah (contohnya, pil air) untuk tekanan darah atau keadaan jantung anda? *Is your doctor advises you to take drugs for high blood pressure and heart failure?*		
7. Adakah anda mempunyai lain-lain sebab untuk tidak melakukan aktiviti fizikal? *Do you know any reason that causes you unable to play sports?*		

- **Sekiranya anda menjawab Ya untuk satu lebih soalan, dapatkan nasihat dari doktor sebelum menjalani kajian ini.**
  If you answer Yes on one or all the questions, seek advice from your doctor before proceeding into this study.
- **Sekiranya anda menjawab Tidak bagi semua soalan, anda boleh terus menjalani kajian ini.**
  If you answer No to all questions, you may proceed with the study.
- **Sekiranya anda berasa kurang sihat, sila tangguh sehingga anda sembuh sebelum meneruskan dengan kajian ini.**
  If you are feeling not well today, please hold until you recover before proceed with this study.

APPENDIX C:

LETTER TO ORGANIZATION

PPP C

Unit Sukan,

Universiti Teknologi MARA,

Cawangan Sarawak, Kampus Samarahan,

Jalan Meranek, 94300,

Kota Samarahan, Sarawak.

Melalui,

Cik Patricia Pawa Pitil,

Pensyarah,

Fakulti Sains Sukan & Rekreasi

UiTM Cawangan Samarahan,

Sarawak. 15 September 2019

Tuan,

MEMOHON KEBENARAN MENGGUNAKAN ATLET BOLA SEPAK UiTM

Saya Muhamad Ali Bin Khairudin merupakan pelajar tahun akhir Ijazah Sarjana Muda Sains Sukan (kepujian) memohon kebenaran dari pihak tuan untuk menggunakan atlet bola sepak UiTM Kampus Samarahan 1, Sarawak bagi menyempurnakan projek penyelidikan saya. Butiran adalah seperti berikut.

Tarikh : 23 September 2019 sehingga 30 September 2019

Peserta : Atlet bola sepak 15 & 18 Tahun

Lokasi : Gelanggang Tenis UiTM Kampus Samarahan 1

2. projek penyelidikan ini bertujuan untuk memenuhi keperluan subjek Research Project. Oleh itu, saya berharap agar permohonan ini akan mendapat pertimbangan yang sewajarnya dari pihak tuan. Sebarang pertanyaan boleh diajukan kepada saya (014-5822953) atau hubungi pensyarah penyelia projek Cik Patricia Pawa Pitil (013-5633605). Kerjasama daripada pihak tuan amatlah dihargai.

Sekian, terima kasih,

(MUHAMAD ALI BIN KHAIRUDIN)

Pelajar
Fakulti Sains Sukan & Rekreasi
UiTM Cawangan Samarahan, Sarawak

Unit Sukan,

Universiti Teknologi MARA,

Cawangan Sarawak, Kampus Samarahan,

Jalan Meranek, 94300,

Kota Samarahan, Sarawak.

Melalui,

Cik Patricia Pawa Pitil,

Pensyarah,

Fakulti Sains Sukan & Rekreasi

UiTM Cawangan Samarahan,

Sarawak. 15 September 2019

Tuan,

MEMOHON KEBENARAN MENGGUNAKAN ATLET BOLA SEPAK UiTM

Saya Muhamad Ali Bin Khairudin merupakan pelajar tahun akhir Ijazah Sarjana Muda Sains Sukan (kepujian) memohon kebenaran dari pihak tuan untuk menggunakan atlet bola sepak UiTM Kampus Samarahan 1, Sarawak bagi menyempurnakan projek penyelidikan saya. Butiran adalah seperti berikut.

Tarikh : 23 September 2019 sehingga 30 September 2019

Peserta : Atlet bola sepak 15 & 18 Tahun

Lokasi : Gelanggang Tenis UiTM Kampus Samarahan 1

2. projek penyelidikan ini bertujuan untuk memenuhi keperluan subjek Research Project. Oleh itu, saya berharap agar permohonan ini akan mendapat pertimbangan yang sewajarnya dari pihak tuan. Sebarang pertanyaan boleh diajukan kepada saya (014-5822953) atau hubungi pensyarah penyelia projek Cik Patricia Pawa Pitil (013-5633605). Kerjasama daripada pihak tuan amatlah dihargai.

Sekian, terima kasih,

(MUHAMAD ALI BIN KHAIRUDIN)

Pelajar
Fakulti Sains Sukan & Rekreasi
UiTM Cawangan Samarahan, Sarawak

APPENDICES D:

SUBJECTS' CONSENT FORM

Consent Form

To become a subject in the research, you or your legal guardian is advised to sign this Consent Form.

I herewith confirm that I have met the requirement of age and am capable of acting on behalf of myself /* as a legal guardian as follows:

1. I understand the nature and scope of the research being undertaken.
2. I have read and understood all the terms and conditions of my participation in the research.
3. All my questions relating to this research and my participation therein have been answered to my satisfaction.
4. I voluntarily agree to take part in this research, to follow the study procedures and to provide all necessary information to the investigators as requested.
5. I may at any time choose to withdraw from this research without giving reasons.
6. I have received a copy of the Participants Information Sheet and Consent Form.
7. Except for damages resulting from negligent or malicious conduct of the researcher(s), I hereby release and discharge UiTM and all participating researchers from all liability associated with, arising out of, or related to my participation and agree to hold them harmless from any harm or loss that may be incurred by me due to my participation in the research.

	Name & IC no	Signature	Date
Participant			
Researcher	MUHAMAD ALI BIN KHAIRUDIN 960805-05-5235		

App D

Participants Information Sheet

THE ACUTE EFFECT OF DIFFERENT SEQUENCE OF COMBINED STRETCHING ON SPEED AND AGILITY AMONG UNIVERSITY SOCCER PLAYER

Introduction of Study

This research is to examine the acute effect of different sequence of combined stretching on speed and agility among university soccer player. The research is to determine either Static stretching then followed by dynamic stretching or dynamic stretching then followed by static stretching that can improve the performance toward soccer player.

Purpose of Study

To identify the difference between CSD stretching and CDS stretching on speed and agility on UiTM soccer players.

Study Procedure

By dividing participants into two groups and each group will perform two different warm-up protocols in two non-consecutive days. The 20 M sprint test and Agility T-Test will used to test the acute effect of different combined stretching methods on speed, and agility in UiTM Kampus Samarahan soccer player.

Participation in Study

Your participation in this study is entirely voluntary. You may refuse to take part in the study or you may withdraw yourself from participation in the study at any time without penalty.

Benefit of Study

This study can give the benefits towards the soccer player in UiTM Kampus Samarahan 1 that can help them to do the correct types of stretching to avoid them to get any injuries during perform in the field. Secondly this research also can help the coaches of UiTM Kampus Samarahan 1 soccer players not only can help minimize the lower body injuries but also can improve their performance especially their speed and agility.

If you have any question about this study or your rights, please contact the investigator, Muhamad Ali Bin Khairudin at 014 – 5822953

Confidentiality

Your information will be kept confidential by the investigators and will not be made public unless disclosure is required by law. By signing this consent form, you will authorize the review of records, analysis and use of the data arising from this study.

APPENDICES E:

SCORE SHEET

APP E

SCORE SHEET

NAME :

AGE:

MATRIC NO.:

WEIGHT:

HEIGHT:

GROUP: CSD / CDS

20M SPRINT TEST		
1ST TRIAL	2ND TRIAL	3RD TRIAL

AGILITY T-TEST		
1ST TRIAL	2ND TRIAL	3RD TRIAL

NAME:

AGE:

MATRIC NO.:

WEIGHT:

HEIGHT:

GROUP: CSD / CDS

20M SPRINT TEST		
1ST TRIAL	2ND TRIAL	3RD TRIAL

AGILITY T-TEST		
1ST TRIAL	2ND TRIAL	3RD TRIAL

APPENDICES F:

LETTER TO ACADEMIC SERVICE

Am
n Hal Ehwal Akademik & Antarabangsa

Universiti Teknologi MARA (UiTM) Cawangan Sarawak
Jalan Meranek, 94300 KOTA SAMARAHAN
Tel : +6082 - 677 200 / Fax : +6082 - 677 300 (Kampus Samarahan)
Tel : +6082 - 678 200 / Fax : +6082 - 678 110 (Kampus Samarahan 2)
http://sarawak.uitm.edu.my

UNIVERSITI TEKNOLOGI MARA

Surat Kami : 100-UiTMKS (HEA&A. 30/7)
Tarikh : 16 Mei 2019

APP(1)

KEPADA SESIAPA YANG BERKENAAN

Tuan/Puan

Sila rujuk lampiran untuk senarai nama pelajar yang terlibat.

Sukacita sekiranya pihak tuan/puan dapat membantu dan memberi kerjasama kepada pelajar di atas dari Program **Sarjana Muda Sains Sukan (Kep)(SR243)** untuk membuat satu kertas projek bagi kursus **SRT606 (Research Methodology In Sport And Behavioural Sciences).**

Maklumat-maklumat daripada jabatan/agensi/syarikat tuan/puan amatlah diperlukan bagi melengkapkan kertas projek tersebut. Semua maklumat yang tuan/puan berikan adalah untuk tujuan akademik sahaja.

Sila hubungi Penyelia Projek, **Cik Patricia Pawa Pitil** ditalian **0135633605** sekiranya pihak tuan/puan ingin mendapatkan maklumat lanjut berkaitan perkara di atas.

Kerjasama daripada pihak tuan/puan kami dahului dengan ucapan ribuan terima kasih.

Sekian.

Yang benar

NOR HAYATI ABDULLAH
Pegawai Eksekutif
Bahagian Hal Ehwal Akademik & Antarabangsa
bp Rektor

lfm