ACUTE EFFECTS OF DIFFERENT WARM-UP PROCEDURES ON 30M. SPRINT, SLALOM DRIBBLING, VERTICAL JUMP AND FLEXIBILITY PERFORMANCE IN WOMEN FUTSAL PLAYERS[2]

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ABSTRACT

The aim of this study was to determine the acute effects of warm-ups procedures which was applied different days on slalom dribbling, 30m. sprint, vertical jump performance and flexibility in women futsal players. Ten women athletes who play futsal in Mugla Sıtkı Kocman University, participated this study. Ten women athletes were assigned randomly to 3 different warm-up procedures (Warm up group I; 5 minutes jogging, Warm up group II; 5 minutes jogging and static streching, Warm-up group III; 5 minutes jogging and dynamic exercises) on non-consecutive days. After each warm-up session, all athletes were tested on slalom dribbling, 30m. sprint, vertical jump and flexibility performances. 30m. sprint and slalom dribbling test performances was measured wtih a stopwatch. For Flexibility, Sit and reach test was used. Vertical jump performance of athletes were measured by taking difference between the height that they can reach by standing and the height that they can reach by jumping. For the analysis of the data obtained from the study, SPSS 16.0 program was used. To find out whether there are any significant differences between the groups, the Kruskal-Wallis test was used and to find out which group cause the difference, Tukey HSD test was used. As a result of the study, significant differences were found 30m. sprint and slalom dribbling performance ($p<0,05$). Consequently, different warm up procedures may have different effect on slalom dribbling and 30m. sprint performance in women futsal players

Keywords: Futsal, Dynamic exercises, Static stretching, Slalom dribbling, Women

FARKLI ISINMA PROTOKOLLERİNİN KADIN FUTSAL OYUNCULARININ TOP SÜRME, 30 METRE SPRİNT, DİKEY SIÇRAMA VE ESNEKLİK PERFORMANSLARI ÜZERİNE AKUT ETKİSİ

ÖZET

Bu çalışmanın amacı kadın futsal oyuncularında farklı günlerde uygulanan farklı ısınma prosedürlerinin top sürme, 30 metre sprint, dikey sıçrama ve esneklik özelliklerine akut etkisini incelemektir. Çalışmaya Muğla Sıtkı Koçman Üniversitesi kadın futsal takımından 10 sporcu katılmıştır. Çalışmaya katılan sporculara üç farklı ısınma protokolü (ısınma grubu I; 5 dk. Jogging, ısınma grubu II: 5 dk. Jogging ve statik egzersizler, ısınma grubu III; 5 dk. Jogging ve dinamik egzersizler) uygulanarak her protokolün top sürme, dikey sıçrama, esneklik, 30 metre sprint özellikleri üzerine akut etkileri incelenmiştir. 30 metre sprint, toplam 10 metre uzunluğundaki slalom testinde top sürme özellikleri kronometre ile ölçülmüştür. Esneklik için otur-uzan testi kullanılmıştır. Sporcuların dikey sıçrama performansları durarak ulaşabildiği yükseklik ile sıçrayarak ulaşabildiği yükseklik arasındaki fark alınarak hesaplanmıştır. Araştırmada elde edilen verilerin analizi için SPSS 16.0 paket programı kullanılmıştır. Gruplar arasındaki farklılıkların anlamlı olup olmadığının test etmek için Kruskal Wallis testi, gruplar arasındaki farklılıkların hangi gruptan kaynaklandığını test etmek için Tukey HSD uygulanmıştır. Çalışmanın sonucunda 30 metre sürat koşusu ve dripling değerlerinde anlamlı farklılıklar bulunmuştur.($p<0,05$).Sonuç olarak farklı ısınma protokollerinin kadın futsalcıların dripling ve 30 metre sürat koşusu değerleri üzerine farklı etkiler yapabileceği görülmektedir.

Ahahtar kelimeler: Futsal, Dinamik Egzersizler, Statik gerdirme, Top sürme, Bayanlar[3]

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INTRODUCTION

Warm-up exercises are called as preparation of athletes both physically and psychologically in the most appropriate manner for the provided certain tasks in trainings and matches and these efforts aim adaptation. In a sense, psychological and physiological aspects of this preparation is referred to as pre-loading.Warming-up activities aim to increase temperature of the body, especially the internal temperature of the muscles (Akgün, 1994). During intense workouts, muscle temperature can rise to 43^{o}C and the body temperature can reach to 41^{o}C degree (Bangsbo,1994). The body temperature falls below 37 degrees, as a result of contraction of the vessels; blood circulation is reduced and fiber breaks may occur. With well-implemented warm-up activities,it is possible to prevent injuries which may occur in the organism. Warm-up activities made for training and competition gives softness and elasticity to joints, muscles, tendons, skin and cartilage tissues. During warm-up, there will be expansion in the capillary vessels so the circulation will accelerate in the tissues. Breathing is strengthened, oxygen intake gets easier and transmission of the nerves is accelerated, thus reflex time is shortened (Günay and Yüce, 2008).

Warm up activities can be done both generally and locally. Heating the whole body in several ways is more efficient in performance than extremity limited warm-up efforts used only in sports. By warming both muscular and rectal temperature rises. Warm up is done actively or passively. To do exercise is active warming. Warming which is carried out by hot bath, hot shower, diathermy, Turkish bath and massage is passive warming. The most effective one is active warming. Active warming consists of general and special moves. General exercises are; jogging, stretching, calisthenic and some resistance exercises, however, special exercises are sport-specific movements (Akgün, 1994).

Football, from the first minute, may require working in anaerobic conditions. In these conditions, the amount of lactic acid in the muscles is increased immediately. If the amount of alkali to neutralize these occurring acids in the blood is found less, the continuity of the movement can not be displayed. During warm up activities the amount of acid of the organism is increased slightly. Alkali reserves to neutralize this amount goes to action. So football player begins the game with an increased and stimulated alkaline reserve (Renklikurt, 1997).

In football, warm-up is done for two purposes. One of them is match, and the other is for training. The warm-up period for matches is standard but also depending on air temperature. The contents and the time of warming for training varies depending on the purpose of training. If the purpose of training is pliometric jumps, low-power jumps can be preferred in special warm-up, if the purpose of training is speed then a few sprint can be preferred in special warm-up, lastly if training purposes aerobic endurance, warm-up activities may be kept short and heart and circulatory system is stimulated. In addition, these activities should contain some football-specific exercises like; warming variator, one-direction, side by side, back to back and with speed variator running, sprinting, agility and jumping exercises (Eniseler, 2010).

Stretching movements constitute a significant portion of the general warm-up exercises (Akgün, 1994). Static stretching is an important warm-up exercise for preparation of football matches and training. Static warm-up is seen almost equal to real warm-up. Dynamic stretching

during warm-ups, as opposed to static stretching or no stretching, is probably most effective as preparation for the high-speed performances required in sports such as soccer. If static stretching is used, evidence suggests that limiting the stretches to short durations and following the stretching with further activity will minimize decrements to power-based performance (Little and Williams, 2006). Static warming not only improves performance but also it is believed that it is a good way to prevent injury. But new researches report that immediately after the static flexibility practices, the change in neural activation as an acute effect, negatively affects explosive exercise performance (Eniseler, 2010).

In team sports players, an acute bout (4 min.) of static stretching of the lower limbs during recovery periods between efforts may compromise repeated sprint ability performance but may have less effect on change of direction speed performance (Beckett et al., 2009). Because of acute disruptive effects of static flexibility in the practices of warm-up on explosive exercise performance, dynamic flexibility rather than static flexibility should be preferred in warm-up (Eniseler, 2010).

Jumping and bouncing exercises towards upper and lower extremities are the samples of dynamic exercises and these exercises constitute the basis of dynamic warm-up exercise. Also, pliometric, heavy-load resistance exercises or maximal voluntary contraction (MVC) are included in these exercises (Gelen, 2010). it is stated that dynamic stretching routines in warm-up protocols enhance power performance because common power activities are carried out by DCER (concentric dynamic constant external resistance, formally called isotonic) muscle actions under various loads. (Yamaguchi et al., 2007). In a conducted study; football players are requested to do dynamic warm-up exercises before they do activities which require high power and as a result; it was found that through dynamic exercises, power production level is increased (Gelen, 2010).

The aim of this study was to determine the acute effects of warm-ups procedures which was applied different days on slalom dribbling, 30m. sprint, vertical jump performance and flexibility in women futsal player.

METHODS

Ten women athletes who play futsal in Mugla Sıtkı Kocman University, participated this study. Ten women athletes were assigned randomly to 3 different warm-up procedures (Warm up group I; 5 minutes jogging, Warm up group II; 5 minutes jogging and static streching, Warm-up group III; 5 minutes jogging and dynamic exercises) on non-consecutive days. This warm-up protocols were performed with 3-day interval. Then dribbling, 30m. sprint, vertical jump and flexibility performance of women were examined. For the sprint performance, subjects ran between 2 lines. The distance was 30m. For the slalom dribbling performance, they did dribbling by zigzagging between 4 cones, which were put at intervals of 2m. along a straight line of 10m. For dribbling and sprint performance were measured wtih a stopwatch. For flexibility, sit and reach test was used. Vertical jump performance of athletes were measured by taking difference between the height that they can reach by standing and the height that they can reach by jumping. Three trials were performed for each test. The highest score of the 3 attempts was used for statistic analysis. All of measurements

were taken at futsal training time (around 20:00 p.m in the evening) on different days. The subjects were asked to abstrain from caffeine intake on each testing day and to avoid any kinds of foods in the 2 hours before testing.

Procedures: Before data collection, all subjects were informed about warm up protocols and then they tried once. Every warm up protocols started with 5 minutes of jogging with low intesity. All subjects relaxed for 2 minutes before performed any warm up methods and after 5 minutes of jogging. After relaxed walking, warm-ups protocols were applied. After each warm-ups protocols, subjects relaxed for 4-5 minutes and then slalom dribbling, 30m. sprint, vertical jump performance and flexibility performance were measured. Stations were established in futsal field to measure each parameter. Two person was assigned at the begining of the each station. All subjects rested at least 3 minutes between tests. Subject completed each warm ups protocols for 15-20 minutes.

Warm up group I, consisted of low intensity aerobic jogging for 5 minutes. Subjects run around the futsal ground for 5 minutes with such an intesity that their heart rate was 140 times per minute. In each group of 10 people, 2 subjects wore a heart rate monitor to measure warm-up intesity. After 5 minutes of jogging, not performing any streching and dynamic exercises, 4-5 minutes later, slalom dribbling, 30m. sprint, vertical jump performance and flexibility performance were measured.

Warm up group II, consisted of low-intensity aerobic jogging (Warm up group I) and static stretching intented for lower extremity muscles for 10 minutes. Static Stretching was intented for special muscles groups (calf, quadriceps, adducktor, hamstring, hip rotator). While subjects were performing each strech, They held each stretch for 20 seconds and then relaxed for 10 seconds. They performed twice. They repeated the same stretch for another 30 seconds before progressing to the opposite extremity. After 4-5 minutes later, slalom dribbling, 30m. sprint, vertical jump performance and flexibility performance were measured

Warm up group III, consisted of low-intesity jogging (Warm up group I) and 12 dynamic warm-up exercises for 10 minutes. Subjects performed each dynamic exercise for 15 m and then rested for 10 seconds and then repeated the same exercises for 15m, they went back starting point. Some instructions were given to the subjects when they performed each dynamic exercises. After 4-5 minutes later, slalom dribbling, 30m. sprint, vertical jump performance and flexibility performance were measured.

Table 1. Static stretching exercises

Calf stretch	The subject stands straight on both feet at a distance of 2- steps distance from a wall, one One leg is stretched in its place while taking a step forward with the other leg, using both hands on the wall for balance. Care must be taken not to lift the heels of the stretched foot off the ground. The same process is then repeated for the other leg.
Quadriceps stretch:	The subject stands and touches a wall or stationary object for balance. The top ankle or forefoot is grasped from behind, and then pulled towards the buttocks. The hip is then straightened by moving the knee backward and held in this position. The same is repeated for the opposite side.
Adductor stretch:	While seated on the ground the subject bends both legs putting both feet together. The knees are then lowered sideways as far as possible with the help of the elbows.
Hamstring stretch:	The subject sits on the ground with both legs straight out in front, and bends forward while keeping the back straight.
Hip rotator Stretch:	The subject lies on his/her back, with both knees bent and feet flat on the floor. The ankle bone of the left leg is rested on the right thigh just above the knee. The left knee is pushed downwards until a stretch is felt in the hip. The same procedure is repeated for the opposite leg.

*(Gelen, 2010)

Table 2. Dynamic warm-up exercises

Light skip	While running with a slight skip, the knees are raised slowly, with arms swinging in rhythm.
High knee pull	While walking each knee is pulled towards the chest with the help of both hands.
Light butt kicks	While running, the heels are raised to touch the buttocks, with arms swinging in rhythm.
Light high knees	While running, the knees are raised slightly with every step, with the arms swinging in rhythm.
Walking lunge	While walking hands behind head, with every step forward the body is lowered by flexing the knee and hip until the knee of the other leg is in contact with floor. The same is repeated with the opposite leg.
Straight leg kick	While walking with both arms outstretched forward, each leg is raised up straight until toes touch palms
High glute pull	While walking, each leg is pulled towards the chest from the ankle using both hands
A-skip	While running, with every skip as each knee goes up, the opposite hand goes up, and the elbows remain bent, swinging in rhythm with the legs.
B-skip	The same as the A-skip with legs kicked forward after knee is raised.
Rapid high knees	The subject pulls knees towards chest as fast as possible while running.
Carioca	The subject runs sideways while crossing both feet in front of each other. This is repeated in both directions.
Power skip	The subject jumps pulling his knees towards his chest while running, with arms moving in rhythm.

* (Gelen, 2010)

STATISTICS

For the analysis of the data obtained from the study, SPSS 16.0 program was used. To find out whether there are any significant differences between the groups, the Kruskal-Wallis test was used and to find out which group cause the difference, Tukey HSD test was used.

RESULTS
Descriptive Statistics

Table 3. Mean and standart deviation values in 30m. sprint, vertical jump, flexibility, slalom dribbling performance for different warm-up methods. (Warm-up I, II, III)

		N	M	S.D.
30m. Sprint(sn)	Warm-up group I	10	6,25	,55
	Warm-up group II	10	6,09	,67
	Warm-up group III	10	5,16	,91
Vertical Jump(cm)	Warm-up group I	10	38,30	3,8
	Warm-up group II	10	38,80	3,93
	Warm-up group III	10	36,70	2,35
Flexibility(cm)	Warm-up group I	10	29,63	10,06
	Warm-up group II	10	33,55	6,14
	Warm-up group III	10	37,50	4,83
Slalom Dribbling(sn)	Warm-up group I	10	9,25	,93
	Warm-up group II	10	8,04	,83
	Warm-up group III	10	8,48	,64

Table 4. The results of kruskal wallis test in 30m. sprint, vertical jump, flexibility, slalom dribbling performance for different warm-up methods. (Warm-up I, II, III)

	30m.sprint (sn)	Vertical Jump(cm)	Flexibility(cm)	Slalom Dribbling(sn)
Chi-square	11,197	1,519	5,633	6,999
Asymp. Sig	,004*	,468	,060	,030*

a. Kruskal Wallis Test * p<0,05

According to the Kruskal-Wallis test results; significant differences were found 30m. sprint (p<0.01) and slalom dribbling performance (p<0.05). No significant differences were found in other variables (flexibility and vertical jump performance).

Table 5. The results of tukey hsd in 30m. sprint, vertical jump, flexibility, slalom dribbling performance for different warm-up methods. (Warm-up I, II, III)

Variable	Warm-up group I-Warm-up group II	Warm-up group I-Warm-up group III	Warm-up group II-Warm-up group III
30.m Sprint	N.S.	**	*
Slalom Dribbling	**	N.S.	N.S.

N.S= Not Significant * = p< 0.05, **= p< 0.01

Significant differences were found 30m. sprint and slalom dribbling performance. In terms of 30m. sprint performance, The reason of that difference is due to the mean score of warm up III was lower than the others group. In terms of slalom dribbling, The reason of that difference is due to the mean score of warm up II was lower than warm up I. Differences were found vertical jump and flexibility performance but These differences were not statistically significant.

DISCUSSION

The aim of this study was to determine the acute effects of warm-ups procedures which was applied different days on slalom dribbling, 30m. sprint, vertical jump performance and flexibility in women futsal players. The findings of this study shows that static stretching performed after mild intensity aerobic exercises (Warm-up II) affected slalom dribbling performance positively as compared with Warm-up I. Dynamic exercises performed after mild intensity aerobic exercises (Warm- up III) affected 30m. Sprint performance positively as compared with Warm-up II and I. We didn't find any significant differences in vertical jump and flexibility performance.

Alikhajeh et al. (2012) were to determine the effects of static stretching, dynamic stretching, and no stretching warm-uptrials on 20m. maximal speed of elite male soccer players There were significant differences among the different warm-up protocols for the 20m. maximal speed with dynamic stretching resulting in significantly better performance than static and no stretching. Carvalho et al. (2012) was to examine the acute effects of 3 different stretching methods combined with a warm-up protocol on vertical jump performance in sixteen young tennis players. They concluded that significant increases in vertical jump performance were observed when comparing the conditions Active Stretching Condition and Dynamic Stretching Condition with Passive Stretching Condition. Needham et al. (2009) found that dynamic wam-up produces a superior sprint and jump performance compared to a warm-up consisting of static stretching.

Lim and et al. (2013) examined the effects of 3 types of postactivation potentiation (PAP) protocols (single-joint isometric, multijoint isometric, and multijoint dynamic) on subsequent 10m., 20m. and 30m. sprint performance in 12 well-trained male track athletes. They indicated that there were no enhancement of short-distance sprint performance after PAP protocols with a 4-minute recovery period, regardless of isometric or dynamics, single-joint or multijoint. Coaches considering the use of PAP protocols to improve sprinting performance of their athletes should exploit the effectiveness of different PAP protocols on an individual basis. Samson et al. (2012) were to determine the effects of static and dynamic stretching protocols within general and activity specific warm-upsin nineteen subjects. They found that the use of static stretching within an activity specific warm-up to ensure maximal ROM along with an enhancement in sprint performance. Paraguan et al. (2012) showed that countermovement jump performance preceded by a general warmup or a general warm-up with dynamic stretching posted superior gains in countermovement jump performance.

Andrejic (2012) was to determine the effectiveness of different warm-up protocols on the flexibility and jumping performance in boys (13 -14 yr). He indicated that dynamic warm-up protocols resulted in a significantly greater jumping performance than static stretching conditions. The vertical jump performance was significantly greater after dynamic exercises compared to static stretching. No significant differences between dynamic warm-up and static stretching were observed for flexibility performance. Bishop and Middleton (2013) were to investigate the effects on 20m. sprint and vertical jump performance following a period of additional static stretching following a dynamic warm-up routine. They demonstrated that performing static stretching following a dynamic warm-up prior to performance does not significantly affect speed, agility and vertical jump

performance. Gelen (2008) demonstrated that static stretching performed after aerobic exercises of mild intensity was found to hinder vertical jump performance, while dynamic warm-up was found to have a positive effect.

Faigenbaum et al. (2005) was to examine the acute effects of different warm-up protocols on fitness performance in children. The warm-up protocols consisted of 5 minutes of walking and 5 minutes of static stretching (SS), 10 minutes of dynamic exercise (DY), or 10 minutes of dynamic exercise plus 3 drop jumps from15-cm boxes (DYJ). They indicated that that vertical-jump performance declined significantly following static stretching as compared to DY and DYJ, There were no significant differences in flexibility following the 3 warm-up treatments. They suggested that it may be desirable for children to perform moderate- to high-intensity dynamic exercises prior to the performance of activities that require a high power output Siatras et al. (2003) was to examine the acute effect of a protocol, including warm-up and static and dynamic stretching exercises, on speed during vaulting in gymnastics. Thet reported that gymnasts mean speed during the run of vault was significantly decreased after the application of the static stretching protocol. The result of the study indicated the inhibitory role of an acute static stretching in running speed in young gymnasts. Gelen et al. (2010) examined that acute effects of different warm-ups protocols on sprint performance. He suggested that It may be desirable for soccer players to perform dynamic exercises before the performance of activities that require a high power output

Fletcher ve Jones (2004) investigated the effecets of four different warm- ups on 97 rugby union players on 20m. sprint performance. These are passive static stretching, active dynamic stretching, active static stretching, static dynamic stretching. They reported that While static stretching applications decreased the short sprint performance, Active dynamic stretching applications increased the 20m. sprint performance. Vetter (2007) investigated the effects of six different warm up protocols on sprint and vertical jump performance in 14 men and 12 women. He found that there were no significant differences among the 6 protocols on sprint run performance. He indicated that a warm-up including static stretching may negatively impact jump performance, but not sprint time. Çolak and Çetin (2010) investigated that the effects of four different on range of motion and flexibility performance in 41 women. They reported that four different warm-up protocols, stretching for 15 seconds following a five-minute jogging was found to be the most effective on joint range of motion. Faigebbaum et al. (2006) examined the acute effects of different warm-up procedures on anaerobic performance in adolescent sportmen. He found that performance on the vertical jump and sprint were significantly improved after dynamic warm up and combined static stretching plus dynamic warm up as compared with Static stretching. Young and Behm (2003) observed that static stretching produced a significant decrement in vertical jump performance and a nonsignificant decrease in concentric explosive muscle performance.

Yıldız et al. (2013) examined the acute effects of different times (15, 30 and 45 sn) of static stretching on sprint performance.Following low-intensity aerobic exercise, static stretching for 15 second duration, static stretching for 30 seconds duration, static stretching for 45 second duration and only low-intensity aerobic exercise (control-all without

stretching) methods were used. The result of the study showed that static stretching, intented for lower extremity muscles, reduced sprint performance of athletes. It was observed that as the time of static stretching increased, sprint performance decreased. Thompsen et al. (2007) found that dynamic exercise may be a viable method of enhancing jumping performance in athletic women as compared to stationary cycling and static stretching.

During warm-up period, Futsal players can apply static stretching and dynamic exercises. Different warm up procedures may have different effect on slalom dribbling and 30 m sprint performance in women futsal players. We suggest that performing dynamic exercise is recommended before dribbling and 30m. sprint performance in Futsal. Consequently, We proposed to coaches, sports scientists that dynamic exercises activities is more effective than static stretching so It should be applied before requiring high effort activities.

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