

## THE EFFECTS OF STATIC AND DYNAMIC STRETCHING ON AGILITY PERFORMANCE

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### ABSTRACTS

The aim of this study was to determine the effects of static and dynamic stretching protocols on agility performance in warm-up sessions. Twenty-three football players (mean  $\pm$  SD age = 15,04 $\pm$  0,77 years; weight = 62,35 $\pm$  6,48kg; height = 1,73 $\pm$  0,06cm) participated to this study from Kocaeli Amateur Football League. Three different warm-up protocols were applied to the players every 48 hours. The first protocol was a general warm-up consisting of 5 minutes jogging with no stretching (GWU+NS), the second protocol was GWU with dynamic stretching (GWU+DS) and the third protocol was GWU with static stretching (GWU+SS) respectively. In the GWU+DS and GWU+SS protocols, 10 different movements were worked out with 12-15 repetitions in 30 seconds for each muscle group. Following each protocols, the players applied an agility performance test. SPSS (17.0) program used to compare the data obtained from 3 protocols and between two of them.

In result, there were no statistically differences between NS and SS protocols ( $p>0.05$ ). However, statistically difference was seen between DS and SS protocols and between DS and NS protocols ( $p<0.05$ ). The warm up protocols consist of dynamic stretching exercises before agility activities should be preferred to have better performance.

**Key Words:** Football, Static Stretching, Dynamic Stretching, Agility.

### STATİK VE DİNAMİK STRETCHING'İN BECERİ PERFORMANSI ÜZERİNE ETKİLERİ

#### ÖZET

Bu çalışmanın amacı, antrenmanın ısınma bölümünde uygulanan statik ve dinamik stretching (germe) egzersizlerinin beceri performansı üzerine etkilerinin incelenmesidir. Çalışmaya, Kocaeli Amatör Futbol Ligi'nde oynayan 23 futbolcu katılmıştır (ortalama  $\pm$  SS Yaş = 15,04 $\pm$  0,77 yıl; Ağırlık = 62,35 $\pm$  6,48kg; Boy = 1,73 $\pm$  0,06cm). Futbolculara her 48 saatte bir üç farklı ısınma protokolü uygulatılmıştır. İlk stretching protokolü sadece 5dk jogging içermektedir. İkinci protokol 5dk jogging + dinamik stretching ve üçüncü protokolde 5dk jogging + statik stretching egzersizleri içermektedir. Dinamik ve statik stretching egzersizlerinde 10 farklı hareket, 12-15 tekrarlı ve her kas gurubu için 30s olacak şekilde futbolculara uygulatılmıştır. Her protokol sonrasında deneklerin beceri özelliğini ölçmek için T-Drill testi yapılmıştır. SPSS (17.0) istatistik programında protokoller arasındaki farklılıklar Friedman testiyle analiz edilmiştir.

Sonuç olarak, NS ve SS arasında anlamlı bir fark bulunmazken ( $p>0.05$ ), DS ve NS arasında ve yine DS ve SS arasında anlamlı farklılıklar bulunmuştur ( $p<0.05$ ). Daha iyi bir beceri performansının sergilenmesi için aktiviteler öncesindeki ısınma programlarında dinamik egzersizler tercih edilmelidir.

**Anahtar Kelimeler:** Futbol, Statik Stretching, Dinamik Stretching, Beceri.<sup>1</sup>

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## INTRODUCTION

The uses of stretching as an important part of all warm-ups have been widely recommended (Ayala et al, 2011). Stretching is the gradual application of tensile force to lengthen a muscle or group of muscles to increase the range of motion of a joint and is often performed as part of a pre-participation routine to aid in preparing the body for activity. Stretching may be categorized into two major types; Static and Dynamic (Behm and Chaouachi, 2011). Some studies focus on different stretching methods used in warm up on effect of motor development (Little and Williams, 2006; Thompsen et al, 2007). The analysis of the scientific literature has shown that dynamic stretching has a positive effect on the

different evaluation tests (isokinetic, jump performance, and functional tests), while static stretch routines have a negative effect, showing a significant decrease in isometric test performance, isokinetic test performance, jump performance and functional test that evaluate sprint performance (Kistler et al 2010, Haddad et al., 2014; Ayala et al, 2011). However static stretching in warm up is preferable because of safe and easiness, the latest studies shows that dynamic stretching is the most effective element in warm up (Amiri-Khorasani, 2013; Chattong et al., 2010; Pagaduan et al., 2012). The aim of this study was to determine the effects of static and dynamic stretching protocols on agility performance in warm-up sessions.

## MATERIALS AND METHODS

### Participants

Twenty-three football players (mean  $\pm$  SD age = 15,04 $\pm$  0,77 years; weight = 62,35 $\pm$  6,48kg; height = 1,73 $\pm$  0,06cm) participated to this study as volunteers from Kocaeli Amateur Football League. During the present study, players did not do any excessive training and the players had no significant history of recent major lower limb injury or disease. They also followed a normal diet and the day before the test, the players refrained from alcohol, caffeine and ergogenic aids. Before the study begun, players were informed about the risks and benefits of the study.

### Procedures

Three different warm-up protocols were applied to the players every 48 hours. The first protocol was a general warm-up

consisting of 5 minutes jogging with no stretching (GWU+NS), the second protocol was GWU with dynamic stretching (GWU+DS) and the third protocol was GWU with static stretching (GWU+SS) respectively. All protocols were applied in football field the time between 01.00- 03.00pm.

In the dynamic stretching protocol (GWU+DS), 10 different movements (thigh, calf, ankle, abdominal, waist, shoulder, hip muscles) were worked out with 12-15 repetitions in 30 seconds with 10 seconds resting time for each muscle group. In the static stretching protocol (GWU+SS), same muscle groups were worked out with two sets and 10 repetitions in 30 seconds. Following each warm-up protocols, the players applied an agility performance test.

### Measurement of Agility (T-Drill Test)

The agility performances were measured using a standard T- test after 2 minutes

from warm-up. This test was administered using the protocol outlined by Semenick, 1990. Four collapsible agility cones (22.86 cm) were arranged as shown in Figure 1. At the tester's signal, the subject sprinted forward 9.14 m and touched the tip of the cone (B) with their right hand. Then they performed a lateral shuffle to the left

4.57m and touched the tip of the cone (C) with the left hand. Subjects then continued to shuffle 9.14 m to the right and touched the tip of the cone (D) with their right hand. They then shuffled 4.57 m to the left and touched point B with their left hand. Finally, subjects back peddled 9.14 m, passing through the finish at point A. The time results of the test were measured by using a hand-held stopwatch.

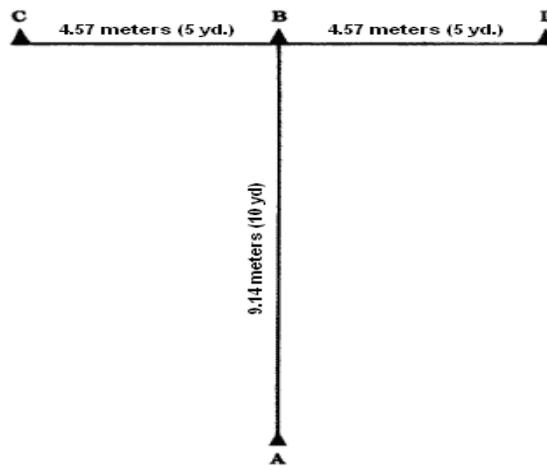


Figure 1. T-Drill Test

### Statistical Analysis

The data were analyzed with the statistical package SPSS (version 17.0). Descriptive statistics (mean  $\pm$  SD) formulated for the variables of age, height and body weight. The best agility performance was

analyzed by using Friedman test. Also, Wilcoxon test used for calculation to compare the data obtained from 3 protocols and between two of them, respectively. A priori level of significance was set at 5% ( $p < 0.05$ ).

### RESULTS

Table1. Results of T-Drill Test: No stretching (NS), Dynamic Stretching (DS) and Static Stretching (SS).

	Mean $\pm$ Std. Deviation
GWU+NS	10,17 $\pm$ 0.64 sec
GWU+DS	9,66 $\pm$ 0.37 sec
GWU+SS	10,07 $\pm$ 0.43 sec

The study was conducted with 23 voluntary male soccer players with the

average T-Drill test result of 10,17 $\pm$  0.64 sec. for general warm-up session without

stretching;  $9,66 \pm 0.37$  sec. for general warm-up session with dynamic stretching

and  $10,07 \pm 0.43$  sec. for general warm-up session with static stretching (Table 1.).

**Table2. Results of Wilcoxon Test.**

	NS-DS	SS-DS	NS-SS
z	-3,834	-4,076	-1,201
p	,000	,000	,230

T-drill agility test results that were measured after the three different warm-up protocols were compared by Friedman test. It was found that there were significant differences between the

protocols ( $p < 0.05$ ) DS and SS, and also between DS and NS ( $p < 0.05$ ). However, there were no differences between SS and NS ( $p > 0.05$ ).

## DISCUSSION

In present study, it was investigated the effects of static and dynamic stretching on agility during the warm-up session of training. According to the literature, there are many studies about the relation between different stretching exercises and motor performances. Some of these literature compared to static stretching exercises with performance (Haddad *et al*, 2014; Gelen, 2010; Little and Williams, 2006) and most of them compared to dynamic exercises with static exercises (Behm and Chaouachi, 2011; Perrier *et al*, 2011; Gelen *et al.*, 2012) which were

similar with the present study. Researchers have recently recommended dynamic stretching over static stretching due to measured deficits in performance (strength and power) associated with the acute affect of static stretching prior to maximal performance (Faigenbaum *et al*, 2006; Thompsen *et al*, 2007). Chaouachi *et al*, (2010) suggested that trained individuals who wish to implement static stretching should include an adequate warm-up and dynamic sport-specific activities with at least 5 or more minutes of

recovery before their sport activity. However, the mechanism of this loss is not describe but it is thought that by means of change in visco-elastic future of tendons, neuromuscular factors, decrease in activation of motor unit, reflex sensitivity. Jordan *et al.* (2011) examined the effects of static and proprioceptive neuromuscular facilitation (PNF) stretching exercises on soccer-specific agility performance in 14 male elite, premier league youth soccer players. They found that neither mode of stretching significantly affected agility performance. The other study concludes that performing static stretching following a dynamic warm-up prior to performance does not significantly affect agility performance (Bishop and Middleton, 2013). Amiri-Khorasani *et al.*, (2010) was found significant decrease in agility time following dynamic stretching vs. static stretching in both less and more experienced players. Static stretching was not appearing to be detrimental to agility performance when combined with dynamic warm-up for professional soccer players. However, dynamic stretching during the warm-up was most effective as

preparation for agility performance. Mahoney (2008) found that static stretching resulted in greater improvements in agility than dynamic stretching in high school volleyball players over a 4 week intervention period and also Kees' (2007) results suggested that dynamic stretching did not produce faster test times for explosive agility activity over static stretching. Van Gelder and Bartz, 2011 indicated that in comparison to SS or NS, DS significantly improves performance on closed agility skills. Additionally, McMillian et al., (2006); Little

### **CONCLUSION**

As the result of this study; dynamic stretching exercises during warm-up session as opposed to static stretching exercises or no stretching exercises is probably most effective as preparation for

and Williams (2006) investigated that repeated measures analysis of variance revealed better performance scores after the dynamic warm up all 3 performance tests ( $p<0.01$ ), relative to the SS and NS ( $p<0.01$ ). The dynamic- stretch protocol produced significantly faster agility performance than did both the no-stretch protocol and the static stretch protocol like present study. It found that dynamic stretching more enhance to agility than SS and NS in present study parallel to the literature ( $p<0.05$ ).

the high-speed performances required in sports such as soccer and we recommended to the soccer coaches to add more dynamic stretching exercises to their training plan rather than static stretching.

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