



Full Length Article

Acute effect of stretching modalities on global coordination and kicking accuracy in 12–13 year-old soccer players



Mohamed Frikha^{a,*}, Mohammad S. Derbel^b, Nesrine Chaâri^c, Adnene Gharbi^b, Karim Chamari^d

^a Department of Physical Education, College of Education, King Faisal University, Al-Hufuf, Saudi Arabia

^b High Institute of Sport and Physical Education, Sfax University, Sfax, Tunisia

^c Faculty of Sciences, Carthage University, Bizerte, Tunisia

^d Athlete Health and Performance Research Center, Aspetar, Qatar Orthopaedic and Sports Medicine Hospital, Doha, Qatar

ARTICLE INFO

Keywords:

Psychomotor task
Speed-accuracy trade off
Precision
Lower limb
Range of motion
Football

ABSTRACT

The aim of the study was to compare the effect of stretching procedures on global coordination and accuracy in instep soccer kicks achieved in different stress conditions. Twenty male young soccer players completed the global coordination test (GC), the instep kicking accuracy test in free (FKA) and in time-pressure (TPKA) conditions, either after static (SS), dynamic (DS), ballistic (BS) or no-stretching (CTR) protocols, on nonconsecutive days and in a randomized order. After performing a 5 min standardized intensity jogging (70% of MAV), followed by stretching exercises for 10 min, each participant completed, successively, the GC, FKA and TPKA tests. Accuracy data, heart-rate, rating of perceived exertion and task difficulty perception were recorded and analyzed using a two-way ANOVA. GC scores were analyzed using one way ANOVA with repeated measures. The results showed higher GC and TPKA performances after DS and BS procedures. However, there was no effect of the stretching procedures on FKA. The GC scores increased by 10.8% and 7.2% after DS and BS, respectively, but were not affected by SS. Compared to FKA, the TPKA accuracy significantly decreased by 20.2% after CTR ($p < 0.01$) and 30.7% SS ($p < 0.001$) with no significant difference after DS (10.1%; $p > 0.05$) and BS (11.0%; $p > 0.05$). The use of dynamic and ballistic stretching yielded to better GC scores and helped reducing the adverse effect of time-pressure on instep kicking accuracy. Consequently, dynamic and ballistic exercises can be recommended before practicing activities requiring coordination and lower limbs speed and accuracy.

1. Introduction

The soccer instep kick is an open-chain movement consisting of a series of stretch-shortening-cycle muscle actions about the hip and the knee joint (Andersen & Dörge, 2011). It constitutes a basic element of both soccer and futsal games (Castagna, D'Ottavio, Granda Vera, & Barbero Alvarez, 2009; Naser & Ajmol, 2016) in which both speed and accuracy are required (Van den Tillaar & Ulvik, 2014). The improvement of soccer instep technique is one of the most important aims of training programs in young players (Kellis & Katis, 2007). As a multijoint motion, it depends on the maximum strength and power of the muscles activated during the kick but also, its performance highly relies on the coordination between the agonist and antagonist muscles (Bjelica, 2008; Dorge et al., 1999; Lees & Nolan, 1998; Manolopoulos, Papadopoulos, & Kellis, 2006). It was previously demonstrated that ball speed of the

* Corresponding author at: Department of Physical Education, Faculty of Education, King Faisal University, 31982 Al-Hufuf, Saudi Arabia.
E-mail addresses: mfrikha@kfu.edu.sa, medfrimed@gmail.com (M. Frikha).

soccer kick may be enhanced by quicker leg movement and transfer of the energy between segments (Tsaousidis & Zatsiorsky, 1996). However, an elevated execution-speed induces decreases in the accuracy of motion (Missenard & Fernandez, 2011). Such phenomenon in goal-directed aiming tasks is related to the Fitts principle (1954), showing that when aiming as quickly as possible at a target of width “W” located at a distance “D”, the execution time “ET” increases as a function of an index of difficulty “ID”, defined as $\log_2(2D/W)$. Therefore, kicking as quickly as possible at a target (time-pressure condition), responding to soccer-competition demands, theoretically leads to an increase of ET and a decrease of accuracy. Researchers focusing on instep kicks demonstrated that by prioritizing accuracy, the kicking ball velocity decreased to 75–85% of maximal values (Andersen & Dörge, 2011; Lees & Nolan, 1998; Van den Tillaar & Ulvik, 2014).

An accurate kick requires high level of kinesthetic differentiation ability and regulation of ball trajectory. It was demonstrated that the kinesthetic differentiation ability, develops rapidly from young age and reaches a maximum at around 10 years of age (Derri, Mertzaniidou, & Tzetzis, 2000). Moreover, the regulation of ball trajectory can be reached by modifying: (i) the support-leg placement characteristics, (ii) the kicking-leg swing motions and (iii) kicking foot-to-ball contact characteristics (Scurr, Abbott, & Ball, 2011). Such regulation requires activation of several lower limbs muscular groups: kicking accurately to a top target requires an activation of tibialis anterior and biceps femoris muscles, while reducing the gastrocnemius muscle activation of the swinging leg (Katis et al., 2013). In contrast, to perform an accurate kick to a bottom target, player must first be able to keep the ball at ground level by: (i) limiting the activation of the tibialis anterior, and (ii) direct in the ball to the desired target by limiting the activation of the rectus femoris (Katis et al., 2013).

Stretching exercises, as part of soccer warm-up procedures, aims amongst others, to prepare players to an optimal state from the first minutes of competition, by increasing the range of motion (ROM; Apostolopoulos, Metsios, Flouris, Koutedakis, & Wyon, 2015), the length of musculo-tendinous unit (MTU) and inhibiting the mechanoreceptor-mediated reflexes (Behm, Blazevich, & McHugh, 2016; Haag, Wright, Gillette, & Greany, 2010).

In the last decade, the impact of the stretching procedures on subsequent performance has been widely investigated (see Behm & Chaouachi, 2011; Behm et al., 2016; Kay & Blazevich, 2012 for reviews). It has been demonstrated that dynamic and ballistic stretching have better effect on hip dynamic ROM during instep kicking in professional soccer players (Amiri-Khorasani, Abu Osman, & Yusof, 2011; Curry, Chengkalath, Crouch, Romance, & Manns, 2009), on sprint performance (Fletcher & Jones, 2004; Little & Williams, 2006), on power and velocity in vertical jumping (Fattahi-Bafghi & Amiri-Khorasani, 2012; Kirmizigil, Ozcaldiran, & Colakoglu, 2014; Miranda, Maia, Paz, & Costa, 2015) and on soccer agility (Amiri-Khorasani et al., 2011; Little & Williams, 2006). Nevertheless, studies related to higher limbs demonstrated that static stretching did not affect baseball pitching velocity and accuracy (Haag et al., 2010) or speed and accuracy in the tennis serve performance (Knudson, Noffal, Bahamonde, Bauer, & Blackwell, 2004). More recently, Mascarini, Vancini, Lira, and Andrade (2015) demonstrated that static stretching decreased medicine ball throwing performance when compared to dynamic warm-up exercises, but did not yield to any drop in ball speed during the handball throwing test. Moreover, Frikha et al. (2016) showed no effect of stretching modalities (i.e. static, dynamic and ballistic) on free darts throw, among young boys. However, the authors recommended 10 min static stretching exercises before practicing activities requiring both upper limbs speed and accuracy.

To the author’s knowledge, no studies investigated the acute effect of stretching on coordination and accuracy in soccer instep kicks. Likewise, the combined effect of stretching exercises and time-pressure on accuracy of lower limbs remains not studied too. Thus, the aim of the present study was to examine the acute effect of static, dynamic and ballistic exercises on global coordination, accuracy and consistency of lower limbs in soccer kicking task in different psychological stress conditions.

2. Methods

2.1. Participants

Twenty male, right-footed young soccer players (age: 13.4 (0.7) yrs, body height: 164 (0.1) cm and body mass: 57.3 (8.1) kg; mean (SD)), volunteered to participate in this study. All the participants, belonged to a soccer team, had a playing experience of 2–4 years in regional tournaments and training with an average of 3–5 training sessions per week in addition to one competitive game. After an explanation of the procedures as well as the benefits and risks involved, a written informed consent was received from the subjects and their parents. Participants reported no sleep disorder, do not consume caffeine and none of them was taking any medication. During the experiment, all participants were instructed to maintain normal daily food and water intake, to avoid any kind of strenuous activity for 24 h before each test, to wear the same sportswear and soccer shoes (without studs/cleats). Two subjects were removed from the study for missed testing sessions. Hence, the data from 18 participants were used for analysis. The study was conducted according to the declaration of Helsinki and the local Ethics Committee approved the protocol.

2.2. Procedures

Once included, participants were invited to perform the Yo-Yo intermittent recovery test (Level_1; Bangsbo, Iaia, & Krstrup, 2008) between 10:00 and 11:30 h a.m. This test was performed to estimate their maximal “aerobic” velocity (MAV). During one week before the start of the experiment, participants were familiarized with the testing procedures and the stretching techniques for at least four sessions, i.e., the global coordination test (GC) (Starosta, 2006; Garbolewski & Starosta, 2013) and the Kicking Accuracy test (Finnoff, Newcomer, & Laskowski, 2002). These familiarizations, performed at the same time-of-day, ensured that participants were fully knowledgeable of the experimental conditions, measurements required, and scoring system. In the last familiarization session,

Download English Version:

<https://daneshyari.com/en/article/5041967>

Download Persian Version:

<https://daneshyari.com/article/5041967>

[Daneshyari.com](https://daneshyari.com)