Performance and half time re-warm-up in soccer

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Abstract

Half time interval seems to influence the performance of soccer players at the beginning of the second half. In this period the players cover less distance and especially in high intensity. This fact may be related with passive half time interval which reduces core and muscle temperature. The purpose of this paper was to analyze record and report the effect of passive and active re-warm-up strategies at half time interval. For such, a research with the following keywords was performed: soccer; football; half time interval, practices and strategies; re warm up practices and strategies in Medline, Scopus and Sport Discus databases. Although the limited number of studies about this aspect, it is obvious that an active re-warm-up can maintain body temperature and physical performance of soccer players. However is needed more studies to clear the duration and the intensity of the exercises that can used for re-warm-up.

Key words: Re-warm-up; soccer; football; half time practices

Introduction

Athletes before their participation in practice perform a kind of warm up. These preparation exercises increase muscle temperature, improve range of motion, increase the production of various hormones responsible for regulating energy production, helps to injury prevention and also helps to mental preparation of the athlete.

The 15-min half time (HT) interval used by soccer players for relax, rehydrate and tactical briefings. In this period usually, soccer players are not active and when the second half begins they are not ready to perform maximum. There is a lot of evidence that has demonstrated reduce in the physical performance of the players at the beginning of the second half of competitive match. More specific researchers mention that the total distance that covered in the first 15 minutes of the second half and the distance covered at high speed are reduced when compared with the first 15 minutes of the first half (Bangsbo et al., 1991; Bradley et al., 2009; Weston et al., 2011).

During this passive period of time muscle temperature has been shown to decrease by 1.5-2.0 °C(Mohr, Krstrup, Nybo, Nielsen, Bangsbo, 2004; Lovell, Barrett, Portas, Weston, 2013) and this is may be one of the reasons for the reduced physical performance at the beginning of the second half. Some other reasons might be a suppressed match-tempo or the team tactical movements (Lovell, Midgley, Barrett, Carter, Small, 2013). A lot of studies mention the beneficial effect of the highmuscle temperature to the performance of high intensity exercises (Asmussen, Bpje, 1945; Bergh, Ekblom, 1979; Sargeant, 1987; Houmnad et al., 1991; Stewart, Sleivert, 1998).

The purpose of this systematic review was to examine the efficacy of warm up practices during the half time interval of a soccer match.

Material and methods

Computerized literature searches of articles until June 2014 were performed with the use of MEDLINE, Scopus and Sport Discus databases. The following search terms were used in different combinations to identify articles that examine the influence of half time practices to soccer player’s performance: ‘soccer,’’ ‘football,’’ ‘half time interval,’’ ‘half time practices,’’ ‘performance,’’ ‘high intensity performance.’
Inclusion Criteria and quality of the articles

Research articles were selected if they a) included soccer players, b) described the outcomes of different half time practices to performance, c) published in peer-reviewed journals. Articles that met the 3 criteria were chosen for the final review.

Data extraction

Data extraction performed by the author considering: 1) aspects of the study design and protocol; 2) aspects of the study population, such as mean age, and gender; 3) aspects of the intervention such as sample size, HT practices and characteristics, frequency and duration of the training program; 4) aspects of the variables that measured and 5) reported results.

Results

Towlson, Midgley, and Lovell (2013) performed a study with questionnaires. In this study participated 19 coaches and sport scientists and gave some elements about HT practices that used in Premier League and Championship. More specific they mentioned that the soccer players arrived in the dressing room in about 1.7 min after the end of the first half. The next 13.3 min used by the players for HT activities like coach instructions, medical attention, nutritional intake, personal preparation, and some other. Also they referred that 2.6 min might be available for re-warm-up and 58% administered re-warm-up activities either on the field or within stadia facilities.

In another one study researchers examined the work rate of soccer players immediately after a passive HT interval. This recent study is in accordance with previous studies that mentioned decrease of work rate at the beginning of the second half (Mohr, Krstrup, Bangsbo, 2003; Bradley et al., 2009; Weston et al., 2011).

In one of the first researches Mohr et al., (2004) studied the relationship between quadriceps muscle temperature and sprint performance. In the study participated soccer players competing in the Danish Fourth Division? One group of players performed a passive HT interval and another one group performed low intensity exercises at HT interval. They measured muscle and core temperature and sprint performance. They found that muscle and temperature decreased significantly after passive recovery at half time. Also they mentioned that re-warm-up keep stable muscle and core temperature. Sprint performance decreased after passive HT interval, but did not change after re-warm-up.

In a later study Lovell, Kirke, Siegler, McNaughton and Greig (2007) studied the effect of passive and active re-warm-up on cardiovascular and thermoregulatory stress, and on second half soccer specific endurance performance. They used an intermittent field test which was performed twice interceded by 15 min HT recovery period. During HT interval 4 experimental trials were executed: a) passive b) passive heating c) non-specific active heating (cycling) and d) soccer specific active heating. Each procedure was performed for 7 min by seven professional soccer players. They referred that active re-warm-up strategies during HT attenuated the decrement in second half soccer specific endurance performance that was observed during passive trials.

In another study Lovell et al., (2013)a examined the effect of whole body vibration and a field based re-warm-up during HT interval on subsequent physical performance measures during a simulated soccer game. Ten semiprofessional performed a 90 min fixed intensity soccer simulation and at the HT interval they execute 3 different practices one with passive interval, one with intermitted agility exercises and one with whole body vibration. They found that passive HT interval reduce sprint, jump and dynamic strength performance. Alternatively intermitted agility exercises and whole body vibration at HT interval attenuated these performance decrements with limited performance differences between interventions.

Zois, Bishop, Ball and Aughey (2013) study the effect of high intensity short duration re-warm-up on team sport related performance. Some of the indices that they measured were the counter movement jump, the repeated sprint ability and, the Loughborough soccer passing test. At the HT interval of the intermitted protocol the participants execute a 15 min passive recovery or 3 min small sided games (SSG) or 5 maximum repetitions (RM) leg press. They found that 5 RM leg press re-warm-up improved physical performance while a SSG re-warm-up enhanced skill execution following standardized intermitted exercise.

Finally in a recent study by Edholm, Krstrup and Randers, (2014), the researchers examine the effect of HT re-warm-up on performance and movement patterns in soccer match play. In the study participated 22 professional soccer players and they performed two kind of HT interval, one passive and one with low intensity exercises. The researchers mentioned that passive HT interval leads to impaired sprint and jump performance during the initial phase of the second half whereas a re-warm-up effectively attenuates such deteriorations.

The characteristics of the studies presented in Table I.
<table>
<thead>
<tr>
<th>Study</th>
<th>Purpose</th>
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<th>Indices</th>
<th>Measures</th>
<th>Conclusions</th>
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<tr>
<td>Edholm et al. 2014</td>
<td>HT RWU on performance and movement patterns in soccer match play</td>
<td>-CG</td>
<td>n=22 male professional soccer players</td>
<td>Max sprint, jump performance</td>
<td>Before &amp; after 1st half; Before 2nd half</td>
<td>Passive HT leads to impaired sprint and jump performance during the initial phase of the 2nd half whereas a RWU effectively attenuates such deteriorations</td>
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<tr>
<td>Lovell et al. 2013a</td>
<td>Effect of WBV and a field based RWU during HT on subsequent physical performance measures during a simulated soccer game</td>
<td>90 min</td>
<td>n=10 semi-professionals male soccer players</td>
<td>MT, CMJ, 10m sprint, knee flexion and extension contractions</td>
<td>Regular intervals during SAFT³⁰</td>
<td>Passive HT interval reduced sprint, jump and dynamic strength performance. Alternatively the other two groups at HT attenuated these performance decrements with limited performance differences between interventions</td>
</tr>
<tr>
<td>Lovell et al. 2013b</td>
<td>Examine the work-rate of soccer players immediately after a passive HT interval</td>
<td>-CG</td>
<td>n = 20 elite youth male soccer players</td>
<td>Total distance, low speed running, high speed running</td>
<td>Before, 5 min, 15 min, 45 min</td>
<td>Players work-rate was markedly lower in the first 5 min after a passive HT interval</td>
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<tr>
<td>Zois et al. 2013</td>
<td>Effect of high intensity short duration RWU on team sport related performance</td>
<td>-2:26</td>
<td>15 min PR</td>
<td>CMJ, repeated sprint ability, Loughborough soccer passing test, BLC, HR</td>
<td>5 RM leg press RWU improved physical performance while a SSG RWU enhanced skill execution following standardized intermitted exercise</td>
<td></td>
</tr>
<tr>
<td>Lovell et al. 2007</td>
<td>Effect of active and passive RWU on cardiovascular and thermoregulatory stress and 2nd half soccer specific endurance performance</td>
<td>2×16.5</td>
<td>n = 7 professional male soccer players</td>
<td>HR, CT</td>
<td>Every 5 min</td>
<td>Active RWU strategies during HT attenuated the decrement in 2nd half soccer specific endurance performance that was observed during passive trials</td>
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<tr>
<td>Mohr et al. 2004</td>
<td>Relationship between quadriceps MT and sprint performance</td>
<td>-CG</td>
<td>n = 25 amateur male soccer players</td>
<td>MT, CT, sprint 3×30m with 25 sec jogging</td>
<td>Rest, Pre, During 1st half, HT, During 2nd half</td>
<td>Decline in MT &amp; CT during HT is associated with lowered sprint capacity at the onset of the second half, whereas sprint performance is maintained when low intensity activities preserve MT</td>
</tr>
</tbody>
</table>

HT: half time; CG: control group; SSG: small sided games; HR: heart rate; CMJ: counter movement jump; RM: repetition maximum; BLC: blood lactate concentration; MT: muscle temperature; CT: core temperature; LIG: low intensity group; IAEG: intermitted agility exercise; WBVG: whole body vibration; ISSG: intermitted soccer specific group; CycG: cycling group; HBG: hot bath group; PR: passive recovery; AR: active recovery; RWU: re-warm-up
Discussion and conclusion

Literature review showed that the number of studies that deal with the effectiveness of HT practices on physical performance of soccer players is limited. The above six studies mentioned that passive HT interval decrease the performance (Mohr et al., 2004; Lovell et al., 2007; Zois et al., 2011; Lovell et al., 2013a; Lovell et al., 2013b; Edholm et al., 2014). Some of the researchers correlate this decrement with muscle and core temperature decrease that observed after a passive period of 15 min (Mohr et al., 2004; Lovell et al., 2007).

Soccer practitioners mentioned that “establish match tempo,” “assert superiority” and tactical strategy” are the major determinants of the work rate that observed at the beginning of the second half of competitive soccer match (Towlson et al., 2013). However we cannot ignore studies that used physical and soccer performance tests and they observed the negative effect of the passive HT interval (Mohr et al., 2004; Zois et al., 2011; Edholm et al., 2014). In these studies all the above determination factors cannot affect the results.

Someone could wonder if this decrease of the physical performance has an impact on score of the soccer match. In order to reply this question we have to see some studies that analyzed the number of goals achieved per 15 min in soccer tournaments (European championship, world cup). Unfortunately the results are not clear, some researchers observed no correlation between time and number of goals (Jinshan, Xiakone, Yamanaka, Matsumoto, 1993; Michailidis, MichailidisPrimpa, 2013) and some others found significant association of goals with time to achieve them (Yiannakos, Armatas, 2006; Armatas, Yiannakos, 2010). The fact is that HT strategies influence players’ performance at the beginning of the second half.

Towlson and cooperates (2013) showed that the most common activities by the players during HT interval are tactical de-briefing, medical attention, nutritional intake, and discussion between players and coaches. Also they mentioned that the participants (79 %) acknowledged the physiological benefits of the HT re-warm-up. While this knowledge the coaches refused to sacrifice time that used tactical discussion and governingbody regulations.

However, literature review showed that intermitted low intensity exercises during the last minutes of HT interval attenuate the reduction of physical performance (Lovell et al., 2007; Zois et al., 2011; Edholm et al., 2014). Also some kinds of exercises like 5 RM leg press or whole body vibration can maintain sprint, jump, and soccer specific performance (Zois et al., 2011; Lovell et al., 2013b). These exercises can performed inside to changing room and give the opportunity to coaches to discuss with their players.

In some of the above studies the researchers used 5-7 minutes to re-warm-up (Mohr et al., 2004; Lovell et al., 2007; Lovell et al., 2013b), but this duration is unrealistic in a soccer match. According to Towlson et al., (2013) study ~3 min is the time that remains for re-warm-up. With a first look this is a little time for re-warm-up, but from literature we learn that moderate intensity exercises can increase muscle temperature 0.15-0.38 °C/min (Gray, Nimmo, 2001; Cochrane, Stannard, sergeant, Ritweger, 2008; Yaicharoen, Wallman, Morton, Bishop, 2012), so in 3 min the players muscle temperature can increase by ~0.5-1.1 °C. This increment is beneficial for player’s performance.

We have to educate the coaches and players about the benefits of a re-warm-up at HT interval. It is needed more research to investigate the minimum duration, the intensity and the kind of exercises that have to conclude in re-warm-up.

References


