Original Article

Neuromuscular differences of selected and non-selected Iraqi National Soccer players

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ABSTRACT

Background: The purpose was to investigate anthropometric, neuromuscular and physiological differences between selected and non-selected Iraqi National soccer players in their preparation to the Olympic Games 2016. Methods: A total of 32 players (selected (N=16) and non-selected (N=16)) participated on three separate training camps. Each occasion was separated by four month and the following performances were measured: Cooper Test, countermovement jump with (CMJ) and without arms (SJ). The data collection was part of the national monitoring process of the U23-Iraq National Soccer team for their preparation for the Olympic Games 2016. All data were analyzed with independent t-tests for each occasion. Results: Selected players had significant higher SJ performance on the first testing and significant higher CMJ performance compared to non-selected players on every testing occasion. However, non-selected players had significant higher cooper-test performance for the first and second test occasion. Conclusion: It seems that neuromuscular performance such as the SJ and CMJ test separates selected U23-Iraqi National soccer players from their non-selected counterparts. Aerobic endurance capacity did not seem to be critical in the selection process. **Key words:** MONITORING, TESTING, SELECTION PROCESS, SOCCER.

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INTRODUCTION

Testing and monitoring are essential parts of sport science environments in team sport settings to evaluate different physical and physiological qualities (Mendez-Villanueva & Buchheit, 2013). Possible purposes from an injury prevention and rehabilitation view are to identify players at risk to sustain an injury (Croisier et al., 2008), identify fatigue (Oliver et al., 2008; Thorlund et al., 2009) and/or overtraining (Schmikli et al., 2011), to investigate discrepancies after injury (Roi et al., 2005) and to decide if players are ready to return to sport (Haines et al., 2013; Roi et al., 2005). Other purposes from a performance aspect might involve updating fitness status for better programming (Svensson & Drust, 2005), investigate efficacy of training (Impellizzeri et al., 2005), profiling of players (Mendez-Villanueva & Buchheit, 2013; Reilly et al., 2000; Sporis et al., 2009), general as well as positional (Boone et al., 2012) benchmarking (Carling & Collins, 2014) and possibly to aid in the selection process. While the latter seemed to be heavily criticized in youth football (Carling & Collins, 2014), physical capacities differentiated successful and unsuccessful teams (Rampinini et al., 2009) and players of different levels of play (Bangsbo et al., 2008; Bradley et al., 2010; Cometti et al., 2001; Mohr et al., 2003; Oberg et al., 1986; Zakas et al., 1995) in adult environments.

For example, aerobic capacity related parameters, such as total distance covered and high-intensity running with the ball differed significantly in successful teams ranked in the first five positions compared to less successful teams ranked in the last five position in the Italian Serie A (Rampinini et al., 2009). Furthermore, VO2max values indicated physiological superiority of players of the team concluding the season in first compared to team in last place in Norwegian (Wisløff et al., 1998). While no league classification were given, Bangsbo et al. (Bangsbo et al., 2008) stated significant YoYo performance differences between players at the highest international level, sub-elite players and moderate-elite players. Neuromuscular capacities were investigated utilizing isokinetic dynamometry (Cometti et al., 2001; Oberg et al., 1986; Zakas et al., 1995), a specific strength exercise (Wisløff et al., 1998) and sprint (Brewer & Davis, 1990; Haugen et al., 2013; Rösch et al., 2000) or jump performance (Arnason et al., 2004; Gauffin et al., 1989; Haugen et al., 2013; Rösch et al., 2000; Wisløff et al., 1998). Reported results showed differences in concentric isokinetic peak torque of the quadriceps (Q) and hamstring muscles between the highest and slowest Swedish soccer divisions (Oberg et al., 1986). Similarly, elite players from France had significant higher knee flexor torque than amateurs at all angular velocities, except at 300 degrees/second (Cometti et al., 2001). The utilized H/Q ratios proposed with two different methods were also significantly lower in the amateur group than in the elite group, except at 300 degrees/second (Cometti et al., 2001). However, there was no significant H/Q ratio difference between four divisions of Greek soccer players at 60 and 180 degrees/second in concentric muscle action (Zakas et al., 1995). Significant differences in 15 and 40m sprinting times were reported in elite and non-elite English soccer players (Brewer & Davis, 1990) and Norwegian national and 1st division players compared to 2nd to 5th division players (Haugen et al., 2013). Vertical jump performance were significant higher in first division teams compared to second division teams (Arnason et al., 2004; Gauffin et al., 1989). In contrast, there were no statistical differences between the first and the last classified team in the Norwegian elite soccer league (Wisløff et al., 1998) as well as players from the Norwegian national team compared to different leagues (Haugen et al., 2013). Concluding the aforementioned scientific evidence, it seems that there are several physical capacities that might distinguish players from different levels of play. However, to the knowledge of the authors there are no scientific references with regards to the physical capacities of soccer players at the highest international level from Iraq. Considering that demands of elite domestic and international match play differ (Bradley et al., 2010) it seems crucial to identify physically superior players that can successfully perform for the national team. Consequently, the purpose was to investigate anthropometric, physiological and neuromuscular capabilities in Iraqi U23-National soccer players and evaluate if selected players differ from non-selected players.

MATERIALS AND METHODS

Participants

The data derived from regular training camp monitoring of Iraqi U23-National field soccer players. Three preparation camps held prior to qualifying games for the 2016 Olympic games were utilized. Goalkeepers were excluded for the copper test. All players had an average soccer-specific weekly training volume of five to seven sessions (~8h) and competed in one match per week. Furthermore, every player had a minimum of 8 years of soccer history in an organized setting. The players did not use any nutritional supplements. After the training camp the national head coach selected the squat representing the national team, however unaware of the test results. While the Iraqi national soccer federation was aware of the study, the data arose from campaign progression in which player's performances were routinely measured over the course of the preparation camps. Therefore, usual appropriate ethics committee clearance was not required. However, the study conformed to the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Procedures

Prior any testing players received a familiarization with accurate test procedures during regular team training. Tests followed a general warm-up that consisted of running, calisthenics, dynamic stretching and warm-up sprints. The testing procedures for all occasions were as follows: Anthropometry, CMJ, SJ, Cooper test. Height, body mass and 7 skinfolds were obtained from all players in accordance to the International Society for the Advancement of Kinanthropometry (ISAK). An ISAK (level 1) accredited sport scientist measured all data. The two jumps (CMJ and SJ) were performed on a jump mat (Microgate Srl, Bolzano, Italy) as described in accordance to Maio Alves et al.(Maio Alves et al., 2010), In short, both jumps started from a standing position and consisted of dynamic flexion at the hip, knee, and ankle, followed by explosive extension of the mentioned joints until take-off and landing on two feet in the same place. During the CMJ the players were allowed to utilize their arms, whilst during the SJ jump the arms remained at the players' hips during the entire jump. Generally, both tests showed good reliability (ICC > 0.94, CV < 4.1%)(Markovic et al., 2004). Data analysis was performed with the Software inherent in the Microgate system. The best of three attempts was used for further statistical analysis for both jumps. The cooper test was performed on a synthetic inside Track and field track. All variables of interest were processed using Microsoft Office Excel (2007).

Analysis

Data were statistically analyzed using SPSS 16.0 (SPSS GmbH Software, Munich, Germany). Means and standard deviation for all dependent variables of interest were used as measures of centrality and spread of data. An independent t-test was used to examine the variables of interest between selected and non-selected players. An alpha level of 0.01 was used for all statistical tests.

RESULTS

Selected players had significant higher SJ performance on the first testing and significant higher CMJ performance compared to non-selected players on every testing occasion. However, non-selected players had significant higher cooper-test performance for the first and second test occasion. All results can be observed in Table 1.

Table 1. Anthropometric, neuromuscular and physiological data for both groups.

Variable	Number of measurement	Group	N	Mean ± SD	Std. Error Mean
Age (years)	1st measurement	Selected	16	24.8 ± 5.71	1.43
		Non-Selected	16	23.0 ± 1.79	0.45
National team experience (years)	1st measurement	Selected	16	4.19 ± 2.23	0.56
		Non-Selected	16	1.38 ± 0.50	0.13
Height (m)	1st measurement	Selected	16	1.81 ± 0.06	0.02
		Non-Selected	16	1.83 ± 0.07	0.02
Body mass (kg)	1st measurement	Selected	16	78.2 ± 7.83	1.96
		Non-Selected	16	76.8 ± 8.90	2.23
	2nd measurement	Selected	16	78.5 ± 7.79	1.95
		Non-Selected	16	77.2 ± 9.11	2.28
	3rd measurement	Selected	16	78.8 ± 7.99	2.00
		Non-Selected	16	76.8 ± 8.86	2.22
Body composition (%body fat)	1st measurement	Selected	16	11.4 ± 1.41	0.35
		Non-Selected	16	12.2 ± 1.76	0.46
	2nd measurement	Selected	16	11.4 ± 1.50	0.38
		Non-Selected	16	12.0 ± 1.81	0.45
	3rd measurement	Selected	16	11.3 ± 1.40	0.35
		Non-Selected	16	11.7 ± 1.83	0.46
SJ (cm)	1st measurement	Selected	16	*37.8 ± 2.27	0.57
		Non-Selected	16	35.4 ± 3.02	0.76
	2nd measurement	Selected	16	38.4 ± 2.57	0.64
		Non-Selected	16	38.2 ± 3.02	0.75
	3rd measurement	Selected	16	39.3 ± 2.39	0.60
		Non-Selected	16	39.2 ± 3.63	0.91
CMJ (cm)	1st measurement	Selected	16	*46.0 ± 2.24	0.56
		Non-Selected	16	43.4 ± 4.34	1.09
	2nd measurement	Selected	16	*47.7 ± 2.67	0.67
		Non-Selected	16	45.2 ± 2.71	0.68
	3rd measurement	Selected	16	*46.8 ± 1.96	0.49
		Non-Selected	16	44.8 ± 3.25	0.81
Cooper Test (m)	1st measurement	Selected	13	2927 ± 144	40.1
		Non-Selected	12	*3028 ± 136	39.3
	2nd measurement	Selected	13	2970 ± 158	43.7
		Non-Selected	12	3122 ± 143	41.4
	3rd measurement	Selected	13	*2984 ± 142	39.3
		Non-Selected	12	3038 ± 238	68.8

*$p<0.01$

DISCUSSION

The present study is the first to investigate anthropometric, neuromuscular and physiological parameters of selected and non-selected Iraqi U23-National soccer players in their preparation phase for an international tournament. Depending on the jump performance, selected players had significant greater jump performance on the first and/or across all testing sessions compared to the non-selected players. However, non-selected players presented significant higher cooper-test performance for two test occasions. Despite some limitations, i.e. different tests and parameters, when comparing our results with the existing literature it seems that our results contradict the reported results with regards to aerobic performance measurements. For example Bangsbo (Bangsbo et al., 2008) stated differences in players between the highest international level, sub-elite players and moderate-elite players. Similarly, Wisloff et al. (Wisløff et al., 1998) were able to distinguish between the first and last classified team in Norwegian elite soccer league for a VO_{2max} measurement. Other parameters, such as total distance covered and high-intensity running that might also be linked with aerobic performance were also shown to be greater in successful teams compared to teams ranked in the bottom of the Italian Serie A(Rampinini et al., 2009). While no significant differences was observed in this study, it seemed that the national coaches selecting the players rated this physiological quality as less crucial compared to other neuromuscular performances. In accordance to Mendez-Villanueva(Mendez-Villanueva & Buchheit, 2013) it seems that as long as players are able to match the opposition and to fulfill the physical match demands from an aerobic performances perspective, coaches might be willing to sacrifice this physiological quality for different neuromuscular capabilities such as speed, or jumping ability. Neuromuscular performance measurements throughout the existing literature were diverse in nature utilizing isokinetic dynamometry(Cometti et al., 2001; Oberg et al., 1986; Zakas et al., 1995), a specific strength exercise(Wisløff et al., 1998), sprint(Brewer & Davis, 1990; Haugen et al., 2013; Rösch et al., 2000) or jump performance(Arnason et al., 2004; Gauffin et al., 1989; Haugen et al., 2013; Rösch et al., 2000; Wisløff et al., 1998). Therefore, caution should be given when comparing different methods and measurements. Nevertheless, the results from our study seemed to be in accordance with the given references, presenting the selected players superior to the non-selected players utilizing isokinetic measurements in Sweden(Oberg et al., 1986) and France(Cometti et al., 2001) as well as sprint performance in English(Brewer & Davis, 1990), Norwegian(Haugen et al., 2013) and French(Cometti et al., 2001) soccer players. However, there was no significant H/Q ratio difference in Greek soccer players at 60 and 180 degrees/second in concentric muscle action between four divisions(Zakas et al., 1995). The vertical jump performance, as the only measurement in the cited references, being an identical measurement to this investigation, discriminated between players from first division teams compared to players from second division teams(Gauffin et al., 1989). However, Wisloff et al.(Wisløff et al., 1998) found no significant difference between the first and the last classified team in Norwegian elite soccer league. Furthermore, Haugen et al. (Haugen et al., 2013) were also not able to report statistical significances between Norwegian soccer players of different levels of play for the CMJ. As most of the players (N=27 of 36) in this investigation competed in the same league. A possible explanation for the neuromuscular differences between the selected and non-selected players might be due to a possible greater performance gradient inside the domestic teams in Iraq. That is, due to multiple variables (i.e. economical reasons) it seemed possible that the physical and physiological performance depth is not as developed in the Iraqi league compared to other countries that have high-performance programs in place possibly also utilizing professional development centers for youth players as well. Consequently, it seems reasonable for national coaches to implement a selection strategy for international duties based on explosive type athletes, as neuromuscular performances such as the sprint were deemed vital in game decisive situations such as goal scoring patterns(Faude, 2012). From a practical point of view, being able to compete physically with an opposition seems crucial to keep score line neutral and positive game outcome possible. Based on the Olympic tournament and its results, the investigated

performances will be used as benchmarks for future national U23 campaigns. However, additional positional specific performance analysis might be necessary to gain a deeper understanding of individual physical and physiological characteristics necessary to fulfill game responsibilities. Due to limited time availability in the preparation phase for major tournaments such as the Olympic games, the gained understanding of position specific profiles might enable better programming. Future research should also take other forms of neuromuscular performances, such as sprint performance or eccentric muscle action into account that was shown to be crucial in decisive game situations(Faude, 2012) as well as being helping to prevent injuries(Schache, 2012).

CONCLUSIONS

Neuromuscular parameters were crucial in the selection process of the Iraqi national Team competing in the Olympic Games. Coaches seemed to favor a more “athletic”/powerful type of players for international competitions. Consequently, neuromuscular training to develop explosive triple extension should be a key component in training routines. However, the aerobic performance of players should be deemed sufficient to match-up opposition and physical game demands.

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