



# UNIVERSITÀ DEGLI STUDI DI TORINO

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## Effects of competition level on the centre forward role of men's water polo

### Abstract

This study aimed to compare specific technical and tactical indicators of the team and centre forward role of Euro League, and Italian Serie A1, Serie A2, and Serie B men's water polo club competitions. A notational analysis was performed on 21 water polo matches to evaluate the occurrence of technical and tactical team and centre forward indicators, highlighting differences among championships according to chi-square analyses. Differences emerged for Counterattack ( $P < 0.001$ ) and Power-Play ( $P < 0.001$ ) possessions, Even ( $P < 0.001$ ; Euro League:  $3 \pm 1$ , Serie A1:  $3 \pm 2$ , Serie A2:  $3 \pm 2$ , Serie B:  $6 \pm 4$ ) and Power-Play ( $P = 0.001$ ) goals, and exclusions and penalties ( $P = 0.008$ ) of the team during Even possessions. Relatively to the role analyses, effects emerged for perimeter players playing events ( $P = 0.049$ ), as well as for centre forwards' goals ( $P = 0.007$ ) and exclusions and penalties ( $P < 0.001$ ; Euro League:  $8 \pm 1$ , Serie A1:  $6 \pm 2$ , Serie A2:  $6 \pm 2$ , Serie B:  $3 \pm 2$ ) occurring at the end of Even possessions. Therefore, in Euro League, and Italian Serie A1 and Serie A2, teams perform a high occurrence of Power-Play possessions following up an exclusion, especially achieved by the centre forward during Even possessions, while, in Italian Serie B, goals were mostly scored during Even possessions, with a relevant contribution from the centre forward role.

### Introduction

In Europe, National water polo championships are organised in relation to different competition levels. In Italy, men's water polo championships are organised in Serie A1, Serie A2, Serie B, Serie C, and Serie D levels. Every year, the best ranked clubs in a given level rise to the upper level, while the worst ranked teams are moved to the lower level. In the most important European water polo national championships, the team ranked first wins the National title, while the best ranked clubs (one, two, or three for each nation according to the Ligue Européenne de Natation (LEN) ranking) participate in the Euro League (LEN, 2010), which is the most prestigious European club water polo competition.

At present, official national and international water polo matches are played by two teams of six field players and a goalkeeper, in a 30 x 20 m court, and for four 8-minute clock-time (i.e., excluding breaks during the game) quarters. Teams have to conclude a single possession in 30 s clock-time. Moreover, after a defender commits an exclusion foul, the attacking team has the opportunity to play a Power-Play situation, which is the phase where the excluded defender has to be out of the game for 20 s clock-time and go in a delimited corner area located behind the goal line (Federation Internationale De Natation [FINA], 2010; Federazione Italiana Nuoto [FIN], 2010).

Water polo has been mainly studied from the physiological (Bratusa & Dopsay, 2006; Gatta, 2009; Lozovina, Pavicic, & Lozovina, 2004; Pavlik et al., 2005; Smith, 1998; Tsekouras et al., 2005) and swimming capability (Falk, Lidor, Lander, & Lang, 2004; Mujika, Mcfadden, Hubbard, Royal, & Hahn, 2006; Platanou, 2006) points of view. Nevertheless, in the last decade, technical and tactical aspects of matches have been also investigated (Argudo Iturriaga & Lara, 2006a, 2006b; Argudo Iturriaga, Roque, Mari'n, & Lara, 2007; Hughes, Appleton, Brooks, Hall, & Wyatt, 2006; Lozovina et al., 2004; Lupo, Tessitore, Minganti, & Capranica, 2010; Lupo et al., 2009; Platanou, Grasso, Cufino, & Giannouris, 2007; Smith, 2004; Stirn & Strojnik, 2006), even considering potential differences between competition levels (Lupo et al., 2010). However, few studies (Lozovina et al., 2004; Smith, 1998) focused on the centre forward and showed that this role strongly influences the opposing defensive arrangements, especially because it occupies the

crucial game area at about 2 m from the opposing goal (Lozovina et al., 2004). Nevertheless, the centre forward has not been evaluated by means of the analysis of the technical and tactical aspects.

Notational analysis is a valuable tool for better interpreting the technical and tactical aspects of performances and coaching (Hughes & Franks, 2004), even with particular reference to water polo (Hughes et al., 2006; Lupo et al., 2009, 2010). Nevertheless, no study has been focused on the notational analysis of a specific water polo role. In particular, it could be possible to hypothesise differences between competition levels for the technical and tactical aspects regarding the entire team as well as the centre forward role. Thus, the present study aimed to analyse the centre forward tactical performance occurring during Even possessions (phases of the game in which the two teams involve an equal number of players) and that of the team during Even, Counterattack, and Power-Play situations, in order to compare Euro League, and Italian Serie A1, Serie A2, and Serie B water polo competitions.

## **Methods**

### **Experimental approach to the problem**

The local Institutional Review Board approved this study to investigate the technical and tactical aspects of the centre forward role competing in the Euro League, and Italian Serie A1, Serie A2, and Serie B championships. Although, it seems reasonable to hypothesise that match-related statistics are linked to the level of competition, at present, the centre forward role has not been investigated by means of this rationale, so that his performance can be inferred only from the analysis of the game of the entire team. Therefore, in this study, differences between competition levels can be expected in relation to the team indicators as well as to the centre forward, providing an observation specifically focused on this tactical role. For this purpose, the data of the present study, related to the technical and tactical indicators of the team and the centre forward, have been considered as dependent variables whereas the competition levels (i.e., Euro League, and Italian Serie A1, Serie A2, and Serie B) are considered as between factors. Therefore, considering that this notational analysis refers to categorical differences, and discrete and not normally distributed variables, the classic chi-square approach was used (Nevill, Atkinson, Hughes, & Cooper, 2002).

### **Participants**

A notational analysis was performed on 21 men's water polo matches of the 2005–06 season: 4 matches (8 teams) in Euro League, 7 matches (14 teams) in Serie A1, 4 matches (8 teams) in Serie A2, and 6 matches (12 teams) in Serie B. Although only based on established water polo habits (and not on published data), to better define the participants of this study, the players of the above mentioned teams are usually involved in a minimum of 5 (Serie B level) to a maximum of 8 (Euro League and Serie A1 levels) 120 min training sessions per week, with at least 5 years of previous water polo practice.

### **Procedures**

The Euro League and Serie A1 matches were recorded from Radiotelevisione Italiana (RAI, Sport Satellite channel), whereas the Serie A2 and Serie B matches were recorded by means of a video camera (GR-DVL 107; JVC, Yokohama, Japan) positioned at a side of the pool, at the level of the midfield line, at a height of 10 m and at a distance of 10 m from the pool. All operators panned their cameras to cover each game action of all considered matches, making it possible to collect all the data of this study. The coaches of the Serie A2 and Serie B teams gave their approval for video recording and analysis of the matches. All the analysed matches were played between 3 and 8 p.m. (FINA, 2010; FIN, 2010). The notational analysis

(carried out according to the technical and tactical indicators listed within the following paragraph) of all matches was performed by means of a Video Home System (SLV-E1000VC; Sony, Tokyo, Japan).

To avoid inter-observer variability, a single experienced observer scored all the matches. However, before the study, the observer scored a single match twice, where the observations were separated by 7 days, reporting a high test-retest reliability for effect of both satisfactory Intra Class Correlations (ICC = 0.96) and Standard Error of Measurement calculated for each indicator (Even, Counterattack, and Power-Play possessions were 0.38, 0.25, 0.00, respectively; Even, Counterattack, and Power-Play goals were 0.00, 0.00, 0.00, respectively; goal, no goal shot, lost possession, and exclusion and penalty achieved ending the Even possessions were 0.00, 0.25, 0.38, 0.00, respectively; Even possessions ended by means of centre forward's event was 0.25; goal, no goal shot, lost possession, and exclusion and penalty achieved ending the Even possessions by means of centre forward were 0.00, 0.25, 0.31, 0.00, respectively).

#### Definition of technical and tactical indicators

1. The occurrence of the offensive possessions in relation to Even, Counterattack, and Power-Play game situation. A possession was defined as originating from the moment that a player gained possession of the ball until the latter was lost to the opposing team or re-obtained after a shot, or in correspondence of the resetting of the 30 s possession clock-time because of any event of the game. In particular, an Even possession is characterised by a number of offensive players relative to the ball position (i.e., in a useful game position to receive, maintain, and lead forward the ball) never larger than that of the defence at the moment of the end of the possession; a Counterattack refers to game situations where, the number of offensive players is larger than that of the defence relative to the ball position, determining a real numerical advantage for the offensive players at the moment of the end of the ball possession; a Power-Play situation is determined by an exclusion foul (decided by the referee) of a defensive player (who has to be out from the game for 20 s clock time) and is provided by a larger number of offensive players with respect to that of the defence at the moment of the end of possession;
2. The occurrence of goals scored in relation to Even, Counterattack, and Power-Play game situation;
3. The occurrence of the team's events of the game (i.e., goal, no goal shot, lost possession, exclusion and penalty achieved) ending the Even possessions. In particular, "no goal shot" refers to all shots that do not end with the scoring of a goal (i.e., shots ending out and on posts of the opponent goal, and blocked by the goalkeeper); "lost possession" is an event of the game determined by an offensive foul, errant pass, or stealing of the ball resulting in a turnover (and the consequent restart of the 30 s clock time to start a fresh single possession); "exclusion and penalty" have been joined into a single category. Specifically, an exclusion foul refers to a "heavy" infringement (more grave than an ordinary one) committed regardless of the court area, whereas the awarding of a penalty occurs when the same "heavy" infringement is committed within the 5 m area and for which a goal would probably have resulted (FINA, 2010; FIN, 2010);
4. The occurrence of Even possessions ended with events of the game performed by specific tactical role (i.e., perimeter player and centre forward's). In particular, the centre forward was defined as any player that occupied a central position at about 2 m from the opponent goal during the offensive Even possession; the others were considered as perimeter players.
5. The occurrence of the centre forward's event of the game (i.e., goal, no goal shot, lost possession, exclusion and penalty achieved) ending the Even.

#### Data analysis

Means, standard deviations and ranges (i.e., minimum and maximum) were calculated for each dependent variable. Statistical analyses were conducted using a SPSS package (version 17.00, Institute Inc., Cary, NC) and the criterion for significance was set at  $P \leq 0.05$ .

The competition level (i.e., Euro League, and Italian Serie A1, Serie A2, and Serie B) effects of each technical and tactical indicator were identified using chi-square tests, considering the expected occurrences according to a coefficient related to the number of teams of each competition level (i.e., Euro League: 8 teams, 0.19; Serie A1: 14 teams, 0.33; Serie A2: 8 teams, 0.19; Serie B: 12 teams, 0.29). Successively, for any significant effect, a post-hoc analysis was applied on each comparable couple of competition levels (i.e., Euro League versus Serie A1, versus Serie A2, and versus Serie B; Serie A1 versus Serie A2, and versus Serie B; Serie A2 versus Serie B) by means of a chi-square with the Bonferroni correction (the new significance was set at  $P \leq 0.044$ ). Then, to provide meaningful analysis for comparisons from small groups, the phi effect sizes between groups were also calculated, considering 0.1, 0.3, 0.5 as small, medium, and large effect sizes, respectively (Huck, 2000).

## Results

Competition level showed main effects for all considered technical and tactical indicators: occurrence of offensive possessions ( $P < 0.001$ , effect size range: 0.2–0.6) and goals ( $P < 0.001$ , effect size range: 0.3–0.6), the team's ( $P < 0.001$ , effect size range: 0.2–0.4) and centre forward's ( $P < 0.001$ , effect size range: 0.2–0.8) events of the game during Even possession, and the Even possessions ended with events of the game performed by specific tactical roles ( $P = 0.018$ , effect size: 0.1).

In terms of occurrences of possessions, effects between competition levels emerged only for the occurrence of Counterattack ( $P < 0.001$ , effect size range: 0.5–0.6) and Power-Play ( $P < 0.001$ , effect size: 0.2) possessions (Figure 1, Table I). Post-hoc analysis showed that teams of Euro League performed less Counterattack possessions than those of Serie A2 ( $P < 0.001$ , effect size: 0.6) and Serie B ( $P < 0.001$ , effect size: 0.5), as well as Serie A1 with respect to Serie A2 ( $P < 0.001$ , effect size: 0.6), and Serie B ( $P < 0.001$ , effect size: 0.5); conversely, the teams of Euro League ( $P = 0.002$ , effect size: 0.2) and Serie A1 ( $P = 0.02$ , effect size: 0.2) performed more Power-play possessions than Serie B.

Table I. Means, standard deviations, and ranges (minimum – maximum) of the frequency of occurrence (n) of actions and goals of Euro League, Italian Serie A1, Italian Serie A2, and Italian Serie B, in relation to the playing situations (i.e., Even, Counterattack, and Power-play situations)

	Even		Counterattack		Power-Play	
	Actions	Goal	Actions	Goal	Actions	Goal
Euro League	37 ± 3 (31–41)	3 ± 1 (1–6)*	2 ± 1 (0–4)**#	1 ± 1 (0–1)**#	11 ± 2 (8–14)*	4 ± 2 (3–8)*
Serie A1	38 ± 3 (34–42)	3 ± 2 (0–6)*	2 ± 1 (0–3)**#	1 ± 1 (0–2)**#	9 ± 2 (6–13)*	4 ± 2 (1–7)*
Serie A2	35 ± 4 (31–41)	3 ± 2 (0–6)*	6 ± 3 (1–10)	2 ± 1 (0–4)	8 ± 3 (3–13)	4 ± 3 (2–7)
Serie B	39 ± 4 (34–49)	6 ± 4 (1–15)	5 ± 3 (0–12)	2 ± 3 (0–10)	7 ± 2 (5–10)	3 ± 1 (0–4)

#differences ( $P \leq 0.044$ ) with respect to Serie A2.

Competition	Even		Counterattack		Power-Play	
	Actions	Goal	Actions	Goal	Actions	Goal

\*differences ( $P \leq 0.044$ ) with respect to Serie B.

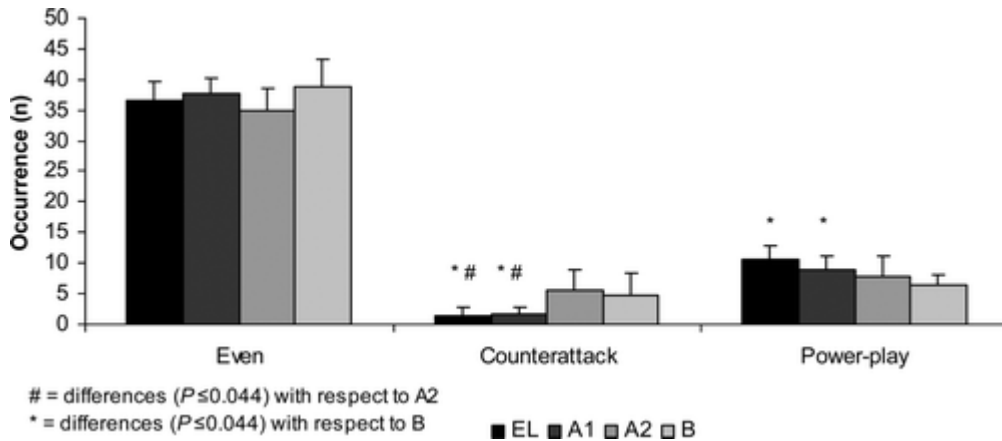


Figure 1. Means and standard deviations of the frequency of occurrence (n) of actions of Euro League (EL), Italian Serie A1 (A1), Italian Serie A2 (A2), and Italian Serie B (B) championships, in relation to the playing situations (i.e., Even, Counterattack, and Power-play situations). #Differences with respect to A2, \*Differences with respect to B.

Although Even was the most frequent game situation in each competition (Figure 1, Table I), only the teams of Serie B reported the majority of goals (Even: 6 goals; entire match: 11 goals; Figure 2, Table I) scored during this phase of game ( $P < 0.001$ , effect size range: 0.3–0.4). In particular, for Even situations, Euro League ( $P = 0.003$ , effect size: 0.3), Serie A1 ( $P < 0.001$ , effect size: 0.4), and Serie A2 ( $P = 0.002$ ; effect size: 0.3) teams scored less goals than Serie B ones. Moreover, for Counterattack (Figure 2, Table I), the teams of Euro League scored less goals than the Serie A2 ( $P = 0.029$ ; effect size: 0.5) and Serie B ( $P = 0.002$ ; effect size: 0.6) ones, as well as the teams of Serie A1 with respect to the Serie A2 ( $P = 0.044$ ; effect size: 0.4) and Serie B ( $P = 0.001$ ; effect size: 0.5) ones. Although no difference emerged in terms of goals scored during Power-play, the related Euro League, Serie A1, and Serie A2 occurrences represented the highest portion of their goal distributions (Figure 2, Table I).

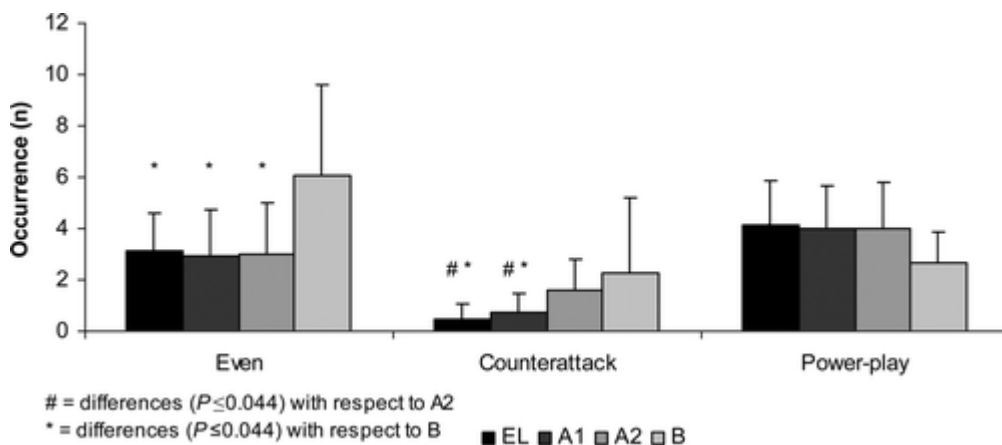


Figure 2. Means and standard deviations of the frequencies of occurrence (n) of the goals of Euro League (EL), Italian Serie A1 (A1), Italian Serie A2 (A2), and Italian Serie B (B) championships, in relation to the playing situations (i.e., Even, Counterattack, and Power-Play). #Differences with respect to A2, \*Differences with respect to B.

In addition to the already reported effects of the goals scored during Even action, the occurrence of the other team's events of the game (i.e., no goal shot, lost possession, exclusion and penalty achieved; Figure 3, Table III) showed differences between competition levels for the exclusions and penalties achieved ( $P = 0.008$ ; effect size range: 0.2–0.3). In particular, this indicator reported that the teams of Euro League ( $P = 0.001$ ; effect size: 0.3) and Serie A1 ( $P = 0.013$ ; effect size: 0.2) achieved more opponent exclusions than the Serie B ones.

Table III. Means, standard deviations, and ranges (minimum – maximum) of the frequencies of occurrence (n) of the play events (i.e. goal, no goal shot, lost possession, exclusion and penalty achieved) performed by teams and centre forwards during the Even playing situation in the Euro League, Serie A1, Serie A2, and Serie B championships

Competition	Goal		No Goal Shot		Lost Possession		Exclusion/Penalty	
	Team	Centre Forward	Team	Centre Forward	Team	Centre Forward	Team	Centre Forward
Euro League	3 ± 1 (1–6)*	1 ± 1 (0–2)*	12 ± 3 (7–16)	1 ± 1 (0–2)	11 ± 4 (4–15)	7 ± 3 (3–11)	10 ± 2 (8–14)*	8 ± 1 (7–10) <sup>##</sup>
Serie A1	3 ± 2 (0–6)*	1 ± 1 (0–4)	13 ± 3 (6–20)	1 ± 1 (0–3)	14 ± 3 (10–20)	8 ± 3 (4–13)	9 ± 2 (6–12)*	6 ± 2 (2–9)*
Serie A2	3 ± 2 (0–6)*	1 ± 1 (0–2)*	13 ± 5 (9–21)	1 ± 1 (0–4)	12 ± 2 (9–16)	7 ± 3 (3–11)	8 ± 3 (4–10)	6 ± 2 (3–8)
Serie B	6 ± 4 (1–15)	2 ± 2 (0–6)	12 ± 3 (8–16)	2 ± 1 (0–3)	12 ± 5 (5–17)	7 ± 3 (2–13)	6 ± 2 (2–9)	3 ± 2 (1–7)

<sup>‡</sup>differences ( $P \leq 0.044$ ) with respect to Serie A1.

<sup>#</sup>differences ( $P \leq 0.044$ ) with respect to Serie A2.

\*differences ( $P \leq 0.044$ ) with respect to Serie B.

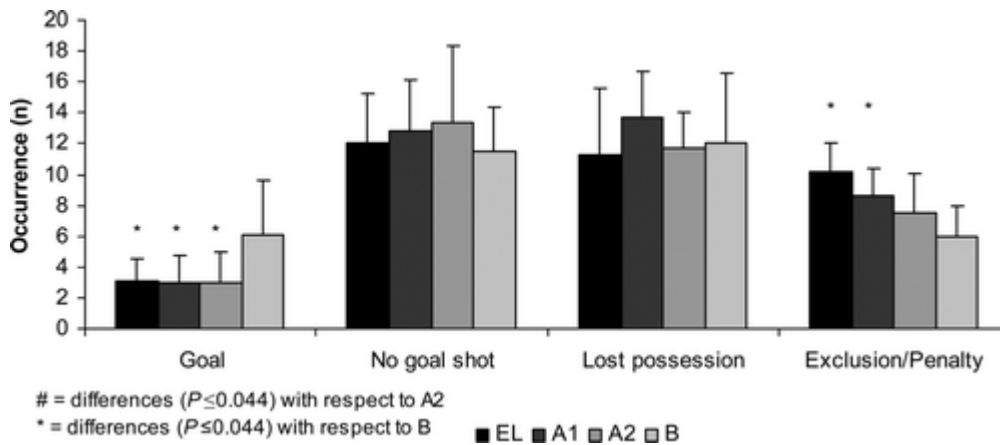


Figure 3. Means and standard deviations of the frequencies of occurrence (n) of the play events (i.e. goal, no goal shot, lost possession, exclusion and penalty achieved) performed during the Even playing situation of Euro League (EL), Italian Serie A1 (A1), Italian Serie A2 (A2), and Italian Serie B (B). #Differences with respect to A2, \*Differences with respect to B.

Relative to the occurrence of Even possessions ended with events of the game performed by specific tactical roles (Figure 4, Table II), a weak divergence emerged for perimeter players ( $P = 0.049$ ; effect size: 0.1). In particular, Even possessions ended by means of a perimeter player event of the game occurred less during Euro League games than during Serie A2 ( $P = 0.002$ ; effect size: 0.1) and Serie B ( $P = 0.007$ ; effect size: 0.1) games.

Table II. Means, standard deviations, and ranges (minimum-maximum) of the frequencies of occurrence (n) of the Even actions ended by means of a centre forward and perimeter player play event in Euro League, Serie A1, Serie A2, and Serie B championships

### Even Actions

#### Competition Centre Forward Perimeter Players

Euro League	17 ± 3 (12–20)	24 ± 7 (16–35) <sup>#*</sup>
Serie A1	16 ± 3 (11–22)	27 ± 10 (13–48)
Serie A2	15 ± 3 (12–18)	28 ± 10 (16–41)
Serie B	15 ± 4 (8–22)	31 ± 13 (13–62)

<sup>#</sup>differences ( $P \leq 0.05$ ) with respect to Serie A2.

<sup>\*</sup>differences ( $P \leq 0.05$ ) with respect to Serie B.



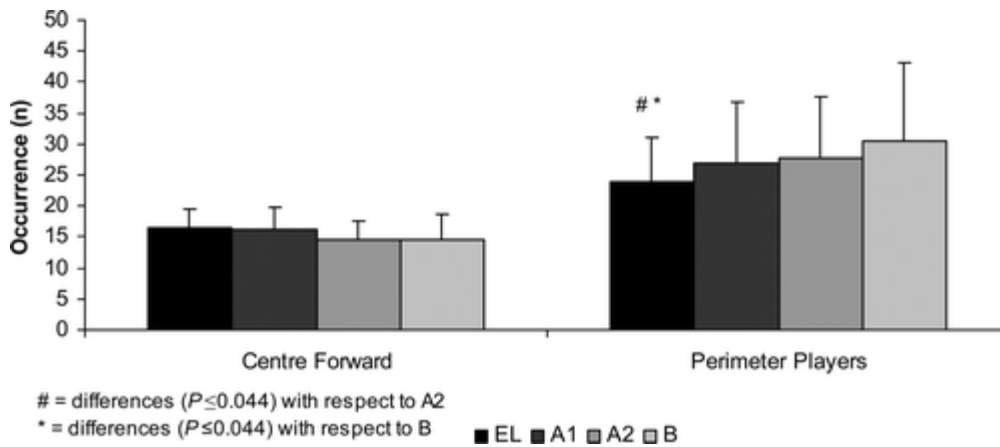


Figure 4. Means and standard deviations of the frequencies of occurrence (n) of the Even actions ended by means of a play event of the centre forward and perimeter players during Euro League (EL), Italian Serie A1 (A1), Italian Serie A2 (A2), and Italian Serie B (B). #Differences with respect to A2, \*Differences with respect to B.

The analysis of the events of the game of the centre forward occurred during Even possessions showed effects for the goals ( $P = 0.007$ ; effect size range: 0.3–0.6), and exclusion and penalty ( $P < 0.001$ ; effect size range: 0.2–0.8) occurrences. In particular, centre forwards playing in Serie B scored more goals than Euro League ( $P = 0.003$ ; effect size: 0.6) and Serie A2 ( $P = 0.004$ ; effect size: 0.3) ones. On the other hand, centre forwards playing in Euro League achieved more opponent exclusions than Serie A1 ( $P = 0.044$ ; effect size: 0.2), Serie A2 ( $P = 0.004$ ; effect size: 0.8), and Serie B ( $P < 0.001$ ; effect size: 0.4) ones, as well as those of Serie A1 with respect to the Serie B ( $P = 0.003$ ; effect size: 0.3) ones (Figure 5, Table III).

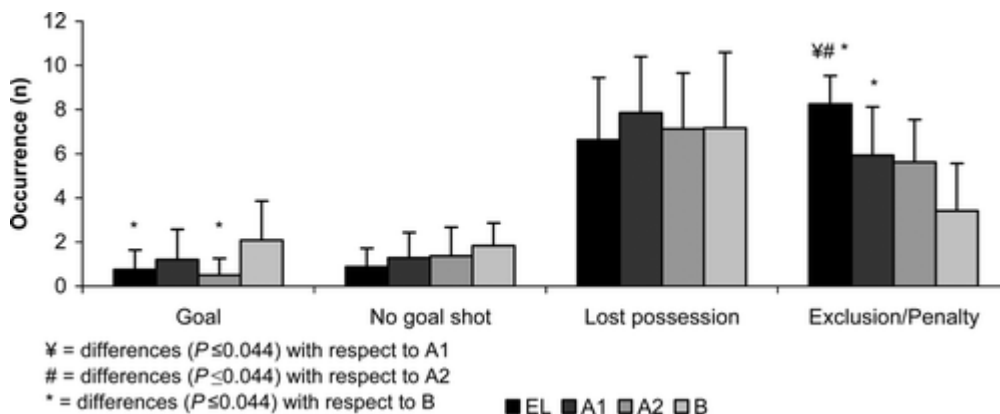


Figure 5. Means and standard deviations of the frequencies of occurrence (n) of the centre forward play events (i.e., goal, no goal shot, lost possession, exclusion and penalty achieved) performed during the Even playing situation Euro League (EL), Italian Serie A1 (A1), Italian Serie A2 (A2), and Italian Serie B (B) championships. ¥Differences with respect to A1, #Differences with respect to A2, \*Differences with respect to B.

## Discussion

Although studies focused on technical and tactical analysis of team sports, like water polo, suffer in terms of replication because of relevant situational nature complexity (Lupo et al., 2010), notational analysis has been shown to be an effective tool for increasing the knowledge of team sports and for better coaching (Hughes & Franks, 2004). At present, even though studies on the notational analysis of different competition levels have been carried out (Lupo et al., 2009, 2010), research on technical and tactical aspects of water polo is mainly present in the elite national team competitions (Argudo Iturriaga & Lara, 2006a, 2006b; Argudo Iturriaga et al., 2007; Hughes et al., 2006; Smith, 2004), with no reference to the profile of specific roles.

The main finding of the present study is that water polo competition level has a significant impact on the occurrence of technical and tactical indicators of team and centre forward performance, often highlighting a split between Euro League and Serie A1 (i.e., elite level) with respect to Serie A2 and Serie B (i.e., sub-elite level), despite Serie A2 sometimes showing intermediate occurrences with respect to the other levels. However, the elite competitions are clearly characterised by teams performing a high occurrence of Power-Play possessions following up an exclusion, especially achieved by the centre forward during Even possessions, while, Serie B shows goals mostly scored during Even possessions, with a relevant contribution from the centre forward role.

In line with other studies (Lupo et al., 2009, 2010), the most frequent game situation was the Even situation in all considered water polo competitions (Figure 1, Table I). However, the occurrence of offensive possessions performed by a team showed competition level effects relative to Counterattack and Power-Play situations. In particular, in Euro League and Serie A1 levels, the low occurrences of Counterattacks (Figure 1, Table I) suggest more balanced offensive arrangements and effective defence with respect to the lowest competitions, as confirmed also by the analysis of goals scored (Figure 2, Table I). Conversely, for the Euro League and Serie A1 championships, the elevated frequencies of Power-Play possessions (Figure 1, Table I) suggest the hypothesis that teams tend to perform a tactical strategy directed to obtain the exclusion fouls of the opponents. Moreover, this speculated aspect is also justifiable considering that, in Euro League and Serie A1, both the team's and centre forward's exclusion and penalty occurrences (Figure 3 and 5, Table III) were higher than Serie B (and Serie A2, despite only arithmetically) ones. Nevertheless, differently from previous studies (Lupo et al., 2010), the occurrence of goals scored during Power-play (Figure 2, Table I) did not statistically (but only arithmetically) confirm the effectiveness of this game situation.

On the other hand, in consideration of the high teams' goal occurrences of Serie B during Even possessions (Figure 2, Table I), it could be hypothesised that the teams of this championship showed reduced defence skills (rather than higher offensive ones) with respect to the Euro League, Serie A1, and Serie A2 levels. Moreover, this game aspect finds a further explanation in consideration of the amount of shots (i.e., the sum of "goal" and "no goal shot" occurrences) performed during Even possessions. In fact, despite no effect emerging for the occurrence of Even possessions, teams and centre forwards of Serie B (Teams: Serie B,  $18 \pm 3$ . Centre forwards: B,  $4 \pm 2$ ) were shown to be able to shoot more than in the other championships (Teams: Euro League:  $15 \pm 4$ ; Serie A1:  $16 \pm 4$ ; Serie A2:  $16 \pm 6$ . Centre forwards: Euro League:  $2 \pm 1$ ; Serie A1:  $3 \pm 2$ ; Serie A2:  $2 \pm 1$ ).

The analysis of the end of Even possessions in relation to the discrimination between centre forwards' and perimeter players' events of the game (Figure 4, Table II) showed weak effects (either in terms of significance or effect size) only for the latter role (Euro League values higher than Serie A2 and Serie B ones). However, despite teams ending Even possession mainly by means of perimeter players rather than

centre forward (expected result considering that teams mostly play Even possessions by means of one centre forward and five perimeter players), Figure 4 reports a tendency of the higher competition levels to encourage the end of this game situation more by means of a centre forward role than by perimeter players (centre forward: Euro League:  $17 \pm 3$ ; Serie A1:  $16 \pm 3$ ; Serie A2:  $15 \pm 3$ ; Serie B:  $15 \pm 4$ . Perimeter players: Euro League:  $24 \pm 7$ ; Serie A1:  $27 \pm 10$ ; Serie A2:  $28 \pm 10$ ; Serie B:  $31 \pm 13$ ).

Some studies asserted that, in elite national teams, centre forwards are the most involved water polo players in the vertical body position and duelling phases (Lozovina et al., 2004; Sardella, Alippi, Rudic, Castellucci, & Bonifazi, 1992; Smith, 1998), often performing high intensity bursts of activity (Lozovina et al., 2004). Coherently with these activity aspects, the present findings highlight that, in the elite club teams, a considerable portion of the Even possessions ended by means of a centre forward's event of the game, suggesting a systematic tactical aiming to finalise the possession with this specific role. In particular, this study highlights that, during the Even possessions of the highest club competitions, the tactical responsibilities of the centre forwards mainly consist of trying to achieve the opponent's exclusion (and penalty) to obtain a Power-Play possession (and penalty throws), whereas, during the same game situation of the lowest levels, shooting to score a goal seems to be the primary aim.

Coaches should be aware that specific technical and tactical aspects of water polo could be useful to structure sound training plans. In fact, Smith (1998) claimed that much of the information used in water polo coaching will remain approximate and unreliable until studies are directly focused on the actual demands of water polo training and competition. Considering specific game phases in relation to the competition levels, this study also provides a technical and tactical analysis of the crucial role played by the centre forward. The differences that emerged in the studied indicators demonstrated that the technical and tactical aspects of the highest men's water polo competitions have their own characteristics and do not easily allow implications for those of the lower levels.

At this point, further studies on water polo could be promoted in favour of physiological and time motion analyses. In particular, the analyses of water polo matches according to a combined investigation of heart rate parameters and swimming aspects (i.e., horizontal and vertical body position, with and without the possession of the ball), as well as contact and duelling phases in relation to specific situations and roles of the game could be promoted. Although this kind of evaluation might be provided only in friendly and not official matches, because the heart rate monitor has to be located on the players' chests (circumstance adverse to the official game rules), such studies could provide useful data, even for training planning.

## **Conclusions**

The present study contributes to the systematic identification of the centre forward demands occurring during the game, which represents an essential process for the definition of specific training programmes for individual water polo positions (Smith, 1998). In particular, the present findings not only offer general information to coaches about the centre forward, but also identify the differences for this role at different competition levels, which also highlights the danger of inferring sub-elite data from elite data (Lupo et al., 2010).

In conclusion, this study has demonstrated (high occurrence of exclusion and penalty fouls committed on this role) and speculated upon (systematic searching and obtaining of the opponent's exclusion foul) characteristics of the game of the centre forward at elite competition levels, inviting coaches to focus the training of this specific role on strategies which are coherent to the game. In particular, the development of the centre forward's aquatic abilities to maintain the body in the appropriate orientation with respect to

the positions of opponents, team mates, and the ball could be promoted, also involving the other players to consider the most effective distances and appropriate instant of the game to pass him the ball. Moreover, in line with these training aspects, the abilities of holding and duelling against the direct opponent seem to be of primary importance for the centre forward (Lozovina et al., 2004; Sardella et al., 1992; Smith, 1998). On the other hand, for the sub-elite water polo levels, coaches should promote a wide range of technical and tactical aspects, which are related to directly scoring a goal during Even possessions. In particular, for this purpose, it could be beneficial to develop the shooting skills by means of a progressive grade of difficulty and physical requests (i.e., series of shooting characterised by different court positions, opponent pressure intensities, or grades of fatigue). Finally, even though the effects relative to the defensive aspects have only been hypothesised in this study, training focused on the increasing of the defensive abilities could promote beneficial improvements to limit the efficacy of the opponent's team and centre forward offensive game.

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