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COMPARISON OF TECHNICAL FACTORS AMONG THREE TOP TEAMS OF MEN AND WOMEN'S HANDBALL IN 2012 OLYMPICS

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ABSTRACT

The present study aims at comparing technical factors among three top handball teams of men and women in 2012 London Olympics. In this regard, three top teams of men's handball in London Olympics including, respectively, France, Sweden and Croatia were compared with three top teams of women's handball including, respectively, Norway, Montenegro and Spain in terms of technical factors. The comparison was conducted based on the comprehensive statistics on the competitions released by the International Handball Federation and the respective countries. Chi-square and independent t test were run to analyze the data at 0.01 level of significance. The results showed that, from among 23 effective factors examined, there was no significant difference between men and women's handball teams in passes leading to goals, snatching the ball, blocking the ball, immediate 2-minute suspension, missing the ball, 9-meter line throws, 6-meter line throws, left- and right-corner throws, three-step shots, penalty, goals scored in the first and second periods, the total goals scored and conceded in both periods, the goals conceded in the first period as well as parrying 9-meter line shots, 6-meter line shots, corner shots, three-step shots, counterattack shots and penalty shots. However, there was a significant difference between male and female handball teams in counterattack shots. It, therefore, seems that the equal percent of these technical factors in both male and female Olympics handball players constitute a good model of performance for all handball players throughout the world who want to measure their accuracy against a touchstone. The significant difference in the counterattack shots may relate to greater strength and endurance profile in male than in female athletes. It seems that female

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INTRODUTION

When you plan for a trip, you need to know where you are, where you wish to go, and how to get there. Similarly, when you design the sports schedule, evaluation of the players and the team helps you know where you are and identification of the purposes determines where you want to go and analysis of the needs specifies the path (Amirtash, 2006). Definitely, if the coach fails to employ the planning and scientific rules of training, he can predict the aims and future of the team and the players with less plausibility and nowadays it is not reasonable to rely on the trial and error (Alijani, 2008). Regardless the principles of exercise science, each sports field hold proper and standard techniques that the coach and the players should follow them. In fact, technique consists of all the structures and technical factors involved in a precise and effective movement that the athlete should perform in the field (Bompa, 2012). However, tactic of each sports field is considered as the tools for athletes to learn the possible methods and procedures to prepare and organize the attack and defense moves to gain access to desirable target (Bompa, 2009). The basis of successful tactical plan for each sport is holding a high technical level. Furthermore, tactical skill is one of the factors determining success in team fields, because in conditions that the techniques are equal, the winner is one who employs more precise and reasonable tactics (Bompa, 2012). Handball is one of the main events of Olympic Games and its related World Championship games are held at various ages (Aghaalinejad, 2007). Team attack of this field starts from a 3-3 basic arrangement in which the players appear in situations according to their abilities and skills. This arrangement provides balance and order, but it does not prevent the players from creativity and freedom. The 3-3 arrangement is common for tactical movement, because it gives equal spaces of players in back

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of the court and the possibility of short passing and better ball control. In this sport, six attack players try to move the ball with passing and shoot into a guarded goal. In other words, players in attack work closely together as a group to organize shooting to the goal (Amirtash, 2006). Due to this fact, the technique of passing and catching the ball is the starting and basic point of handball. Drawing upon these techniques results in sustained attack and increased pressure on the opponent's defenders and consequently increases the chances of scoring the goal. Of course, the final and main objective of attack is scoring, so in handball the shooting technique is the final act in attack to earn points. Meanwhile, firm shoot is not enough to defeat a skilled goalkeeper, it is necessary to shoot accurately. Shooting with technique and precision form various posts provides the opportunity for scoring opportunities to earn point. However, if the offensive team loses the possession of ball because of shooting with low precision, error pass or violation of the rule, it should turn the game quickly to the defense position and try to delay starting the other team's attack to prevent from their fast break. To avoid this situation, all defending players should return to 6 m line and do the organized defense there. Indeed, the team success mostly depends upon the ability of not receiving the goal (Delavar, 2009). Besides, goalkeeper is the last line of defense. If the shot passes from the defenders, a goalkeeper is there to be a barrier against the ball.

When the attacking player shoots, the goalkeeper moves to attack the ball and divert it with part of his body in order to stop the ball entering the goal (Amirtash, 2006). The goalkeeper encounters the shots at a speed of 80 miles (128 kilometers an hour). Among the features of handball are goalkeeper spectacular ball handling, contact and physical clash in 6m and 9m lines, dive shots of wing and pivot, field players' jump shot over the defenders, the speed of the game which is more than most of the ball and field games (Amirtash, 2006). Hence, in order to succeed in such factors, the players need not only to learn in which positions they should implement these techniques and tactics, they also need to know the right time to implement them. Acting one minute early or late results in missing the opportunity. Therefore, choosing the type of technique and tactic by the back and forth players can determine the result of the game. The researcher aims to address the questions: 'what should be the technical statistics of handball teams and Olympics players at the success rate of players' passes and shots in different positions, goalkeeper's blocked shots and the number of goals scored and conceded in the first and second period? Is there any significant difference in the statistics of technical factors between the three top teams of men and women's handball in 2012 Olympics? If so, what would account for this difference? If the results reveal that the difference is not significant among the teams, due to their normality, the statistics may be used as model performance for other players, teams and coaches.

MATERIALS AND METHODS
In current study, the library and documentary method have been utilized. The related information gathered from the data and comprehensive statistics recorded in the official websites of World Federation and handball competitions. The sample population of this study included all the teams reached 2012 Olympic in London. The first considered group was the men top three teams (France, Sweden and Croatia), and the second group was the women top three teams (Norwey, Montenegro and Espania). The groups were selected through non-random sampling method after finishing the tournament and compared. In order to analyze data related to comparing the players' performance, in case that data were in frequency form, the one-way chi-square was employed and in cases that data were as proportion and the purpose was to compare two independent proportions, a test of independent proportions was used $Z = \frac{P1-P2}{\sqrt{Pq\left(\frac{1}{n1}+\frac{1}{n2}\right)}}$

by Sharkey and Gaskill (2008).

RESULTS AND DISCUSSION
Results
The research hypothesis assumed that there was no significant difference in the frequency and percent of technical factors between the top three teams of men and women's handball in 2012 London Olympics. The following results were obtained from testing the research hypothesis:

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1. The handball players of the top three handball teams of men and women in London Olympics showed equal proficiency in technical factors such as passes leading to goals, snatching the ball, blocking the ball, immediate 2-minute suspension and missing balls (Table 1).

2. The handball players of the top three handball teams of men and women in London Olympics displayed equal proficiency in technical factors such as 9-meter line shots, 6-meter line shots, corner shots, three-step shots and penalty shots. However, there was a significant difference between male and female players in counterattack shots, with males outperforming females (Table 2).

3. The handball players of the top three handball teams of men and women in London Olympics showed equal proficiency in technical factors such as the goals conceded in the first period, the goals scored in the first period, the goals conceded in the second period, the goals scored in the second period and the total goals conceded and scored in both periods (Table 3).

4. The goalkeepers of the top three handball teams of men and women in London Olympics displayed equal proficiency in technical factors such as parrying shots (9-meter line, 6-meter line, corner, counterattack, three-step and penalty shots) (Table 4).

Table 1: Chi-square results to compare passing technique of two teams

Statistical index	Index	Observed frequency	Expected frequency	Remaining	(x^2)	df	Sig
Teams							
men	Assist pass	347	343	0.035	0.07		6.63
woman		339	343	0.035			
men	steals	88	90.5	0.044	0.088		
woman		93	90.5	0.044			
men	blocked	47	49	0.045	0.090		
woman		51	49	0.045			
men	2 Minute	78	78	0.003	0.006		
woman	Suspensions	78	78	0.003			
men	missed	48	62.5	3.136	6.272		
woman		77	62.5	3.136			
						1	

Table 2: Findings of two independent proportions test to compare two groups in terms of shooting technique of two teams

Groups	Index	F	N	Total ratio $P = (\dfrac{f1+f2}{n1+n2})$	P1-P2	Z	Sig.
men	9m shots	187	419	0.40	0.08	1.85	2.58
woman		147	406				
men	6m shots	137	194	0.69	0.02	0.42	
woman		132	192				
men	Wing shots	112	191	0.60	-0.03	0.57	
woman		102	165				
men	Breakthroughs	65	86	0.73	0.04	0.63	
woman		81	114				
men	7m throw	60	78	0.73	0.06	0.89	
woman		70	100				
men	Fast breaks	126	147	0.78	0.16	3.05	
woman		76	109				

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Note: F, frequency; N, number;

Table 3: Chi-square results to compare tactical performance of two teams in terms of received and scored goals

Statistical index Teams	Index	Observed frequency	Expected frequency	Remaining	(x^2)	df	Sig.
men	First half	263	281.5	1.15	2.30	1	6.63
woman	received goals	300	281.5	1.15			
men	First half scored	328	318.5	0.254	0.508		
woman	goals	309	318.5	0.254			
men	Second half	280	275.5	0.058	0.116		
woman	received goals	271	275.5	0.058			
men	Second half	349	319.5	2.632	5.264		
woman	scored goals	290	319.5	2.632			
men	Total received	543	557	0.327	0.654		
woman	goals	571	557	0.327			
men	Total scored	677	638	2.323	4.646		
woman	goals	599	638	2.323			

Table 4: Findings of test of two independent proportions to compare two groups in terms of goalkeepers' performances

Groups	Index	F	N	Total ratio $P = (\frac{f1 + f2}{n1 + n2})$	P1-P2	Z	Sig.
men	Receiving 9m	195	369	0.5	0.05	1.35	
woman	shots	173	364				
men	Receiving 6m	35	133	0.27	-0.02	0.035	
woman	shots	33	116				
men	Receiving wing	47	140	0.34	-0.02	0.34	
woman	shots	45	126				2.58
men	Receiving fast	21	86	0.23	0.01	0.15	
woman	breaks	20	85				
men	Receiving	16	69	0.24	-0.01	0.14	
woman	breakthroughs	22	89				
men	Receiving 7m	11	61	0.2	-0.03	0.47	
woman	throw	26	119				

Note: F, frequency; N, number.

Discussion
The results showed that the handball players of the top three men and women's handball teams in London Olympics showed equal technical proficiency in such factors as passes leading to goals, snatching the ball, blocking the ball, immediate 2-minute suspension and missing the ball. As each team played 8 games at London Olympics tournament, it is recommended that the number and frequency of passes leading to goals (N=14), snatching the ball (N=3.5), blocking the ball (N=2), immediate 2-minute suspension (N=3) and missing the ball (N=2) be considered for every match so that handball players, teams and coaches may use these statistics as a performance model in order to distinguish their shortcomings and plan appropriate training programs to eliminate their problems.
The results also revealed that the handball players of the top three men and women's handball teams in London Olympics displayed equal proficiency in 9-meter line, 6-meter line, corner, three-step and penalty shots. However, they showed a significant difference in counterattack shots, with male players

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outperforming female ones. Therefore, it is recommended that the criterion percent for 9-mter line, 6-meter line, corner, three-step and penalty shots be considered as 44%, 70%, 61%, 75% and 76%, respectively, so that handball teams and players may use these percents as the benchmark of their performance. However, determining the appropriate percent of counterattack shots requires further studies. Besides, female handball players need further training to improve their endurance and strength as these two factors account for the appropriate counterattack performance during a match.

The present findings revealed that the handball players of the top three men and women's handball teams in London Olympics displayed equal proficiency in such technical factors as the goals conceded in the first period, the goals scored in the first period, the goals conceded in the second period, the goals scored in the second period and the total goals conceded and scored in both periods. Therefore, considering the number of matches and the goals conceded in each period, the top three male and female handball teams conceded one goal per 163 seconds on average. However, a similar study has shown that the top four youth handball teams in the world conceded one goal per 148 seconds in the first and one goal per 154 seconds in the second period. It should be noted that the top three teams of men and women's handball conceded goals in either period in equal intervals, which may relate to appropriate physical fitness of these teams. This is because the tactical defense training is subject to technical defense training and good physical fitness. Thus, improved physical fitness and technical skills are prerequisites of new tactical training (4). On the other hand, the top three teams of men and women's handball scored a goal every 144 and 138 seconds in the first and second periods, respectively. A similar study, however, showed that the top four youth handball teams in the world scored a goal per 121 seconds in either period. Therefore, it seems that the more experienced the handball players, the more they concentrate on defense so that they may score points in longer intervals. It is recommended that the number and frequency of goals conceded in the first period (N=11), the goals scored in the first period (N=12.5), the goals conceded in the second period (N=11), the goals scored in the second period (N=13) and the total goals conceded (N=22.5) and scored (N=26) in both periods be considered as the standard so that other teams may use these frequencies as the performance benchmark.

The results also showed that the goalkeepers of the top three men and women's handball teams in London Olympics had equal proficiency in parrying 9-meter line, 6-meter line, corner, counterattack, three-step and penalty shots. As the teams played 8 matches each at London Olympics, it is recommended that the goal keepers' percent of parrying 9-meter line shots (52%), 6-meter line shots (28%), corner shots (35%), counterattack shots (25%), three-step shots (26%) and penalty shots (21%) be considered as the performance benchmark so that other goalkeepers may consider this as their role model of performance. They may measure their performance against this touchstone and try to achieve appropriate level of performance. It is recommended that coaches direct the offence by the opponent toward the positions where their goalkeepers show greater success.

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