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Decreasing number of distance shooting in handball – trend of nowadays male handball competition

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Abstract

Study aim: The aim of this study was to analyze and compare performance data structure in two consecutive EHF Men's EURO competition in 2020 and 2022 in order to highline significance of differences in two-year cycle of European Championships.
Material and methods: Official game reported data of all 65 games of 24 teams participated in both tournaments was collected and analyzed in order to claim the tendencies in handball development. The data concerns number of attacks and shots regarding its context, on court location and efficiency, turnovers and goalkeeping efficiency. Mean Values (M), Standard Deviation (SD), minimal and maximal values (MIN, MAX) and percentage (%) were used in the analysis. The significance of differences related to the task was determined by the Mann-Whitney U Test. All the calculation and analysis were made using STATISTICA software.
Results: Significant decrease in the number of distance shots (9m) in EHF EURO 2022 in comparison to EHF EURO 2020 (–24.2%, $p < 0.01$) was revealed. The disparity within the performed actions of EHF EURO 2022 was found in greater number of shots taken from near distance center area (6 m Center) when compared to EHF EURO 2020 (+20%, $p < 0.05$). Higher number of breakthrough shots in 2022 than in 2020 (+19.6%) was noticed.
Conclusions: The analysis revealed changes developing in the characteristic of offensive structure, what should have impact on training routine in order to achieve high level of performance.

Keywords: Offensive actions – Efficiency – Handball trends

Introduction

Handball is the turn-based game where the participating teams take the role of attackers or defenders according to the ball possession [20]. Physiological demands regarding intensity and volume of physical effort become key factors for efficient performance for particular playing positions [18]. It is understandable that complexity of tasks distributed within team members requires investigation and monitoring of the game structure as well as the player's technical, tactical and motor skills [16, 20, 26]. Adequately performed analysis can provide information over game requirements that can be used in order to enhance annual training plan or/and single session effectiveness. Top handball players are more and more frequently required not only to present professional level of fitness but also the ability to scan playing area, creating pre-defined tactical situations and providing decision making process regarding situations faced during the game [4, 11]. Appropriate analysis shall find outcome in the training routine in order to ensure comprehensive player development.

Official quantitative and qualitative data collected by European Handball Federation are carried out with respect to the shooting zone and direction efficiency, turnovers, defensive actions, goalkeeping efficiency and majority and minority action efficiency. New digital technologies also gives an opportunity to collect data regarding distance and velocity of player and ball movement, acceleration, quantity and efficiency of passes, which are likely to be used in scientific researches oriented on trends and tendencies of developing handball [9, 17]. The outcome of analysis proves significance of certain factors that are more likely contributed to the winning or losing the game. One of the profound differentiators that has been associated with studies are shooting effectiveness and the number of assists committed [2, 25]. Furthermore the finishing

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zone was also considered by researchers, who claimed advantage of number of 6 meter shots and its efficiency by the winning teams [14]. It has to be noted that rules implemented in handball affected the game significantly what caused the need of different approach to the training process [13]. Therefore, the following studies was undertaken. The main aim of this study was to analyze and compare performance data structure in two consecutive EHF Men's EURO competition in 2020 and 2022 in order to highline significance of differences in two-year cycle of European Championships. The analysis includes the zone of the court and tactical situation related to performed action, onset of efficient shots related to the position, onset of efficient attacks and goalkeeper efficiency regarding offensive situations.

Material and methods

The data analyzed concerns cumulative statistics of the teams participating in the EHF EURO 2020 in Sweden, Austria and Norway and EHF EURO 2022 in Hungary and Slovakia. Comparative analysis was performed upon official statistics published by EHF. Statistics of all 65 games of 24 teams participated in each tournament was collected and analyzed in order to claim the tendencies in handball development. The study covered a group of handball players who were participating in the EHF EURO 2020 in Sweden, Austria and Norway and EHF EURO 2022 in Hungary and Slovakia. The document concerns number of attacks and shots r egarding its context, on court location and efficiency, turnovers and goalkeeping efficiency. The efficiency of shots was calculated as a fraction of throws that received point gratification in relation to all shots directed toward the goal whereas the goalkeeper's efficiency was counted as fraction of shots save related to the amount of saves and goals conceded. The analysis consisted of the number of offensive actions occurred at EHF EURO 2020 and EHF EURO 2022 such as: attacks on the goal, shots, goals, turnovers, 9 m shots, 7 m shots, 6 m shots, wing shots, breakthrough shots, fast throw off shots. The following values were used in the analysis: Mean Values (M), Standard Deviation (SD), minimal and maximal values (MIN, MAX) and percentage (%). The significance of differences related to the structure of the games was determined by the Mann-Whitney U Test. All the calculation and analysis were made using STATISTICA software. Significance level was set at $\alpha = 0.05$

Results

Quantitative analysis of data collected during EHF EURO's concerned (Tab. 1), indicated significant decrease in the number of distance shots (9 m) in EHF EURO 2022 in comparison to EHF EURO 2020 (–24.2%; $Z = 3.03$; $p < 0.01$; $R = 0.51$). While the overall number of shots and actions remained statistically unchanged, the disparity within the actions performed was found in greater number of shots taken from near distance center area (6m Center) when compared to EHF EURO 2020 (+20%; $Z = 2.03$; $p = 0.042$; $R = 0.34$). The variables regarding remaining actions revealed no significant differences in two-year European championships cycle, however it's worth noticing higher number of breakthrough shots in 2022 than in 2020 (+19.6%). The quantity of turnovers, 7-meter shots, wing shots and fast throw off shots were similar for both tournaments.

Table 1. Mean number of offensive actions occurred at EHF EURO 2020 and EHF EURO 2022

	EHF EURO 2020 (n = 65)		EHF EURO 2022 (n = 65)	
	M ± SD	MIN ÷ MAX	M ± SD	MIN ÷ MAX
Attacks	50.4 ± 1.6	47.9 ÷ 53.0	50.8 ± 2.5	45.0 ÷ 55.1
Shots	44.3 ± 2.1	40.0 ÷ 48.2	43.6 ± 3.3	37.3 ÷ 49
Goals	26.6 ± 2.2	23.3 ÷ 30.9	27.4 ± 2.4	20.3 ÷ 30.9
Turnovers	9.8 ± 1.4	6.6 ÷ 14.0	9.6 ± 2.3	5.9 ÷ 15.0
9 m shots	15.7 ± 2.9	11.0 ÷ 23.7	11.9 ± 4.7 **	4.7 ÷ 22.7
7 m shots	3.3 ± 0.8	2.0 ÷ 4.3	3.6 ± 0.9	1.0 ÷ 5.3
6 m Center shots	8.0 ± 2.2	4.1 ÷ 15.0	10.0 ± 3.4 *	3.7 ÷ 14.3
Wing shots	9.1 ± 2.6	5.0 ÷ 16.3	9.0 ± 2.2	4.0 ÷ 12.7
Breakthrough shots	4.1 ± 2.1	1.7 ÷ 11.3	5.1 ± 2.5	0.7 ÷ 9.0
Fast Throw off shots	2.0 ± 1.8	0 ÷ 7.0	2.69 ±2.3	0 ÷ 9.0

Statistically significant differences: * = $p < 0.05$, ** = $p < 0.01$.

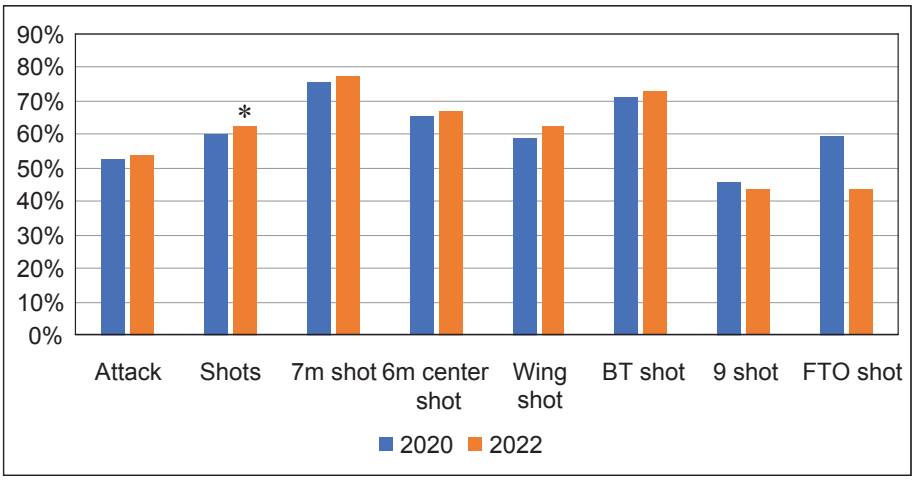


Figure 1. Overall efficiency and efficiency of shots at EHF EURO 2020 and EHF EURO 2022

Statistically significant differences: * = $p < 0.05$.

The analysis of data regarding efficiency of overall number of actions revealed no significant differences (Fig. 1). Comparison of actions resulted with shots performed disclosed significantly higher efficiency in EHF EURO 2022 than in EHF EURO 2020 (+2.7%; $Z = 2.37$; $p = 0.018$; $R = 0.40$). Despite the fact that no significant differences were found among the particular type of shots performed in both tournaments, it needs to be highlighted that distance shots (9m) and fast throw off shots (FTO) were the only ones that noticed lower values in EHF EURO 2022 than in EHF EURO 2020. All the remaining shots taken in 2022 resulted in slightly higher efficiency than the same ones performed in 2020.

Quantity analysis over structure of the offensive actions revealed difference in fastbreak attacks performed with the predefined team or group actions (Team Fastbreak) patterns solving tactical situations that players faced while gaining ball possession during the game (Tab. 2). Significantly higher number of such situations (+11.3%; $Z = 2.01$; $p = 0.044$; $R = 0.34$) were observed during EHF EURO 2022 than in EHF EURO 2020. It is also worth noticing that all fastbreak attacks were observed a little more often in 2022, but no significant differences were found nor in this or any other analyzed aspects of tactical situation during the game.

The data referred to efficiency of specific tactical situation of offensive actions during EHF EURO 2020 and EHF EURO 2022 (Fig. 2) disclosed significant increase of scoring rate of positional attacks (+2.3%; $Z = 2.02$; $p = 0.043$; $R = 0.34$), with simultaneous decrease of fast break attacks effectiveness in 2022 (–8%; $Z = 2.46$; $p = 0.014$; $R = 0.41$. As the further analysis was conducted, lower efficiency of those situation was mainly caused by Team Fast Break attacks which turned out to be significantly less effective in EHF EURO 2022 (–12%; $Z = 3.09$; $p < 0.01$; $R = 0.53$). No significant differences have been found among Majority and Minority attacks efficiency despite the fact of higher values obtained in 2022 (respectively +4% and +3.3%).

Goalkeepers efficiency data comparison revealed no significant differences in both tournaments (Fig. 3.). Worth noticing is increase value of efficiency of distance shoot

Table 2. Mean number of tactical situations related to offensive actions at EHF EURO 2020 and EHF EURO 2022

	EHF EURO 2020 (n = 65)		EHF EURO 2022 (n=65)	
	M ± SD	MIN ÷ MAX	M ± SD	MIN ÷ MAX
Position attack	46.2 ± 1.8	42.8 ÷ 49.4	45.9 ± 2.5	41.0 ÷ 50.3
Fastbreak attack	3.9 ± 1.4	1.0 ÷ 7.0	4.6 ± 1.5	1.7 ÷ 8.4
Individual Fastbreak	0.6 ± 0.6	0 ÷ 1.89	0.7 ± 0.7	0 ÷ 2
Team Fastbreak	3.4 ± 1.1	1 ÷ 5.3	3.83 ± 1.4*	0 ÷ 7.4
Majority attacks	6.0 ± 1.6	3.6 ÷ 10	6.2 ± 1.5	3.7 ÷ 9
Minority attacks	4.2 ± 1.0	2.7 ÷ 6.7	4.6 ± 1.3	2.7 ÷ 6.7

Statistically significant differences: * = $p < 0.05$.

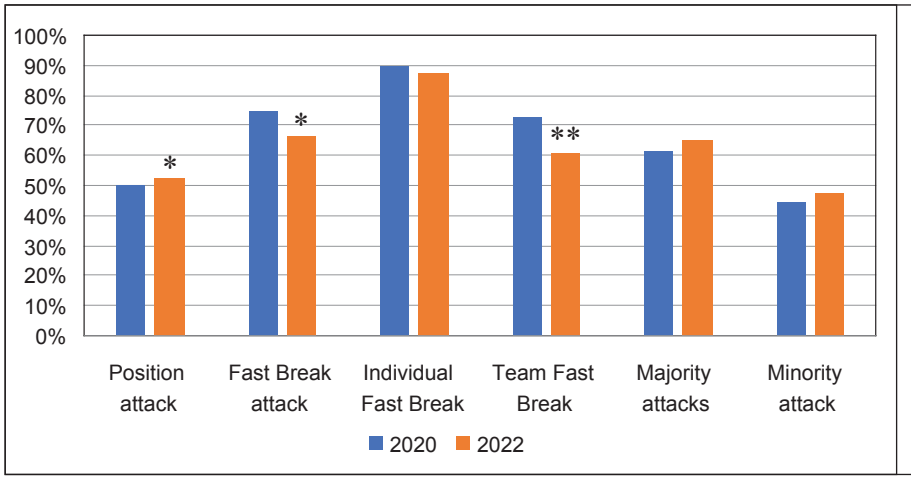


Figure 2. Efficiency of tactical situations related to offensive actions at EHF EURO 2020 and EHF EURO 2022

Statistically significant differences: * = $p < 0.05$, ** = $p < 0.01$.

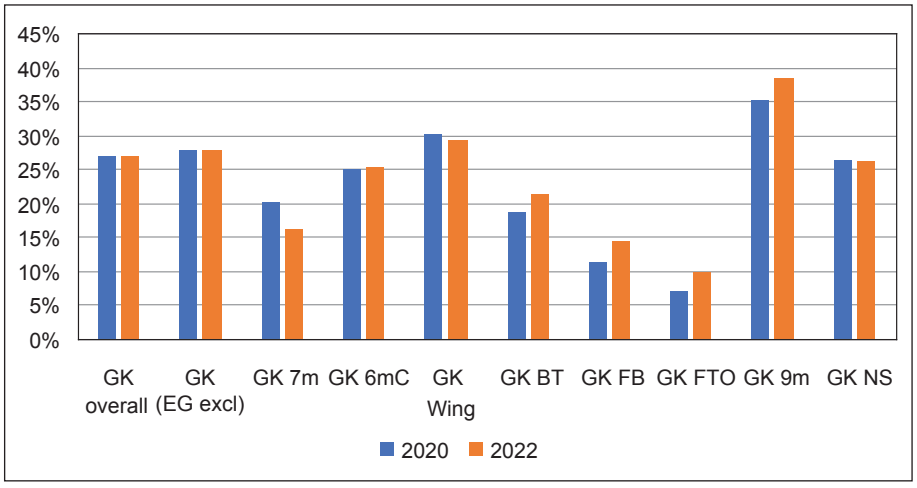


Figure 3. Goalkeeper efficiency at EHF EURO 2020 and EHF EURO 2022

saves (9m) what can be recognized as a trend of modern handball which is more and more dynamic and based on breakthrough abilities rather than distance shooting skills.

Discussion

The main aim of this study was to analyze and compare data structure in two consecutive EHF Men's EURO Championships in 2020 and 2022. The analysis includes the zone of the court and tactical situation related to performed handball actions. After collecting dates and analyzing them there were no statistically significant differences between mentioned EHF EURO Championships except 9 meter shots. Similar results were obtained in the study of Meletakos et al. [15] were no significant differences observed over the years for the court players. There is no doubt, that rule changes affects the game structure in many ways [7,13]. These changes require development of technical and tactical approach to the training process; thus, coaches are obliged to follow the trends and demands of nowadays handball. Fulfilling those tasks is well supported by the growth of IT industry which provide more and more data collection at handball events, particularly at the World and European Championships [8]. Analyzing game situations in consecutive events gives the information over the trends and allow to draw conclusions in order to meet the requirements of upcoming championships and perform the best possible way.

Analyzing the quantitative data, it is important to emphasize the predominance of positional attack situation over the fastbreak attack which for many years constitute 75-85% of all actions performed [13]. However, under further investigation over the tactical situation, it's very

important to highlight significant decrease of the quantity of distance shots, which are likely to be linked with the character of handball and the handball player silhouette [12]. Gryko et al. [6] informed about decreasing number of 9 meter shots which has leveled at average of 17.3 shot per game in World Championships in 2015 and was significantly lower than in 2013 (-9.9%, $p<0.05$). In EHF EURO 2022, mean number of distance shots per game was only 11.9 what proves changing character of the game over last few years. The reduced number of long-range shots on goal did not reduce the overall effectiveness of teams during the European Championship, but rather opened up the use of other tactical solutions during handball match. It is obvious that distance shooting abilities are the associated with the player's body size [5, 10, 23, 24]. Increasing of speed of the game and development of defensive tactical and technical skills required to fulfill demands of making decision immediately, create a need of players able to perform fast, accurate and unpredictable for its opponents, especially on the play making position [19]. For the last few years, handball followers can marvel spectacular actions performed by the players with not very impressive body size who are to perform breakthrough actions rather than create distance shoot situation for themselves. Thus, it is important to see potential of lower body size players when the recruitment process is considered as the trend of developing handball seem to get the game faster.

As the distance shots quantity decrease, significantly more center area 6-meter actions are performed. It needs to be emphasized that creating a 6-meter scoring chance is tactically linked with the distance shoot threat made by the backcourt players in order to open the space for pivot player activity or/and fainting activity for the rest of court players [21, 22]. Analyzing the level of differences in the number of actions performed at EHF EURO 2020 and 2022, clear tendency in implementing the tactics aimed to finalize the actions from as close distance to the goal as possible was found.

The present study has also shown that goalkeepers efficiency data comparison revealed no significant differences in both EHF EURO Championships. Similar conclusions had Agullo et al. [1], there were no statistically significant differences ($p>0.05$) in goalkeeping effectiveness between any of the different analyzed periods. The findings of this study suggest that the ability of goalkeepers to prevent the goal from different throwing areas and positions has changed little over the past 30 years.

Analyzing the changes in the characteristic of offensive play, the difference in number of fastbreak attacks in relation to positional attack needs to be noted. Trying to identify the causes of this occurrence it needs to be remember that EHF EURO 2022 was conducted around COVID-19 pandemic, what resulted in constant roster rotation throughout the competition. Unexpected Covid-19 test results force the team officials to call for the players who did not fully participated in pre-tournament preparation period and often joined the teams in further phase of tournament with not cumulative fatigue, yet not well physically prepared [3]. This occurrence statistically did not have significant impact on the game structure, however it might found it's reflex on the statistically lower efficiency of fastbreak attacks.

Conclusions

The results of the study have led to formulate following conclusions of our research. The tendencies observed in two year cycle elite handball teams confirm the conclusions of previous studies regarding significant decrease of distance shots and decrease of number of actions finalized in the 6-meter center area of the court. Also, it was observed that there is strong relation between distance shot threat and availability of using 6-meter center area what needs to be considered while implementing training plan. Collected EHF EURO Championship data show that recruitment process should not be mainly based on the somatic parameters as the character of the game changes and the need of fast decision making and performing become more and more significant. The analysis of the two-year cycle of the EHF EURO competition has revealed changes in the characteristic of offensive structure, what should have impact on training routine in order to achieve high level of performance.

The conducted research has shown that it is necessary to monitor and analyze further EHF Men's EURO Championships.

Conflict of interest: Authors state no conflict of interest.

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