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Original Article

The Throw Effectiveness in The Last Minutes of Handball Close Games and The Factors That Influence It

Oikonomou Charalampos[1]*
Yannakos Athanasios[2]
Acsinte Alexandru[3]
[1, 2] *Aristotle University of Thessaloniki, Thermi, DPESS AUTH, 57001, Greece*
[3] *"Vasile Alecsandri" University, 157 Marasesti, Bacău, 600115, Romania*

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Abstract

This paper examines the throw effectiveness in the last 10 minutes of close games (50-60th), during the season 2018-2019 of the Greek Men's Handball Championship "Handball Premier". The research observed all the matches from the 2018-2019 Greek Men's Handball championship. 61% of the total attacks ended with a throw with 56% of them ending as a goal, while the rest 39% of the total attacks ended with a turnover or a 2-minute Suspension/Penalty. During the last ten minutes (50-60th), there was both an increase in the shots that came from the 6m area (22% to 26%) and the percentage of suspensions and penalties, while the percentage of the fast breaks declined by 4% (17% to 13%). In conclusion, whereas the total effectiveness of throws increased in the last 10 minutes (50-60th), the number of the fast breaks and the defensive effectiveness decreased resulting in more suspensions for the defensive team.

1. Introduction

Handball is a famous Olympic team sport characterized by its continuous movement with or without the ball, the high frequency of explosive movements and the dwelling between attackers and defenders (Pavlin, Šimenc & Delija, 1982, Kotzamanidis, 2010). Thus, it is imperative that the handball players are able to repeat these movements with the same intensity throughout the game (Povoas et al., 2012). In the course of time, handball game play became faster and more demanding in terms of physical condition in both attacking and defending situations (Kotzamanidis, 2010). From 2002-2007 there was an increase in the goals scored from both teams according to Meletakos and Bayios (2010).

* *E-mail*: choikonom@gmail.com, tel. +30 6974840709

According to Gruic, Vuleta and Milanovic (2006), the winning teams, in World championship of 2003 in Portugal, had better accuracy from the 9m shots and used the Pivots more in their attacking plays. In 2012, Bilge examined the Olympic Games from 2004 to 2012 and found that the majority of goals came from fast breaks and Pivots. In another article from Vuleta, Milanovic and Ohnjec (2012) it is mentioned that the winning teams were faster and more efficient in the transitional phases of the game. The performance of the team is also affected by the time, indicating that towards the end of the game, team's performance tends to decline (Hirvonen et al. 1992; Povoas et al. 2012; Bekono Prioux, Zouhal, Delamarche &. Delamarche. 2001). The findings of Yiannakos et al. (2005) seems to corroborate this view, since there is a decrease in the number of fast breaks occurred in the second half compared to the first half (Yiannakos & Armata, 2006). Rogulj, Foretic and Burger (2011) divided a handball game in 6 periods of 10minutes each and examined the teams' performance in each period, finding that teams reached their peak in the 40-50thminute period (Foretic, Rogulj, & Trninic, 2010; Srhoj, Rogulj, & Katic, 2001). In the last minutes of tight games, according to Bar-Eli and Tractinsky, 2000), there is an increase in both defensive and offensive errors due to fatigue and psychological pressure. According to Oliveira, Gomez and Sampaio (2012), in close handball games, the teams scored more goals in the last 5minutes of both halves (25-30min, 55-60min). A game is considered close when the final outcome is 0≤2 goals and the percentage of close games indicates the competitiveness of a league (Meletakos & Bayios, 2010). Despite the importance of close games (Oliveira et al., 2012), studies are limited. Therefore, the aim of the present study is to examine the throw effectiveness in the last minutes (50-60th) of handball close games and the factors that influence it.

2. Material and methods

Sample, methods, variables

The sample of the study consisted of 24 games from the Greek Handball Championship (Handball Premier) in the season 2018-2019.From these games we focused on the close games which were analyzed and assessed in terms of throw effectiveness from 9m, 6m, 7m and fast breaks in the last 10 minutes compared with the rest of the game. The recording and editing of the games were done with the use of a video camera and a computer and the analysis with the computer video analysis application "Sport Scout" (Tsamourtzis, Sfigos, & Tsimpiris, 2002). The dependent variables and the factors that analyzed were the 1) Type of attack (Fast Break, Set attack), 2) Throw area (6m,7m, 9m, Wing, Pivot), 3) Throw effectiveness (Goal, Save, Missed), 4) Timeframe of the throws (0-50thmin,50-60thmin) and 5) Score deviation (Close, Balanced, Tie). Independent variables were the teams, the game and time.

Data Analysis

For the analysis and editing of the data we used the cross tabulations tables of SPSS 24.0 software. In order to define the statistically important deviations, the non-parametrical method of x2 test (Chi-square) $p<0.05$ was used.

3. Results and Discussions

Within the timeframe of 0-50thminutes, 83% of the total attacks were set while 17% were fastbreaks. Important statistical differences were found between the following pairs: set attacks and 1st wave of Fast break (x^2=120,032, p=0,00),set attacks and 2nd wave (x^2=126,965, p=0,00),set attacksand3rd wave (x^2= 130,558,p=0,00) and set attacks and individual fastbreak (x^2= 126,965, p=0,00). On the other hand, no important statistical difference was found between the different types of fastbreak, (fig.1).

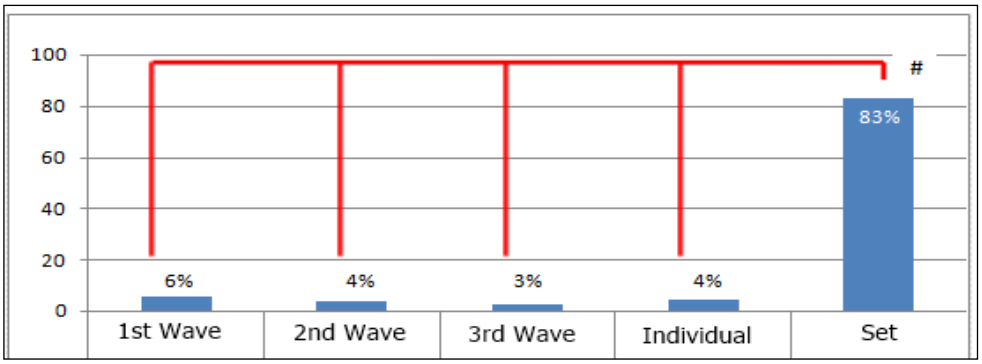

Figure 1. *Percentage of attack type in 0-50th minute timeframe*
 # Set vs 1st Wave (x^2=120,032 , p=0,00) , 2nd Wave (x^2= 126,965 , p=0,00), 3rd Wave (x^2= 130,558,p=0,00) , Individual (x^2= 126,965 , p=0,00)

In the timeframe of 50-60thminute, 87% of the attacks were Set and 13% were fast breaks. To be more specific, there was a significant statistical difference between set attacks and 1st wave (x^2=138,905 ,p=0,00), set attacks and 2nd wave (x^2=142,545, p=0,00), set attacks and 3rd wave (x^2= 146,269 , p=0,00) and set attacks and individual fast break (x^2= 138,905 , p=0,00). On the other hand, no important statistical difference was found between the different types of fast break, (fig.2).

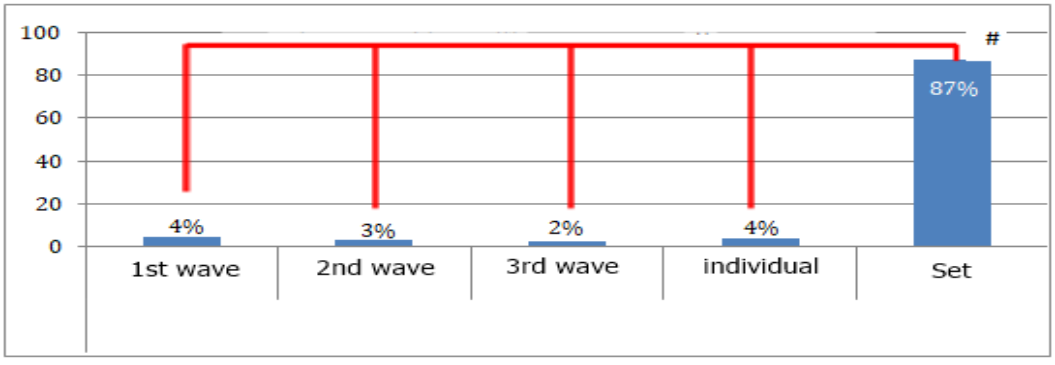

Figure 2. *Percentage of attack type in 50-60th minute timeframe*
 # Set vs 1st wave (x^2=138,905,p=0,00) , 2nd wave (x^2=142,545, p=0,00), 3rd wave (x^2=146,26, p=0,00),individual (x^2=138,905, p=0,00)

From the total amount of throws in the timeframe of 0-50th minute, 22% was from the 6m area, 11% from 7m throws, 39% from 9m, 18% from Wing position, 8% from Pivot Position and 1% from a random position. There was a significant statistical difference between9m and 6m (x^2=6,816, p=0,00),9m and 7m throws (x^2=20,906, p=0,00),9m and Wings (x^2=10,820, p=0,00), 9m and Pivots (x^2=26,727, p=0,00). Furthermore, significant statistical difference was found between 6m and Pivots (x^2= 7,686, p=0,00), 6m and 7m throws (x^2=4,391, p=0,03). On the other hand, no significant statistical difference was found between 6m and Wings, (fig.3).

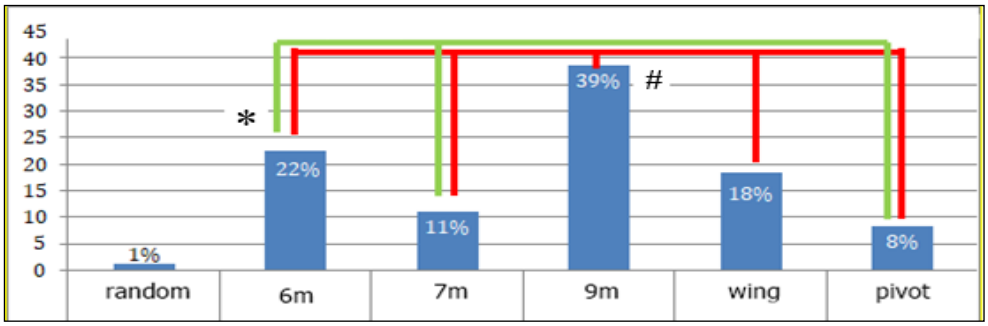

Figure 3. *Percentage of throws by field positions in 0-50th minute timeframe # 9m vs 6m(x^2=6,816, p=0,00), 7m(x^2=20,9061, p=0,00), wing(x^2=10,820, p=0,00), pivot (x^2=26,727 , p=0,00) * 6m vs pivot (x^2= 7,686, p=0,00), 7m (x^2=4,391, p=0,03)*

From the total amount of throws in the timeframe of 50-60th minute, 26% was from 6m area, 10% from 7m throws, 39% from 9m area, 19% from Wing Positions, 7% from Pivot position and 1% from a random position. There was significant statistical difference between 9m and 6m(x^2=3,851, p=0,04),9m and 7m throws (x^2=22,732, p=0,00),9m and Wings (x^2=9,713, p=0,00),9m and Pivots (x^2=28,910, p=0,00). Furthermore, significant statistical difference was found between 6m and Pivots (x^2=13,101, p=0,00),6m and 7m throws (x^2=8,672, p=0,00). No significant statistical difference was found between 6m and Wings, (fig.4).

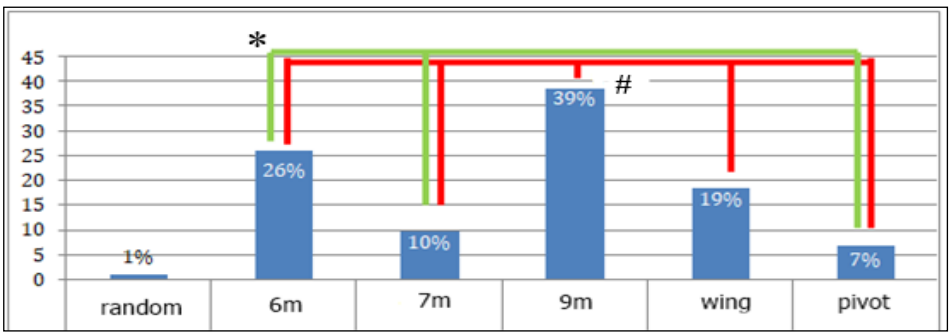

Figure 4. *Percentage of throws by field positions in 50-60th minute timeframe # 9m vs 6m(x^2=3,851, p=0,04), 7m (x^2=22,732, p=0,00), wing (x^2=9,713, p=0,00), pivot(x^2=28,910 , p=0,00). *6m vs pivot (x^2=13,101,p=0,00), 7m (x^2=8,672,p=0,00).*

From the total amount of throws in the timeframe of 0-50th minute, 30% was saved by the goalkeeper, 56% ended as a goal and 14% missed or hit the post. Significant statistical differences were found between goals and the throws saved(x^2=13,790, p=0,00), as well as between goals and those missed(x^2=38,769, p=0,00). Significant statistical difference is also found between the throws saved and missed(x^2=7,459, p=0,00), (fig.5).

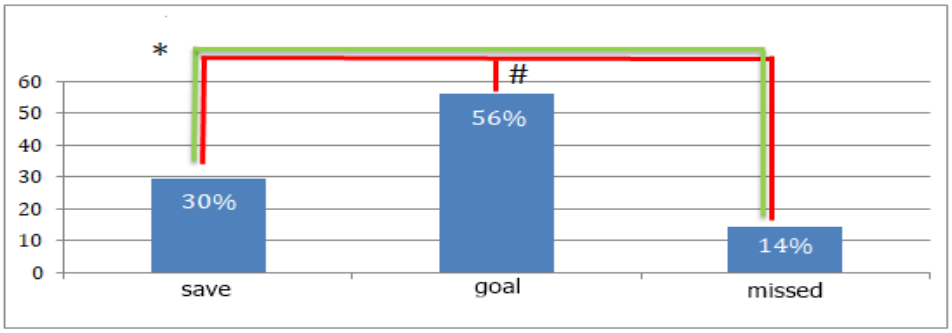

Figure 5. *Percentage of throw effectiveness in 0-50th minute timeframe. #goal vs save (x^2=13,790, p=0,00) , missed (x^2=38,769 , p=0,00) *save vs missed (x^2=7,459, p=0,00) .*

From the total amount of throws in the timeframe of 50-60th minute, 29% was saved by the goalkeeper, 59% ended as a goal and 11% missed or hit the post. Significant statistical differences were found between goals and the throws saved (x^2=18,262, p=0,00),goals and the throws missed (x^2=50,637,p=0,00). Significant statistical difference is also found between the saved and missed throws (x^2=10,125, p=0,00), (fig.6).

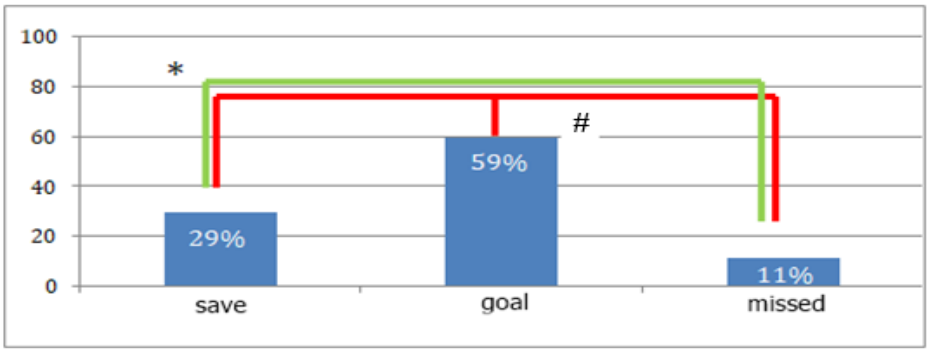

Figure 6. *Percentage of throw effectiveness in 50-60th minute timeframe. # goal vs save (x^2=18,262 , p=0,00) , missed (x^2=50,637 , p=0,00) . *save vs missed (x^2=10,125 , p=0,00).*

From the attacks that didn't end with a throw, in the 0-50th minute timeframe, 69% ended as an attacking error (turnover), while 31% ended with 2minute suspension for the defender or penalty throw. Significant statistical differences were found

between turnovers and penalty throws(x^2=42,592, p=0,00) as well as turnovers and 2min suspensions (x^2=78,576, p=0,00). Significant statistical difference was also found between penalty throws and 2 min suspensions(x^2= 8,589, p=0,00), (fig.7).

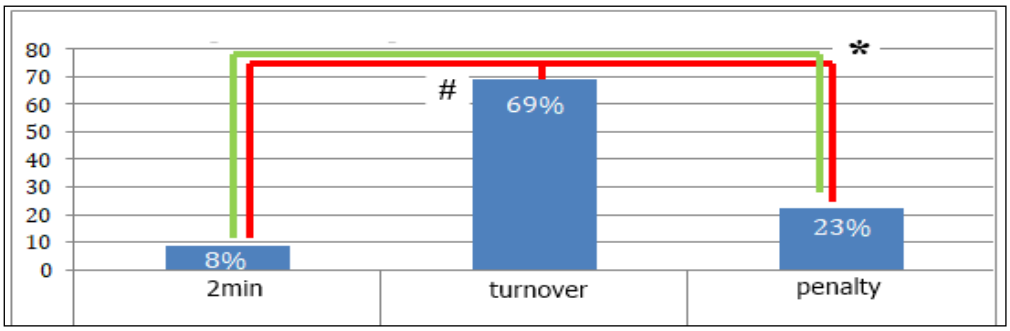

Figure 7. *Percentage of attacking and defending errors in 0-50th minute timeframe # turnover vs penalty (x^2= 42,592 , p=0,00) , 2min (x^2= 78,576 , p=0,00). *penalty vs 2min (x^2= 8,589, p=0,00)*

From the attacks that didn't end with a throw, in the 50-60th minute timeframe, 61% ended as a turnover while 49% ended with a suspension for the defender or a penalty throw for the attacker. Significant statistical differences were found between turnovers and a 2min suspension for defender (x^2=62,152, p=0,00), turnovers and a 2min suspension for both defender and attacker (x^2=80,662, p=0,00), turnovers and a red card for defender (x^2=80,662, p=0,00) as well as turnovers and penalty throws (x^2=23,457, p=0,00). Significant statistical differences were also found between penalty throws and a red card for defender (x^2=25,206, p=0,00), penalty throws and a 2min suspension for both defender and attacker (x^2=25,206, p=0,00) and penalty throws and a 2min suspension for defender (x^2=12,502, p=0,00). No significant statistical differences were found between a 2min suspension for both defender and attacker and a red card for defender, (fig.8).

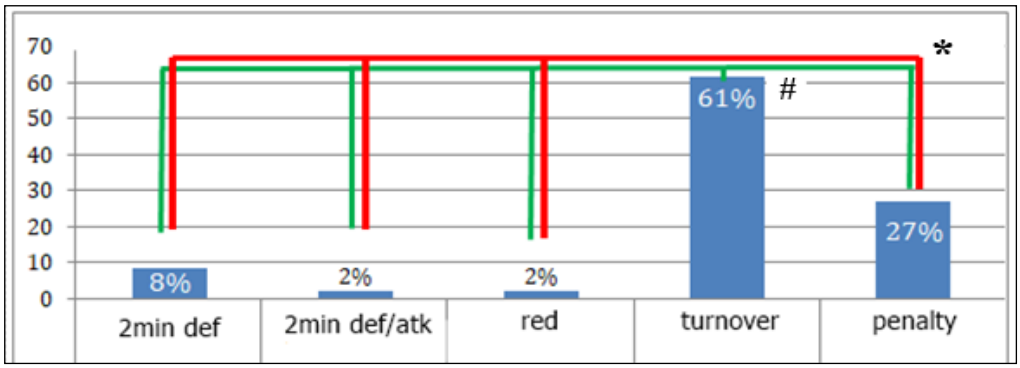

Figure 8. *Percentage of attacking and defending errors in 50-60th minute timeframe # turnover vs 2min def (x^2= 62,152, p=0,00), 2min def/atk (x^2=80,662, p=0,00), red (x^2=80,662 , p=0,00) , penalty (x^2=23,457 , p=0,00) *penalty vs red (x^2= 25,206, p=0,00), 2min def/atk (x^2=25,206 , p=0,00), 2min def (x^2=12,502 , p=0,00)*

Discussion

According to the statistical analysis of the data, the throw average per game was 40.3 contrary to the findings of Meletakos, Vagenas and Bayios (2011), where the throw average per game in the World Championships of 2005, 2007 and 2009 were 50.6, 52.5 and 50.3 respectively. The lower number of throws per game in Handball Premier relative to World Championships might be a result either of the attacking inferiority of the Greek teams compared to the World teams, or due to the slower tempo of Handball Premier's games leading to less attacking opportunities.

From the total attacks that did not end with a throw 61% ended with a turnover, while the rest 39% ended with a defensive error (2min suspension/Penalty). In specific, in Handball Premier, the turnover average per game was 17.32. According to Gruic et.al (2006), the turnover average per game in the World Championship of 2003 was 15.68, whereas according to Bilge (2012) the turnover average per game decreased to 12.1 from 2004 to 2012. The higher number of turnovers in Handball Premier might be resulting from the lower technical and tactical level of Greek Handball Players or from the psychological pressure caused by the small goal difference.

From the total attacks that ended with a throw, 82% came from Set attacks while the rest 18% came from fastbreaks. According to the findings from the European Championship of 2020, 78% of the throws came from Set Attacks and 22% came from fastbreaks. The higher number of Set attacks in Handball Premier, compared to the European Championship, could be due to the good defending transition of the Greek Teams or due to the fatigue that might occur causing teams to slow their tempo.

According to the timeframe classification, in the 50-60thminute period, the percentage of Set attacks is 87%, while in the 0-50thminute it is 82%. The increase in Set attack percentage in the last 10 minutes of the game might be the result of a more careful attacking approach, in order to minimize turnovers considering the small score difference.

The majority of the throws (39%) came from the 9m area, 23% came from 6m, 18% came from Wings and finally 8% came from Pivots. According to Meletakos, Noutsos and Bayios (2020), the teams that finished between the 1stand the 4th place, in World Championships, displayed higher throw percentages from 6m area compared to 9m area. The higher throw percentage from 9m in Handball Premier, compared to World Championships, could be due to the inability of the attack to create chances fora throw from either 6m, the Wing or the Pivot.

In both the 0-50thminute and 50-60th minute timeframes the throws are similarly distributed. In the later, the throw effectiveness from 9m is 50%, from 6m is 71%, from Wings is 40% and from Pivots is 77%. Conversely, in the 0-50thminute timeframe, the throw effectiveness from 9m is 68%, from 6m is 63%, from Wings is 51% and from Pivots is 79%. Besides Wings, the throw effectiveness increases in the last 10minutes for every position. According to Rogulj, Vuleta, Milanovic, Cavala and Foretic, (2011), there is an increase in the goals that teams score in the last 10 minutes, corroborating our evidence. The

increased throw effectiveness in the last 10 minutes might occur, due a more careful attacking approach, in order to minimize turnovers or due to goalkeeper's and defenders' poor performance by reason of fatigue.

Even though there is a decrease in the turnovers from 69% (0-50thminute) to 61% in the last 10 minutes of the game, there is an increase in penalties and suspensions for the defending team. The penalty average is 3.7 per game in the 50-60thminute timeframe, while in that of 0-50th minutes the average is 2.5 per game. According to Taborsky (2008), the penalty average of Beijing Olympic Games was 3.9, while Gomez, Lago, and Pollar (2013) found that the penalty average was 3.5 per game. The high number of penalties given in the last 10 minutes, compared to the rest of the game, could be due to the frustration and fatigue stemming pressure of time and the score deviation (Gomez, Penas, Viano, & Garcia, 2014).

4. Conclusions

The comparison between the findings of this dissertation with the existing bibliography, suggests that the Handball Premier championship lacks competitiveness, since the number of close games is limited. It can be inferred from the game analysis that the need of improvement in the defense is imperative, in order to minimize the goals conceded and the suspensions of defenders in the last minutes giving the attacking side advantage. Furthermore, the improvement of all physical conditioning components is necessary in order for the athletes to be able to meet the requirements of the modern handball, which is primarily based on their good physical condition and their fast and effective transition between attacking and defensive situations. In addition, of equal importance are the improvement of the back court (9m) throw effectiveness and a more careful selection of throws from positions with higher scoring opportunities. Summarizing, this dissertation comes to conclusion that the throw effectiveness in the last 10 minutes of Handball Premier's close games increases compared to the rest of the game.

References

1. BAR-ELI M., & TRACTINSKY, N. (2000). Criticality of game situations and decision making in basketball: An application of performance crisis perspective, *Psychology of Sport and Exercise 1(1):27-39.*
2. BEKONO, F., PRIOUX, J., ZOUHAL, H., DELAMARCHE, A., &. DELAMARCHE, P. (2001). Physiological profile of handball players, *The Journal of sports medicine and physical fitness 41(3):349-53.*
3. BILGE M. (2012). Game Analysis of Olympic, World and European Championships in Men's Handball, *Journal of Human Kinetics 35(1): 109-18.*
4. FORETIC, N., ROGULJ, N., & TRNINIC, M. (2010). The influence of situation efficiency on the result of a handball match, Faculty of Kinesiology, University of Split, Croatia*, Sports Science 3(2): 45-51.*
5. GÓMEZ, M., PENAS, C., VIANO, J., & GARCIA, I. (2014). Effects of game location, team quality and final outcome on game-related statistics in professional handball close games, *International Journal of fundamental and*

applied kinesiology 46(2).

6. GÓMEZ, M., LAGO, C., & POLLARD, R. (2013). Situational variables, *Routledge handbook of Sports Performance Analysis (pp. 259-269),* London: Routledge, UK.
7. GRUIĆ I., VULETA D., & MILANOVIC D. (2006). *Performance indicators of teams at the 2003 men's world handball championship in Portugal*, University of Zagreb, Faculty of Kinesiology, Zagreb, Croatia.
8. HIRVONEN, J., NUMMELA, A., RUSKO, H., REHUNEN, S., & HARKONEN, M. (1992). Fatigue and changes of ATP, creatine phosphate, and lactate during the 400-m sprint, *Canadian journal of sport sciences, 17(2): 141-4*.
9. KOTZAMANIDIS, C. (1999). *Handball: From theory to practice*, Christodoulidi K, Greece.
10. MELETAKOS, P., & BAYIOS, I. (2010). General trends in European men's handball: a longitudinal study, *International Journal of Performance Analysis in Sport 10(3):221-228.*
11. MELETAKOS, P., VAGENAS, G., & BAYIOS, I. (2011). A Multivariate assessment of offensive performance indicators in Men's Handball: trends and differences in the World Championships, *International Journal of Performance Analysis in Sport 11(2):284–294.*
12. MELETAKOS, P., NOUTSOS, K., & BAYIOS, I. (2020). Stable and changing characteristics of high-level handball as evidenced from World Men's Championships, *Journal of Physical Education and Sport 20(3):1354-1361.*
13. OLIVEIRA, T., GOMEZ, A., & SAMPAIO, J. (2012). Effects of game location, period, and quality of opposition in elite handball performances, *Perceptual and Motor Skills, 114(3):783-94.*
14. PAVLIN, K., ŠIMENC, Z., & DELIJA, K. (1982). Analiza pouzdanosti i faktorske valjanosti situaciono motoričkih testova u rukometu, *Kineziologija 14,177-187.*
15. PÓVOAS, S., SEABRA, A., ASCENSAO, A., MEGALHAES, J., SOARES, J., & REBELO, A. (2012). Physical and Physiological Demands of Elite Team Handball, *The Journal of Strength and Conditioning Research 26(12):3365-3375.*
16. ROGULJ, N., FORETIC, N., & BURGER, A. (2011). Differences in the course of result between the winning and losing teams in top handball, Faculty of Kinesiology, University of Split, Croatia. *Homo sporticus (1):28-32.*
17. ROGULJ, N., VULETA, D., MILANOVIC, D., CAVALA, M., & FORETIC, N. (2011). The efficiency of elements of collective attack tactics in Handball, *Kinesiologia Slovenica17(1):5-14.*
18. SRHOJ, V., ROGULJ, N., & KATIC, R. (2001). Influence of the attack end conduction on match result in handball, *Collegium antropologicum 28(2),*

739-746.

19. TABORSKY, F. (2008). Cumulative indicators of team playing performance in handball (Olympic Games Tournaments 2008)*, EHF Web Periodical 2008.*
20. TSAMOURTZIS, E., SFIGOS, N., & TSIMPIRIS, A. (2002). Application of multimedia and digital video to individual and team sports: *Sportscout*, *Proceeding of the 7th Annual Congress of the European College of Sport Science, 603, 506.*
21. VULETA, D., MILANOVIC, D., & OHNJEC, K. (2018). Performance Indicators of Winning and Defeated Female Handball Teams in Matches of the 2012 Olympic Games Tournament, *Journal of Human Kinetics 64(1):247-253.*
22. YIANNAKOS, A., SILELOGLOU, P., GERODIMOS, V., TRIANTAFILLOU, P., ARMATAS, V., & KELLIS, S. (2005). Analysis and comparison of fast break in top level handball matches, *International Journal of Performance Analysis in Sport, Volume 5, 2005, pages 62-72.*
23. YIANNAKOS, A., & ARMATAS, V. (2006). Evaluation of the goal scoring patterns in European Championship in Portugal 2004, *International Journal of Performance Analysis in Sport 6(1):178-188.*