

DEFENSIVE PERFORMANCE INDICATORS OF THE GREEK YOUTH NATIONAL HANDBALL TEAM

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ABSTRACT. The aim of the present study was to assess defensive tactics among players of the Greek National Youth Team, during the 18th World Championship that took place in Thessaloniki. **Methods:** We examined the prevalence of different tactical defensive formations, their efficacy against goal-attempt shots, their outcome, as well as the goalkeeper's ability to fend-off. All games of the Greek National team were recorded and analysed with Sport scout video-analysis software for PC. The statistical analyses were performed with the SPSS 19 statistical software and the use of non-parametric Chi-square tests. Significance was set at $p < 0.05$. **Results:** Data analysis revealed that the majority of the offensive attacks performed against the Greek National Team included goal-attempt shots (65.2%), whereas attacks free of goal-attempts involved only 34.8% of the recorded phases. The most prevalent tactical defensive formation applied was the 6:0 (82.1%). Among the recorded phases, defence with a fewer number of defenders was applied in 7.6%, 5:1 defence system was adopted in 4.7% and 5+1 was used on 3.2% of the phases. Goalkeepers were successful in fending-off 24.4% of the organized attacks. **Conclusion:** The use of the 6:0 defence formation is quite common, either in a more offensive manner or with adaptations. It is highly likely that the frequent use of this formation in a passive manner and the application of defence with fewer defenders resulted in a relatively low ranking of the Greek team.

Keywords: sport; handball; tactical; defensive performance; video analysis; performance analysis

Introduction

Defence consists of one of the most important factors in handball, aiming primarily on goal prevention as well as in winning the ball from the opposite team. Improved ball tactics, player physical abilities and between-player cooperation can all enhance the efficacy of an offensive formation and highlight pitfalls in the opponent's defence (Paparizou, 2011). These improvements in the offensive formations

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have resulted in a need for a more adapted and focused defensive response among opponents (charging the offensive players, offensive fouls, shot feinting, stealing the ball, etc.), expressed via an accelerated ball claim (Kandjia, 1979). This accelerated defensive response is likely to change the final outcome of a game and is hence considered crucial for a team's success (Seco, 1999).

Close observation of a team after an offensive attempt reveals that the primary concern of the players is the prompt return to their defensive positions, in order to organize the next effective defence system on time. According to Kotzamanidis (2005), the defence-organizing phase is dependent on the attainment of defensive cohesion. This is expressed when players are attaining their main defence positioning, covering each other through synchronized movements, or confronting the ball-handler as a group instead of individually. This cohesion is adapted and preserved in each new phase of the game, simultaneously.

Each team exhibits a variety of defence tactics, with distinct differences in the way each formation is applied and adapted by the players, according to their skills and abilities to effectively prevent a goal-attempt by the opponents. As noted, the recently adapted changes concerning handball rules have resulted in an accelerated play mode with goal-attempts being performed in various manners. In this perspective, it would be interesting for both coaches and players to be aware of the indicators associated with defensive formations, in order to augment their chances for winning (Oscar and Pascual, 2011).

Video analysis of the games gives an advantage in performance improvement, on both individual and team level (Mullen, 1992; O'Donoghue, 2006). It can provide valuable information on various levels such as technical pitfalls, tactics or strategy. Additionally, the record, statistical analysis and observation of the performance indicators exhibited by elite teams can also provide valuable data on the evolution of handball (Sampaio and Janeira, 2003), useful to both coaches and athletes (Taylor *et al.*, 2004).

From this perspective, the aim of the present study was to evaluate the different defensive systems adopted by the Greek Youth National Team, including the prevalence and efficacy of each defensive formation in halting the opponents' goal-attempts, as well as the on the final outcome of each phase.

Methods and Procedure

Sample

All games performed by the Greek Youth National Team during the 18th World Championship (WCh) were used in the analyses. The 18th WCh took place in Thessaloniki, in Northern Greece.

Procedure

The games were recorded and analysed with the use of Sports-scout software (Tsamourtzis *et al.*, 2001; Tsimpiris *et al.*, 2006), a specialized PC program allowing the reliable optical observation of athletic matches and their point-to-point analysis, with application on many different sports. The observer has the ability to input important aspects of the play in the software and analyse them using a P/C. With regards to the present study, all defensive formations performed by the Greek National team were recorded and analysed.

Statistical Analyses

The Statistical Package for Social Sciences v.19.0 (SPSS Inc., Hong Kong) was used for the statistical analyses. In further detail, crosstabs were applied and the Chi-squared test was used to evaluate differences in the prevalence of various parameters. Significance was set at 95% of the confidence intervals ($p \leq 0.05$)

Results

Data analyses revealed (Fig. 1) that from the total number of offensive attempts performed against the Greek National Team, 79.3% were organised, while a statistically lower percentage involved fast-break attacks 20.7% ($\chi^2=68.679$, $p \leq 0.001$).



Fig. 1. Type of offensive play by the opponents against the Greek Youth National Team ($p \leq 0.001$)

The majority of the organised offensive attempts (65.2%) ended with a goal shot, whereas the remaining 34.8% ended otherwise ($\chi^2=18.483$, $p\leq 0.001$), (Fig. 2).

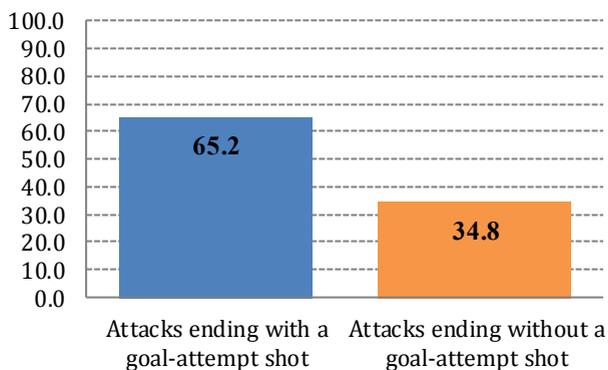


Fig. 2. Outcome of the organised offensive phases performed against the Greek National team ($p\leq 0.001$)

As far as the adopted defensive formations against the organised offensive attempts are concerned, 82.1% of the phases involved different aspects of the 6:0 defence zone system. In further detail, the 6:0 defence system at 6m was recorded in 65.50% of the phases, the 6:0 formation with «cutting» of the attackers was adopted in 14.53% of the cases, whereas the more aggressive 6:0 zone defence system was selected in 2.1% of the phases. Additionally, 4.7% of the phases involved the 5:1 system, 3.2% the 5+1 zone system and 2.4% referred to other formations such as the 4:2 or the 3:3. In 7.6% of the phases defence was performed with one less player. The statistical analysis revealed that the passive 6:0 defence zone system was the most prevalent ($\chi^2=54.187$, $p\leq 0.001$) towards all 6:0 formations and all other defence systems in general ($\chi^2=81.138$, $p\leq 0.001$). Additionally, the 6:0 defence zone system with «cutting» was also more prevalent compared to the rest of the formations ($\chi^2=5.533$, $p\leq 0.01$), (Fig. 3).

The majority of goal-attempt shots performed during organised defence formations resulted in successful scoring (62.9%), 24.4% were fended-off and the remaining 12.7% landed outside the field (Fig. 4).

When the opponents performed goal-attempt shots against a flat defence system, a great prevalence of successful scoring was noted in all 3 forms of the 6:0 defence formation (66.0% during passive 6:0, 70.0% during the 6:0 formation involving «cutting» of the opponents and 71.0% during more aggressive 6:0 formations). The prevalence of shots fended-off by the goalkeeper reached 20.0% during the passive

6:0 defence zone system, 22.0% while the 6:0 formation with «cutting» was adopted and a smaller prevalence during more aggressive 6:0 formations (4.0%). The goal-attempt shots landed outside the field in 20.0%, 22.0% and 25.0% of the cases in each 6:0 formation respectively.

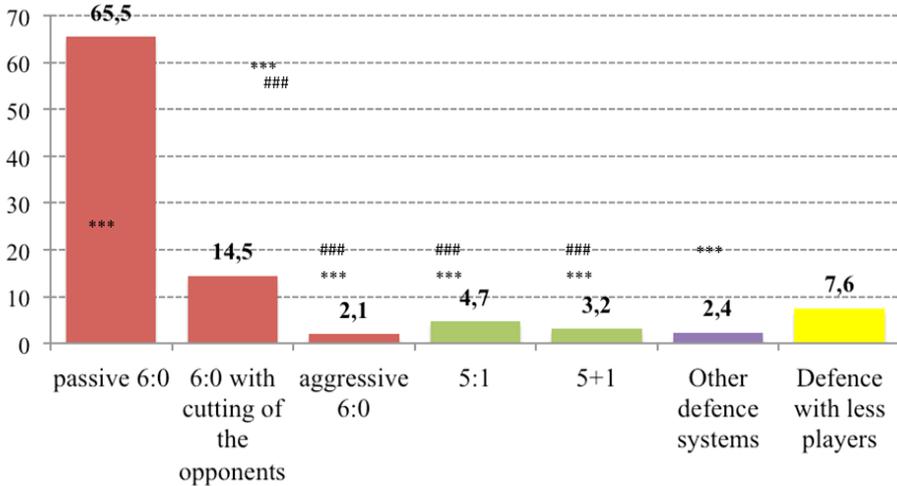


Fig. 3. Prevalence of each defence system.

Significantly different compared to the passive 6:0 *** $p \leq 0.001$. Significantly different compared to the 6:0 formation with «cutting» of the opponents ### $p \leq 0.001$

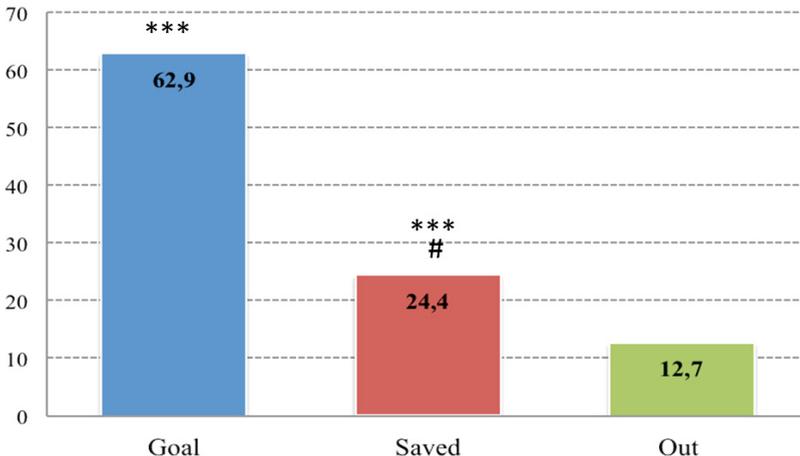


Fig. 4. Outcome of the goal-attempt shots during organised offense against the Greek Youth National Team.

Significantly different compared to the successful goal-attempt shots *** $p \leq 0.001$. Significantly different compared to the deflected goal-attempt shots # $p \leq 0.05$

The statistical analyses revealed that successful scoring was significantly more prevalent among all 6:0 defence formations compared to the fended-off goal-attempts ($x^2=42.387$, $p\leq 0.001$), and the latter was more common compared to the goal-attempts that landed outside the field when the 6:0 defence with cutting or more aggressive 6:0 formations were adopted by the Greek team ($x^2=7.686$ and $x^2=17.785$ respectively, $p\leq 0.001$ for both). Additionally, goal-attempts of the opponents were more often deflected than out when either the passive 6:0 defence system or the 6:0 with cutting of the opponents was adopted by the Greeks ($x^2=10.488$ and $x^2=14.323$ respectively, $p\leq 0.001$ for both and $x^2=3.854$, $p\leq 0.04$). No difference was recorded on the three distinct 6:0 formations and the final outcome of the recorded phases (Fig. 5).

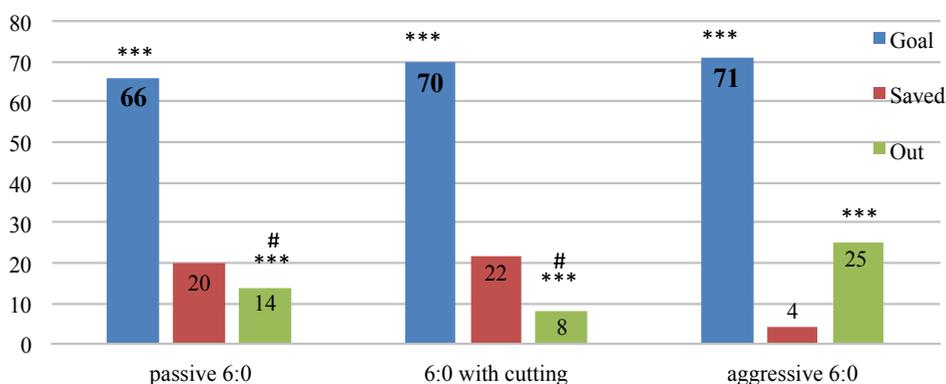


Fig. 5. Outcome of goal-attempt shots in each variation of the 6:0 defence system applied by the Greek Youth National Team.

Significantly different compared to the deflected goal-attempt shots when the same defence system was used *** $p\leq 0.001$

Significantly different compared to the goal-attempt shots that ended outside the field when the aggressive 6:0 defence system was used # $p\leq 0.05$

The analysis of the two-line defensive systems adopted by the Greek National Team (5:1 and 5+1) revealed a similar successful goal (50.0% and 57.0% respectively) and deflected goal-attempt prevalence (50.0% and 46.0% respectively). As far as 5:1 defence zone system was concerned, no difference was observed between successful and deflected goal-attempt shots ($x^2=2.922$, $p=0.08$), but a difference was noted between successful and non-cadred shooting ($x^2=33.754$, $p\leq 0.001$), as well as between deflected and non-cadred shooting ($x^2=18,026$, $p\leq 0.001$). The 5+1 defence zone system allowed a greater prevalence of successful scoring compared to saved goal-attempts ($x^2 =10,666$ $p\leq 0.001$) or

non-cadred shooting ($\chi^2=52.103$, $p\leq 0.001$), and a lower prevalence of the latter compared to the saved shots ($\chi^2=18.515$, $p\leq 0.001$). Comparison of the two defence systems did not reveal any differences regarding the final outcome (Fig. 6).

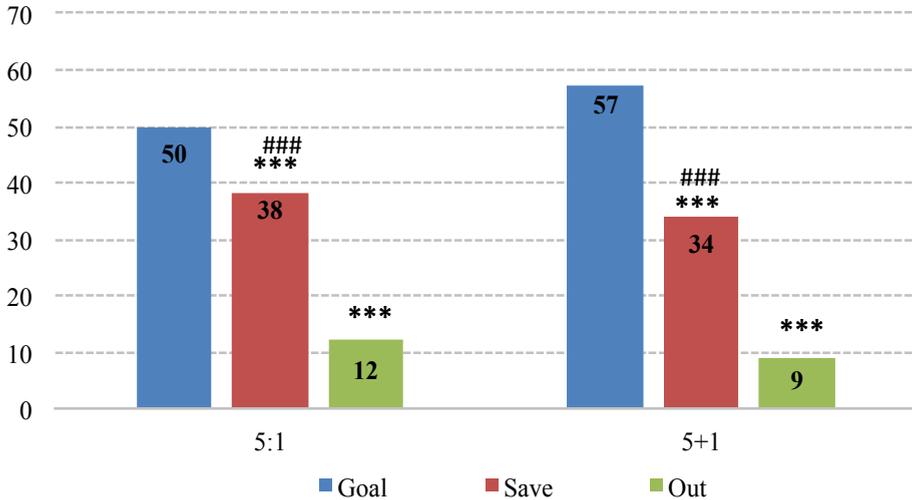


Fig. 6. Outcome of the goal-attempt shots when two zone defence systems were applied by the Greek National Team.

Significantly different compared to the successful goal-attempt shots when the same defence system was used *** $p\leq 0.001$

Significantly different compared to the goal-attempt shots that ended outside the field when the same defence system was used ### $p\leq 0.001$

The analysis of the data concerning the rest of the defensive formations, although their prevalence was relatively low, 58.8% resulted in goals, 29.0% were saved and 13.0% involved non-cadred shooting. The statistical analysis revealed a significant difference between successful scoring and deflected shots ($\chi^2=17.109$, $p\leq 0.001$), between successful scoring and non-cadred shooting ($\chi^2=44.218$, $p\leq 0.001$), as well as between deflected shots and shots landing outside the court ($\chi^2=7.715$, $p\leq 0.001$). When defence systems with fewer players were adopted, 68.0% of those resulted in successful scoring of the opponents, 24.0% were deflected and 8.0% landed outside the playing field. Successful scoring was more prevalent compared to saved shots ($\chi^2=38.969$, $p\leq 0.001$) or non-cadred shooting ($\chi^2=76.400$, $p\leq 0.001$), and the latter was less prominent compared to the number of deflected shots ($\chi^2=9.523$, $p\leq 0.001$).

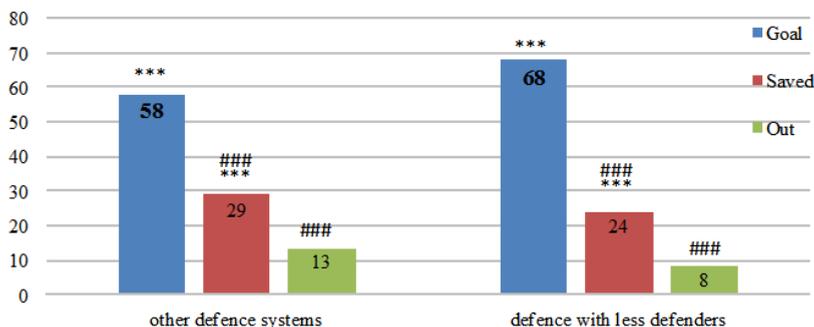


Fig. 7. Outcome of the goal-attempts when the Greek National team adopted different defence systems. Significantly different compared to the goal-attempt shots that landed outside the playing field *** $p \leq 0.001$. Significantly different compared to the successful goal-attempt shots ### $p \leq 0.001$

Discussion

The aim of the present study was to evaluate the different defence formations used by the Greek Youth National team against organised offensive attempts, the prevalence of each adopted system and their outcome.

Data analysis revealed that a total of 79.3% of the offensive attempts performed against the Greeks were organised. This prevalence is similar to that recorded (76.0-85.0%) by Seco (2008) against the Greek Youth National team after analysis of data concerning the 2004-2008 Olympics and the World Championships that took place during the years 2005, 2006 and 2007. On the other hand, after evaluating data from 3 World Championships (2005, 2007, 2009) Meletakos and associates (2011) reported that the mean prevalence of organised offensive attempts reached 54.2%, whereas Bilge (2011) reported a prevalence equal to 57.5%.

Of these organised offensive attempts, the majority (65.2%) resulted in goal-attempt shots, whereas the remaining 34.8% ended otherwise. Sevim and Táborský (2004) reported a similar prevalence of goal-attempt shots (62.8%) during the 2004 Athens Olympic Games, but a lower prevalence was noted during the European Championship (ECh) in Slovenia (48.0%) on the same year. When data from the 2005 WCh in Tunisia were analysed, the goal-attempt shots during organised offence reached 59.0% (Sevim and Táborský, 2004), similar to the ones reported by Pokrajac (2007) during the WCh hosted by Germany (58.0% and 60.0%). Overall, literature is unanimous in indicating a

steady increase of the offensive formations ending in goal-attempts during the pass of the time (Seco, 2000; Pollany 2003; Táborský, 2007), in both the ECh and the WCh. Any observed differences between WCh and ECh might be the result of different dynamics of the participating teams (Paparizou, 2011), discrepancies in the age of the players or gradual improvements in the defensive attitude of the teams.

The analysis of the defence systems adopted by the Greek Youth National team revealed a preference towards the flat 6:0 defence zone system (66.5%) and less frequent adoptions of the 6:0 defence system with cutting of the opponents (14.5%), the more aggressive 6:0 defence formation (2.1%), the 5:1 defence system (4.7%), the 5+1 formation (3.2%), defence formations with fewer defenders (7.6%) or other defence systems (2.4%).

Researchers analysing the youth and adult EChs and WChs reported that the 6:0 is indeed the most prevalent defence system used (Seco, 2000; Lafko *et al.*, 2008; Zidens and Cebrikovs, 2004; Czerwinsky, 2005; Sevim and Bilge, 2005; Pollany, 2006; O'Donoghue, 2006; Visnapuu, 2006; Hergeirsson, 2008). However, in some cases the 6:0 was equally prevalent with the 5:1 defence system. Additionally, adaptations in the defence system have been noted in several games, with more skilled players being used in specific defence positions. Sevim and associates (2006) analysed data from the 2004 Olympic Games and the 2005 WCh and concluded that the most prevalent defence formations included the 6:0, the 5:1 and the 3:2:1, in various adaptations depending on the opponents' offensive play. However, according to Táborský (2007) the two best teams participating at the Youth WCh hosted in Bahrain were using the 5:1 and the 3:2:1 defence systems.

It has been suggested that teams ranking better in competitions are actually aiming for the use of more aggressive defence systems, instead of the 6:0 formation, in order to surprise the opponents. This has been verified by Hagleitner (2006) during the ECh hosted in Austria, Pollany (2006) when analysing data from the ECh that took place in Switzerland, and Abramovic (2010) who evaluated the games of the ECh hosted in Montenegro. Pokrajac (2007) noted that during the Youth WCh in Germany, the most prevalent defence formation was the 3:2:1, whereas the 6:0 defence zone system was only adopted by teams with tall players. When the outcome of the goal-attempts performed by the opponents were accounted for, the majority (62.9%) resulted in successful scoring. Overall, the shooting efficiency of various elite teams appears to range in literature between 53.0 to 58.0%, with the present study reporting an even greater prevalence, exceeding this spectrum. The lowest prevalence has been reported in the ECh taking place in Germany (53.0%) (Valdevit *et al.*, 2004), with similar ratios recorded during the 2004 Athens Olympics, the Men's ECh in Slovenia (54.0%)

and the WChs in Tunisia (55.0%) (Sevim and Táborský, 2004) and Bahrein (55.1%) (Táborský, 2007). When data from the ECh in Slovakia were analysed, successful scoring reached 56.8% (Mikuš *et al.*, 2003), whereas data from the Youth ECh organised in Latvia, revealed that goal-attempt shots were successful in 58.0% of the cases (Zidens and Cebrikovs, 2004).

In 24.4% of the cases the Greek goalkeepers were efficient in saving the goal-attempt shots of the opponents. According to Czerwinski (1998), distinct differences are apparent when analysing the deflected goal-attempt shots, depending on the efficacy of the goalkeepers. Thus, during the ECh in Italy, the most efficient goalkeepers saved 41.0% of the goal-attempts shots, while the less skilled ones deflected a mere 30.0% of the shots (Czerwinski, 1998). Similarly when the Youth ECh was hosted in Montenegro deflected goal-attempts ranged between 33.0-43.0% (Abramovic, 2010). Seco (2008) pooled the data concerning the 8 finalist teams participating at the Sidney Olympics and calculated the mean fended-off shot prevalence as 35.0%.

When the Youth WCh was hosted in Estonia, the saved goal-attempts of the winning team reached 43.5%, as opposed to a mere 29.8% of saved goal-attempts recorded for the team finishing last (Czerwinski, 2000). Sevim and Bilge (2005) noted a gradual increase in goalkeeper efficacy during the course of time with the lowest prevalence of saved shots during the WCh in Tunisia (32.6%), a slightly greater one during the ECh in Slovenia during the year 2004 (33.0%) and an even greater one recorded later that year, during the Olympic Games hosted in Athens. Overall, participating athletes of younger age appear to attain lower mean goal-keeper efficacy as recorded during the Youth EChs, ranging from 31.0% when the ECh was hosted in Romania (Macovei and Rizescu, 2008), 32.5% in Poland (Kuchta, 2002), to 35.9% of fended-off shots in Austria (Hagleitner, 2006). On the other hand, adult teams tend to exhibit slightly greater goal-keeper efficacy as far as saved goal-attempt shots are concerned, reaching a mean 38.1% of the cases during the WCh hosted in Egypt (Seco, 1999).

Overall, according to literature goalkeepers appear to deflect goal-attempt shots in a prevalence ranging between 29.8-43.5%, with the herein results falling low below this reported range, reaching a ratio of 24.4%. This does not necessarily imply low efficacy of the goalkeepers as it could also be attributed to an increased number of offensive attempts performed by the opponents or the adoption of an less-efficient defence system by the Greek National team.

The frequent use of the 6:0 defence systems by the Greek National team is in agreement to the trend recorded during previous competitions. However, it should be noted that the team appears to lack in athletes' height and between-

athlete cooperation, in order to carry out this defence system effectively. As Norkowski (1997) has noted, the defensive play of the Greek Youth National team appears to be very energetic, when the 3:2:1 or 4+2 defence systems are adopted. Thus, the use of defence systems that appeared to either save the ball or result in non-cadred goal-attempts more often might prove of great advantage for the team and could probably result in better ranking during future competitions.

This increase in the offensive phases resulting in multiple goal-attempt shots consists of a positive element concerning the evolution of handball, since it forces towards improvements in the defensive tactics of the opponent team. Further research is needed in order to evaluate the reason behind the recorded increase in goal-attempt shots, forcing the Greek National team to adopt defensive formations using fewer defenders.

In conclusion, the analysis and study of performance indicators associated with the defensive play in handball is important. It provides the elements needed by coaches in order to design tailored training schedules and educate athletes, all aiming to improve the defensive efficacy of the teams.

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