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Additional Field Player Tactics' Effects to Match Performance During the Numerical Asymmetric Situations In Female Handball

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Abstract

The aim of this study was to analyze to effects of additional field player rule as a tactical intervention in elite female handball. The thirty-nine highly competitive handball matches were undergone notational analysis from 2020 IHF Women's World Championship. Goal, 7-m and 2-min penalty, missed shots, technical errors, received goal empty net, missed shots empty net, fast break goals and substitution failures analyzed during the goalkeeper benched durations for tolerate the numerical inferiority or creating numerical asymmetry to attack with an extra player for each 10-min periods. There was a significant difference between 5&6 and 7&6 situations however no statistically significant differences all parameters in both situations in comparison winner and loser teams. Moreover, we did not observe significantly changes all parameters when compared the match periods in 5&6 and 7&6 situations. These findings suggested that current tactical variation more frequently used by teams to tolerate the numerical inferiority in the attack whereas the consequences of application has a low risk to receive goal the empty net. Current findings of this study teams which used the additional field player strategy has no extra attacking efficiency however this tactical application does not result in any negative effects within risk of empty goalie

Keywords: Handball, Additional Field Player, Numerical Asymmetric Attack

INTRODUCTION

Handball is a team sport especially common in Europe, based on defense through body contact by holding and pushing (20). Handball players are allowed to defense the opponent by upper body contact using their arms to block their running course and prevent them from entering the goal area. Moreover, it is completely within rules to prevent the opponent from passing the ball or scoring a goal by pressing the throwing arm to block an active attack and errors resulting in a lost ball with such interventions bring a free throw (6). However, contact on the face and throat areas of the attacking player, pulling the opponent from behind, and contact with a stretched arm are considered out of the sport's etiquette and result in a two-minute penalty according to the game rules (6). The punished team is left with the disadvantage of playing with one player less in the offense and defense. In 2016, the International Handball Federation (IHF) introduced a series of changes in the rules including the "substituting the goalkeeper with an additional field player" (6). This rule allows the field player in with the goalkeeper stepping aside and gives teams an even chance for attack instead of attacking with numerical inferiority. Around ¾ of all teams choose to make use of this rule (12). Moreover, this rule is not only used during offense by teams with the numerical inferiority, but also by some coaches who have trouble finding

goals in offense in certain instances of the game with seven players.

Before the rule change, completing the offense force with the goalkeeper and replacement or performing the offense with an additional player was the tactic used, but this was not practical due to some difficulties. This old rule allowed the additional field player to enter the game in a jersey in the same color as the goalkeeper's but with own number showing and only that additional player could switch with the goalkeeper. There are a limited number of studies researching the strategy of goalkeeper-player substitution within the framework of these old rules (3,8,14). In a recent study, it was shown that the additional field player tactics had beneficial effects and no major harmful return despite the empty net (3). The results of a study collecting the opinions of elite coaches about the new rule revealed that initially there was no consensus for this rule-tactic implementation (10). In the only study conducted with this modern version of the additional field player rule, games in the 2016 Olympics were analyzed. The results of this study show that it did not make a significant contribution to the offensive team performance, but did not do any harm in the attacking opponent on an unguarded net (11). However, lack of any findings on the factors affecting the implementation of this strategy and other performance indicators in handball deserves some attention. The aim of this study was to analyze the effect of the additional field player rule, which led to the special situation of numerical asymmetry in women's handball in the last world championship.

METHOD

Study Model

The following actions were evaluated in the games during the times the team was missing players (attack with numerical inferiority, 5&6 + 1 field player) or numerical equality was broken (attack with numerical superiority, 6&6 + 1 field player).

Analyzed parameters:

Scored goal: These are scored when playing with the additional field player.

A 7-m penalty or 2-minute suspension gained (7-m&2-min): Actions that do not result in a goal while attacking with the additional field player, but include attaining a 7-m shot or having the opponent out of the game.

Missed shots (MS): Situations where the goal shots during the attack with the additional field player are not goals such as out of target, block, or saved by the goalkeeper.

Technical error (TE): Faulty actions resulting in a lost ball during offense, such as the violation of the goal area, offensive foul, steps or passing or catching error, or goal area violation during an attack with the additional field player.

Received a goal with an empty net (RGEN): Goals scored by the opposing team when the net is empty, before the goalkeeper had a chance to switch with the additional field player at the end of the attack.

Missed shots at the empty net (MSEN): These are the shots sent by the opposing team into the empty net, before the goalkeeper had a chance to switch with the additional field player at the end of the attack.

Fast-break goals (FBG): Goals scored as a result of a fast-break attack before the opponent could form their defense, even when the goalkeeper was successfully substituted at the end of the attack.

Substitution failure (SF): Substitution failures that resulted in penalty when substituting the goalkeeper with the additional field player.

Notation analysis was performed for six consecutive periods of 10 minutes each throughout the game. Moreover, the teams were marked as winners and losers for evaluation after the analysis.

Universe-Sample (Study Group)

In this study, 39 of the games in the IHF 2020 Women's World Handball Championship that ended with a competitive score were analyzed retrospectively. Games that ended with a score difference of four goals maximum were accepted as competitive. The 3rd - 4th match of the teams between the last four ranks ended with a big difference, yet included as an exception. Games were viewed and analyzed through the public videos at the website;

https://www.youtube.com/watch?v=qpUBd6b08sU&list=PLWCecFpv5TPsFZ6FLu8ftjhDp5XLuU4oQ (last access date: May 25, 2020). A group of operators with experience as handball players and coaches independently performed notation analysis after a standard training in analysis variables.

Analysis of the Data

Statistical analysis of the data was performed with SPSS 25 statistical package software. (IBM Corp. Released 2017, IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY). Statistical significance level was accepted as $p<0.05$. Descriptive statistics were made for all parameters. The difference between winning and losing teams and 5&6 or 7&6 comparisons were evaluated with the independent sample Student's t-test. Whether the actions analyzed in both 5&6 and 7&6 situations differ between game periods was tested with the one-way variance analysis (ANOVA). Bonferroni post-hoc test was applied to identify the significantly different periods.

RESULTS

Descriptive analysis for the parameters obtained in different periods of the game and in cases of numerical asymmetry (inferiority or superiority) is presented in Table 1.

Table 1. Descriptive data for the parameters according to the periods and inferiority/superiority status

	Goal	7m2min	SE	TE	RGEN	MSEN	RGFB	SF
5&6	158	53	116	62	26	20	26	5
7&6	46	9	26	9	5	2	11	0
1st period (0-10 min)	28	6	16	3	3	1	8	0
2nd period (10-20 min)	21	7	21	8	1	3	9	0
3rd period (20-30 min)	39	15	28	18	7	5	6	1
1st half total	88	28	65	29	11	9	23	1
4th period (30-40 min)	32	14	25	14	4	6	2	2
5th period (40-50 min)	42	12	22	10	10	2	5	1
6th period (50-60 min)	42	8	30	18	6	5	7	1
2nd half total	116	34	77	42	20	13	14	4
Game total	204	62	142	71	31	22	37	5

MS: missed shot; TH: technical error; RGEN: received goals in empty net; MSEN: missed shots at empty net; RGFB: received fast-break goals; SF: substitution failure.

Comparing all 5&6 and 7&6 situations in all games, we found significant differences in all parameters (Figure 1).

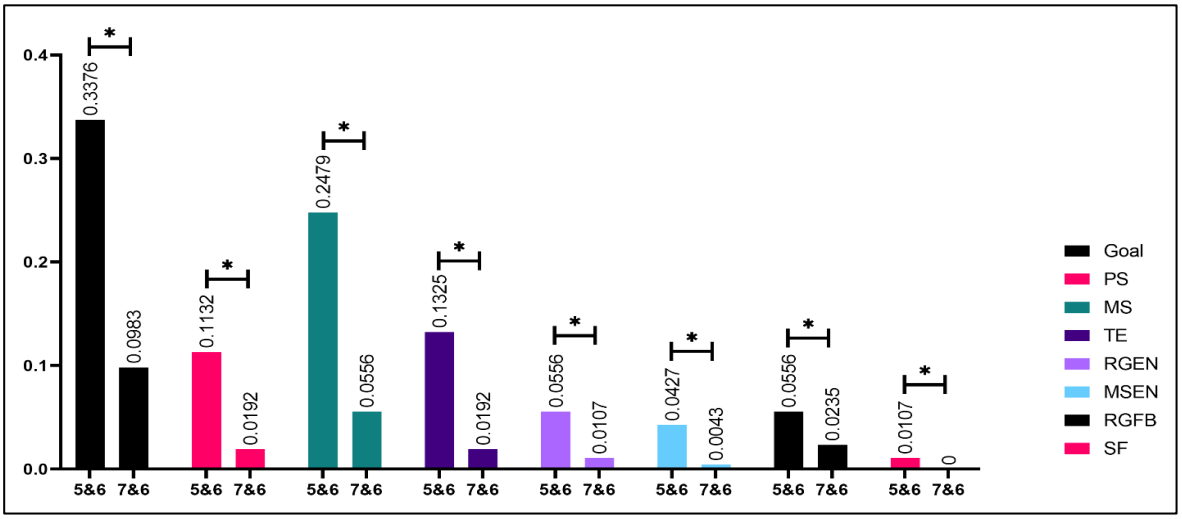

Figure 1. Change in the parameters analyzed as compared to the numerical situation where the tactic of using an additional field player is employed. 7m2min: Gained 7-m penalty or 2-min suspension; MS: missed shots; TE: technical error; RGEN: received goals at empty net; MSEN: missed shots at empty net; RGFB: received fast-break goals; SF: substitution failure. * p=0.001

No significant difference was found in the parameters analyzed as a result of playing with an additional field player both for the losing and winning teams in situations of 5&6 and 7&6 (Figure 2).

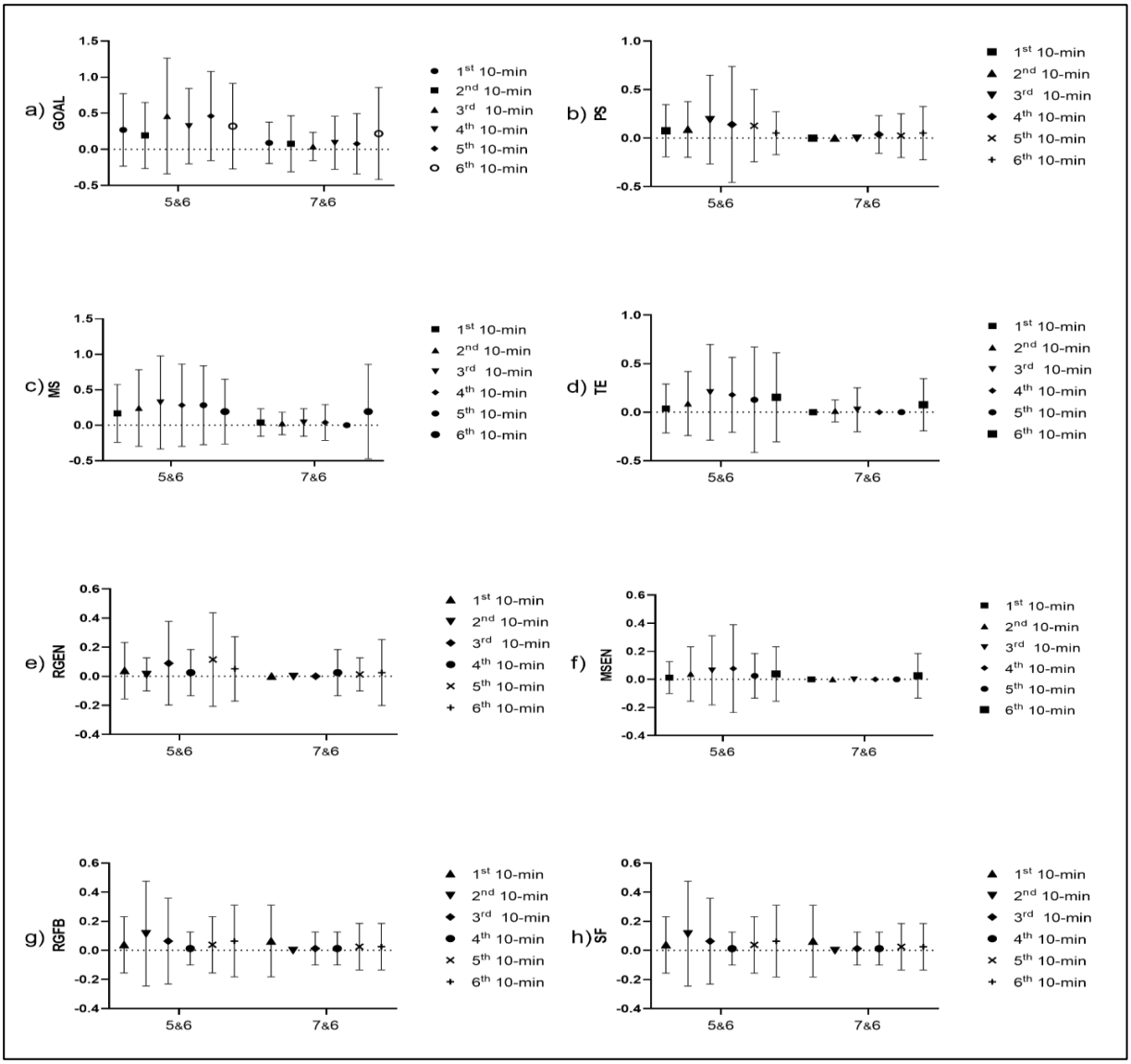

Figure 3. Variance analysis of the parameters based on the game periods for the situations of 5&6 and 7&6. a) goal; b) 7m2d: 7-m penalty or 2-minute suspension gained; c) missed shot; d) technical error; e) received goals at empty net; f) missed shots at empty net; g) received fast-break goals; h) substitution failure.

DISCUSSION

This study was conducted with the aim of exploring the potential benefits and possible negative outcomes of the strategy of playing with an additional field player in handball leaving the net empty. The findings of the study showed that this tactical variation was used to achieve numerical equality by penalized teams, rather than playing with an offensive edge and that teams did not suffer a significant negative outcome despite the risks an empty net might involve.

In handball games, numerically asymmetric situations are on the rise due to the 2-minute suspensions applied (17) and the tactical behavior of players is affected by the numerical change in their teams (18). Observations indicate that after one player is out, the team has difficulty in scoring a goal with fewer players on the offense and their attack performance suffers (15). In beach handball, a common tactic is attacking with one more player at the end of the goalkeeper substitution (5). Similarly, substituting the goalkeeper with an additional player in the last minutes of the game is also a strategy in ice hockey (2).

The first finding of this study is that winning and losing teams both use the tactic of goalkeeper-player substitution, which makes no difference in terms of the positive or negative outcomes it yields. This may be because teams want to stick with their own systems of game and do not want to take any

additional risks besides using this tactic to tolerate missing players. In the literature, attack activity during the periods of numerical asymmetry in the game stands out as a factor that separates the winning and losing teams (4,19). Contrary to the findings of this study, Prudente et al. (2019) found that playing with an additional field player brought about negative outcomes including an increase in lost balls, avoiding shots, and fewer assists. Beiztegui-Casado et al. (2019) reported a rare use of this tactic (927 situations of numerical inferiority / 154 times a goalkeeper-player tactic used). According to the findings of the same study, the strategy of an additional field player increases the chance to score, while the risk taken by leaving the net empty does not cause any statistically significant harm. The reason teams' appeal to this tactic less frequently may be found in the analysis of the games in a previous tournament played according to the old goalkeeper-player rule. The timing of the substitution due to the old rule, the area where the attack ends and the side of attack the substitution area corresponds to are all factors that affect the practical application of this tactic. On the other hand, Prudente et al. (2019) found that the rate of application of this tactic was 11.5% in the 2017 Men's World Championship. Research findings indicate that teams tend to hold longer attacks when using this tactic and especially the midfield players in the quarterback position avoid taking risks. In another similar study, it was shown that playing with an empty net (5&6 or 7&6 with an additional field player) prolongs the attack and allows more passes to be thrown (9). Krahenbül et al. (2019b) not only found that the attack efficacy did not change significantly when teams played with an additional field player, but also showed that no overly negative situation (e.g. conceding a goal in the empty net) was experienced due to disadvantages such as a lost ball (11). According to these studies, the reason that the additional player tactic is used at a low rate is the fact that it is still in its infancy following the rule change of the IHF and the teams did not have enough time to devise and adapt suitable tactical variations yet. In a long-term study, Klett (2014) investigated the outcomes of attacking with seven players, and identified it as a low-impact tactic resulting from an increase in goals conceded at an empty net (8). However, this research, too, covers the games played out according to the old rule of goalkeeper-player substitution. The application of the rule in this way limits the behavior of the additional player joining the game to start the attack and run for substitution rather than being a threat with their shooting. This result can be explained by the opponent's defensive strategies devised in this direction. Bachman's study (2014) supports this result with its finding that the additional player chose not to perform an offensive shot and that team attacks tend to end in the opposite direction of the substitution area after this tactic is implemented (1). Another study indicated a relation between playing with seven players and gaining a 7-m penalty (16).

Another finding of this study is that positive or negative outcomes of implementing the additional field player strategy do not change according to game periods. However, a change could be expected in the way the tactic is used, hence in its outcomes, towards the end of the game. Nevertheless, Beiztegui-Casado et al. (2019) found that the implementation of this tactic decreased significantly in the last 10 minutes of games (3). This can be explained with the fact that teams take the risk to use this tactic when there is a significant difference in the scoreboard, but choose to play safe when the scores of both teams are close. In our study, we analyzed only the games with a high level of competition where two teams scored relatively close. This might lead to different results compared to other the findings of other studies. According to the results of this study, as this tactic is implemented towards the end of the game, positive outcomes could not be achieved and the parameters such as high-intensity activity, running at high speeds and over big distances leading to exhaustion after the game could be reduced (7, 13, 21). Study findings show that using the tactic of additional field player at the level of national teams in women's handball does not increase attack effectiveness, but taking the risk of attacking with an empty net does not bring any negative outcomes, either. The results presented herein are limited to women's handball and the study does not include an analysis of the physical, physiological, and technical-tactical differences between male and female athletes. Another limitation of this study is that the game results of national teams are obtained by analysis due to their shorter preparation times. Further studies are needed to investigate the outcomes of this tactical practice at the level of elite clubs. In addition, further studies should be planned considering that coaches will develop different solutions and different ways to use this tactic more widely.

Consequently, turning the rule of additional field player into a tactical move is expected to bring along the advantage of attacking with seven players in the missing periods and bring together innovative sets of attacks where new possibilities are explored. This may change handball as an ordinary branch of sport and create a more attractive and spectacular game. However, during the implementation of this strategy, the total sprint distance and the physical load of the players in the goalkeeper position are also bound to be affected since the substitution is faster than normal to ensure goalkeeper's return to the field.1.

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