Research has been conducted to understand the role of blockers in beach volleyball. This study analyzed 1166 blocking actions from 24 European men's teams during the Ninth European Beach Volleyball Championship EUSA GAMES. The analysis was carried out using the LongoMatch v.0.27 software program. Statistical significance was calculated using the Z test.

Results showed that blockers do not have a leading role in direct intervention (DI) of the ball (37%, p < 0.001). The blocking actions most occurred were Line Blocking (LB) (46.9%), Net Exits (NE) (21.1%) and Diagonal Blocking (DB) (18.1%). When comparing specific periods (F1: 1 to 7, F2: 8 to 14, F3: 15 to 21), statistical differences were observed between periods F1 and F3 for the most used blocking actions: LB, NE and DB. Finally, similar efficiency values were observed for the most common blocking actions (29.3% for LB and 23.2% for DB). Higher efficiencies can be found in less common defensive actions, such as V Blocking (VB) (31.4%) and Fighting (F) (34.6%).

Keywords: beach volley, training, beach sports, university sport, block, blockers.

Abstract. In this paper, we present a study of blocker's activity at university beach volleyball players. A total of n=1166 blocking actions were analyzed from 24 European men's teams at the Ninth European Beach Volleyball Championship EUSA GAMES. Analysis of videos was carried out using the free software program LongoMatch v.0.27. Statistical significance of the comparison between systems was calculated using the Z test to compare proportions. Results showed that blockers do not have a leading role in Direct Intervention (DI) of the ball (37%, p < 0.001). The blocking actions most occurred were Line Blocking (LB) (46.9%), Net Exits (NE) (21.1%) and Diagonal Blocking (DB) (18.1%). When comparing periods of points (F1: 1 to 7, F2: 8 to 14, F3: 15 to 21), statistical differences (p < 0.001) were observed between periods F1 and F3 for the most used blocking actions: LB, NE and DB. Finally, similar efficiency values were observed for the most common blocking actions (29.3% for LB and 23.2% for DB). Higher efficiencies can be found in less common defensive actions, such as V Blocking (VB) (31.4%) and Fighting (F) (34.6%).

Keywords: beach volley, training, beach sports, university sport, block, blockers.

Introduction

The study of blocking in volleyball and beach volleyball has been of interest over the years for different researchers. This is a key technical element which, together with the serve effectiveness and errors in the attack, is directly related to the success of the game (Busca and Febrer, 2012; Jimenez Olmedo, Penichet Tomas, Saiz Colomina, Martinez Carbonell, and Jove Tossi, 2012; Marcelino et al., 2010; Peña et al., 2013). A hard and consistent blocking action hinders the attack of the opposing team (Castro et al., 2011), which indicates the motivation of studying its own characteristics and the degree of intervention in the game result.

The profile and characteristics of the blockers have been dealt in the literature. Different studies analyze the physical characteristics of the players according to their playing position, in senior teams (Jimenez Olmedo, Pueo, Penichet-Tomas, Chinchilla-Mina, and Perez-Turpin, 2016; Pueo, 2016). The camera was calibrated using four placeholders to create a framework containing an overlap of 30% above the limits of the field.

Data were collected from the videotaping of games celebrated from 24 European men's teams during the Ninth European Beach Volleyball Championship EUSA GAMES. The competition hosted men's and women's categories. In this study, 24 men's teams from 16 different nationalities were analyzed. Blockers actions were investigated, through an analysis of 1166 blocking actions.

Since blockers play a role in the development of the game, they have been the focus of training to improve their performance. New analytical methods have been developed to optimize the performance of athletes (Lin, 2014; Pascaul, Alzamora, Martinez and Perez, 2015), with new techniques that improve the different technical and tactical aspects of the players (Schack et al., 2014). One of the most interesting aspects has been the preparation and technical-tactical improvement of the vertical jump for specific training purposes (Sheppard et al., 2011; Armasay, 2008).

But, these studies have been developed in volleyball and to a lesser extent in beach volleyball. In addition, no study has addressed the performance of athletes at university level. It is important to note that college athletics follow the same regulations as the senior competitions, so their study and analysis will help better understand the evolution of professional athletes who started their careers at lower levels, mainly at university level.

The aim of this study is to determine the intervention levels of the beach volleyball blocker at a university level, as well as an in-depth study of the types and effectiveness of blocks that are used in an international game competition.

Method

Sample

Data were collected from the videotaping of games celebrated from the 23rd to the 28th of July, 2013 in the Portuguese city of Oporto, during the Ninth European Beach Volleyball Championship EUSA GAMES. The competition hosted men’s and women’s categories. In this study, 24 men’s teams from 16 different nationalities of Europe were analyzed. Blockers actions were investigated, through an analysis of 1166 blocking actions.

Instruments and data collection

It was used a Sony DCR-cx 280 video camera with a focal length equivalent to 29.8-953.6 mm and a resolution of 1920x1080p / 50fps (Pueo, 2016). The camera was calibrated using four placeholders to create a framework containing an overlap of 30% above the limits of the field (Jimenez Olmedo, Penichet-Tomas, Martinez Carbonell, Andreu Cabrera, and Perez-Turpin, 2014).
Blocking actions performed were analyzed by players in different games from the group stage to the final stages of the Championship. The analysis of the videos was carried out using the free software program LongoMatch v.0.27.

After transcoding the video, we were able to combine the characteristics of the files with the software requirements analysis of LongoMatch using the open source software Handbrake. The combination of frequencies obtained from the analyzed categories and subcategories was made with Google Drive Sheets.

Procedure
An experienced observer made the visualization and analysis of the video recordings. During the study, displays of a two intra-operator were performed to prove the reliability of the observation (Jimenez-Olmedo, Pucio, and Penichet-Tomás, 2016).

For each variable analyzed, to calculate the percentage error, the following mathematical expression was used (Hughes, 2004):\[ E_{m}=(\text{mod}(V_{1}-V_{2}))/V_{\text{mean}})*100 \] where \( V_{1} \) are the frequencies of the first visualization, \( V_{2} \) the frequency of the second visualization, \( V_{\text{mean}} \) the average of the two frequencies visualization registered and \( \text{mod} \) is the module.

Reliability performed on the intra-observer analysis showed a margin of error lower than 5% (James et al., 2007), established within acceptable margins of error.

To carry out the analysis of the actions undertaken by the blockers, different categories of observation that would allow collecting the necessary frequencies to answer research questions were established.

First, the type of intervention during blocking defensive actions may lead to:
- Direct Intervention (DI): Defensive actions touching the ball.
- Indirect Intervention (II): Actions taken by the blocker without touching or trapping the ball.

Second, defensive actions have been categorized into six different types:
- Line Blocking (LB): Blockages to prevent the line attack.
- Diagonal Blocking (DB): Blockages to prevent the diagonal attack.
- V Blocking (VB): Blockages with wide opened arms to cover a large area and disturb opposing attack.
- Fighting (F): The ball is suspended over the net and both blockers try to control it at the same time.
- Net Exit (NE): The blocker analyzes opposing attack and leaves the net zone returning to a field position to construct and execute a fast break.
- No Blocking (NB): Actions out of the net line where, before an attack or a passing, the blocker does not go towards the net or stays out of it to continue and execute a fast break.

Finally, in order to establish relationships between the variables under analysis, it was decided to classify the effectiveness and frequencies obtained depending on the time when the action was carried out. To do this, the following periods were established:
- F1: Period of points 1 to 7
- F2: Period of points 8 to 14
- F3: Period of points 15 to 21

Statistical Analysis
The significance in the analysis of the effectiveness of the blocks was calculated by applying the Z test to compare proportions of frequency.

Results
The first analysis on the intervention of the blocker establishes a significant difference \((p<0.001)\) between Direct Intervention (DI) and Indirect Intervention (II). The results indicate that the blocker does not have a leading role in the Direct Intervention of the ball (DI) as to touch the ball occurs only in 37% of cases. In the remaining actions, (63%), his task focuses on defenses without direct contact with the ball.

As for the most used blocking actions, it is observed that 46.9% of the blockades carried out the attack on the line. The second action most carried out by the blockers was net exits with 21.1% of total actions, followed by blocking attacks seeking diagonal movement with 18.1%. To a lesser extent, 6.4% non-blocking (NB) defensive actions were registered. In addition, actions which recorded the lowest frequencies correspond to the actions of fighting (F) net with 4.5% and finally V blocks (VB) with 3%.

The comparison between actions allows establishing the possible statistical differences between them. The results indicate differences between all actions, except among the diagonal blocks (DB) with no blocks (NB) \((p=0.569)\), as well as actions V block (VB) and fights (F) in the net \((p=0.006)\).

It is also important to analyze the evolution of the use of technical aspects throughout the set; therefore, the frequency of technical actions is presented in Table 1.

<table>
<thead>
<tr>
<th>Blocker frequency of actions performed by set area</th>
<th>Frequency (%)</th>
<th>Frequency (%)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB</td>
<td>39.12*</td>
<td>38.39</td>
<td>22.20*</td>
</tr>
<tr>
<td>DB</td>
<td>28.86*</td>
<td>36.97</td>
<td>24.17*</td>
</tr>
<tr>
<td>VB</td>
<td>51.43*</td>
<td>31.43</td>
<td>17.14*</td>
</tr>
<tr>
<td>F</td>
<td>40.38*</td>
<td>38.46</td>
<td>21.15*</td>
</tr>
<tr>
<td>NE</td>
<td>43.06*</td>
<td>35.37</td>
<td>22.50*</td>
</tr>
<tr>
<td>NB</td>
<td>44.00*</td>
<td>22.67*</td>
<td>33.35</td>
</tr>
</tbody>
</table>

Note: LB: Line Blocking; DB: Diagonal Blocking; VB: V Blocking; F: Fighting; NE: Net Exit; NB: No Blocking; *=p<0.01

An evolution is observed in the technical actions used by the blockers in his defensive tasks. The results indicate a decrease in the frequency of all actions during period 3 (F3) in relation to period 1 (F1) and period 2 (F2).

On the one hand, the analysis of the evolution of the actions presents differences between period 1 (F1) and period 3 (F3) for line blocking (LB) actions \((p<0.001)\), whereas it does not present differences between period 1 (F1) and period 2 (F2) \((p=0.803)\). In the same way, as for the diagonal blocking (DB) and net exits (NE), statistical differences between periods are repeated. It is necessary to emphasize this fact, as these three actions are the most used ones, so the difference in periods 1 (F1) and 2 (F2) with respect to period 3 (F3) could refute the idea of fatigue due to the decreased number of actions as the set develops. Regarding the actions of fight (F), the only difference is established between period 1 (F1) and period 3 (F3) \((p=0.033)\), as occurs in V blocking (VB) \((p=0.002)\). By contrast, non-blocking actions (NB) recorded differences between period 1 (F1) and period 2 (F2) \((p=0.005)\).

Besides, one of the most important aspects is the effectiveness of each action. The most used blocking types present similar values of efficiency: 29.3% for line blocking (LB) and 23.2% for diagonal blocking (DB). In the case of least used defensive actions, such as V blocking (VB) (31.40%) and fighting (F) (34.60%), activities are higher. Among them, the most effective one is given in actions where blocking tactics (40%) are not used, followed by actions of net exits (NE) (31.7%). This result does not indicate that the defensive actions where there is no blockage are more effective and therefore a couple should play without using them, but these non-blocking actions did not present a threat to the continuation of the game (distant attacks, passes ball free, intentional or not), so the construction of a counter facilitates the subsequent completion of the point by the defending team.

The development of the game causes that different indexes of efficiency could exist for the same action along the disputed sets. Therefore, the effectiveness differentiated by bands set is presented in Table 2.

<table>
<thead>
<tr>
<th>Table 2: Effectiveness of the different analyzed actions</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB: Line Blocking; DB: Diagonal Blocking; VB: V Blocking; F: Fighting; NE: Net Exit; NB: No Blocking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LB</td>
<td>24.80%</td>
<td>23.50%</td>
<td>26.90%</td>
</tr>
<tr>
<td>DB</td>
<td>19.50%</td>
<td>24.40%</td>
<td>27.50%</td>
</tr>
<tr>
<td>VB</td>
<td>31.30%</td>
<td>27.30%</td>
<td>33.50%</td>
</tr>
<tr>
<td>F</td>
<td>38.10%</td>
<td>35.00%</td>
<td>27.30%</td>
</tr>
<tr>
<td>NE</td>
<td>23.80%</td>
<td>39.10%</td>
<td>34.50%</td>
</tr>
<tr>
<td>NB</td>
<td>36.30%</td>
<td>23.10%</td>
<td>64.60%</td>
</tr>
</tbody>
</table>

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The development of the game causes that different indexes of efficiency could exist for the same action along the disputed sets. Therefore, the effectiveness differentiated by bands set is presented in Table 2.

Note that effectiveness evolves differently throughout the set. In
the most performed actions, actions blocker activity on the net, such as blocking the line (LB) and blocking the diagonal (DB), increase in their effectiveness is observed. This increase may be due to a better reading of the game done by the blocker on the opposing team, which takes the defense to better protect the net using a working look. Improving effectiveness of in line blocking (LB) by 6.1% and by 8% in the diagonal blocking (DB) may be due to this factor.

Discussion

The importance of the blockade and its influence in volleyball is widely known. There are several studies that prove or not (Silva et al., 2014) this success when it comes to blockades. Nevertheless, as far as Beach Volleyball University is concerned, only 37% of attacks had a direct intervention (DI) by the blocker, far from 56.5% of direct intervention (DI) observed in professional beach volleyball players (Koch and Tilp, 2009). This difference may be due to several factors. Among them is the limitation of technical skills that influence the blocking (Smith et al., 1992), the number of steps performed before the jump (Lobietti and Merni, 2006), jump height (Sterkowicz-Przybycien et al., 2014) and the analysis that the blocker does of the attacker. All these circumstances help more or less the direct intervention performed by the blocker. Despite all this, it should be noted that, in the specific case of the college beach volleyball players, shares where further direct interventions (DI) occurred were in the line blocks (LB), the diagonal (DB) and net exit (NE). These interventions may be the result of a greater insistence by blockers to carry out these actions. However, in the case of direct interventions (DI) of the diagonal blocks (DB), it should be noted that, the coverage area is lower in this type of attack. In addition, attacks on the diagonal are accompanied by a rolling, which prevents the blocker from carrying out modifications or adjustments to the blocking action to stop the attack (Ficklin et al., 2014).

Regarding the evolution of blocking actions, the most used actions are the line blocks (LB), followed by the diagonal blocks (DB) and finally net exits (NE). This is based on a simplification of the actions of the blocker and a better understanding with the defender, as the blocking actions and exits on the line facilitate the work of the defender or the delayed player. Thus, they did not changed positions within the field because these require more communication between players for game points (Künzell et al., 2014).

Nevertheless, even so it must be taken into account the evolution of the actions throughout the set. A study about the intervention of the number of blocking actions indicates that professional players of beach volleyball decrease the number of blocking actions along the sets (Palao et al., 2014), which would correspond to the decrease in number of shares, in this case by period of the game. This may be justified because of the intensity and the demand required by players. In addition to the conditions of the increased load, other factors must be taken into account, such as game: strategy, preferences, limitations or potential of the player, as well as environmental conditions or the movements of the adversaries, and the condition of directly performing a type of locks or others (Schläppi-Lienhard and Hossner, 2015).

Despite the existing differences between the uses of some technical actions instead of others, the results show greater effectiveness in unstructured attack actions like fighting (F), no locks (NL) and net exits (NE), as opposed to the structured attack actions like line blocks (LB) or diagonal (D) attacks. It is important to emphasize that the fighting (F) occurs when the ball is divided and not during an attack, as a non-blocking action. Typically, these actions are the result of a poor attack-opposing player resulting in a pass ball, allowing the player to work on a proper attack. The same situation would be given in net exits (NE), which would explain a more effective blockage. Therefore, although there are large differences between frequencies, these are not that great as far as effectiveness is concerned.

This study has presented a detailed analysis of blocker’s activity in university beach volleyball players. The natural position of blocker in beach volleyball should be the net and, therefore, this player works mostly near the net (72.5%). As a consequence, it is important to develop specific job training for blockers, although we must also bear in mind that blockers develop an important defensive assignment outside the net, which should be taken into account when training. In addition, the fact that only in 36.71% of actions performed the blocker touches the ball (DI), we can conclude that his defensive role is mostly indirect (II).

On the other hand, the most used blocking actions are Line Blocking (LB), Diagonal Blocking (DB) and Net Exit (NE), despite not being the most effective blocking actions when it comes to getting more points. This type of defensive actions blocker is the basic structure of the first line of defense. In addition, blocker can easily signal the defender and the type of block to perform, which help to build structure defensive systems during the match. Also, this type of blocking actions is a complement to defender actions, which should cover those areas not covered by the blocker on the net.

Finally, there is no clear tendency in the effectiveness of the blocker throughout period of points, except for the diagonal blocks (DB), which undergoes a positive effectiveness per period. There are several reasons for this behavior: shares anticipation by the blocker, different types of attacks, accumulation of fatigue or different environmental conditions, among others. These factors would be responsible for the irregular effectiveness pattern along the set and the match, which can be either positive or negative, depending on the evolution of the game.

References


