THE IMPORTANCE OF A SPECIFIC WARM-UP ON THE PERFORMANCE OF THE HANDBALL GOALKEEPER

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Abstract:
The aim of this paper is to determine the influence of a specific warm-up in the performance of the handball goalkeeper. To achieve this, the different aspects that influence the preparation of the player who occupies this position, were examined. The samples chosen for this research consist of five handball players aged between 17 and 28 years (M = 23) belonging to a Spanish female handball Club. The information was collected from the official match statistics of the first and second national Spanish League. The results obtained point to the need for a specific warm-up for the goalkeeper position because it significantly increases the performance level of the player in this position, and shows the importance of the specific warm-up for the goalkeeper on the team results.

Key Words: Handball, Specific Warm-up, Goalkeeper, Coach Training

Introduction
The handball players take on different roles throughout a match and, in particular, the goalkeeper must perform different tasks other than specific positions. Therefore, it requires adequate preparation and training of this specificity in order to fulfill the complex roles within modern handball. The current demands of the game of handball have multiplied as the game speed, strength and endurance of the players and the technical-tactical background has increased. These requirements imply that the physical condition of the player has acquired a central importance in the preparation and his possible performance. Nevertheless, the tactics and techniques along with the physical preparation together are, affected by the psychological aspects of the game. Motivation,
concentration, emotional control and confidence, are tested during the games and over the player lifetime. Therefore, the coaches have to know how to work both, the specific physical preparation for the goalkeeper position, and the psychological aspects, during the training of their players. In addition, to instructing them in technical and tactical contents and preparing the general physical condition, it is essential to know how to help them to acknowledge and respond to the psychological demands of this position.

In handball, the initial location of the handball players are ordered through the specific positions. The players are distributed in a rational and desirable way in a space of action and they try to achieve the goals of the game through collective action. The specific positions vary in relation to the tactical system used, or with the game phases, especially if the team is in attack or in defense, however this is not so with the specific position of goalkeeper which will comply with the resulting duties. (Antúnez & García, 2008, Anton, 1993).

Achieving the team goals is often related to the goalkeeper’s own behavior and performance. That is why the necessity of action systems are to reach the optimal model of the specialised handball player, for the position of goalkeeper. To obtain this, it is starting with the selection, preparation, and the know-how needed to address the technical and tactical content within the training.

It can be concluded that the position of the handball goalkeeper is a very complex one, of great responsibility within the team, because he participates in the entire evolution of the game development. We can say that the goalkeeper is the last and the first line of defence, and also the first and last attacker. This is not a pun but a reality that must be understood by each and every one of the goalkeepers of handball and which will be discussed below. In conclusion the handball goalkeeper is:

- The last defence: defending the space of the goal behind all the defenders;
- The first defender: placed, at the stages of attack, to 8-9 m, stopping or trying to stop the opposing team counterattacks;
- The first attacker: launching a counterattack of his own team and taking the initial pace of the game;
- The last attacker: placed at 8-9 m in position to follow the attack of his own team, like a reserve, is used to resolve difficult situations.

The goalkeeper also has an important role in maintaining team morale. If he is very well prepared, with a high morale, and behaves well in the match, the team will play well, with much more calm and security, both in defence and attack. A goalkeeper well prepared and provided with the necessary skills can decide the outcome of a game. It is well-known that even if a handball team is well prepared and is composed of many players of a good level, it can not succeed if it does not benefit from the contribution of a valuable and well-trained goalkeeper. In addition, it is difficult to obtain very good results without a goalkeeper with a good performance through a match or tournament, and who can withstand the stress created by the game development or the place where it is played.

Many handball experts have written about the vital importance and the impact of the performance of the handball goalkeeper in team performance (Barcenas & Roman, 1991; Czerwinski, 1993; Antúnez & García, 2008). The fulfillment of the tasks and requirements of the specific position of the goalkeeper are influenced by situational aspects of the game. The rules (Antúnez, 2003), and uniqueness of the handball goalkeeper are enlarged with the burden and responsibility that comes with being the last reference when the opposing team scores a goal. That is why we see also the importance of the specific psychological preparation for this position.

The above considerations support the importance of a high-performance handball goalkeeper for his team. This means that it is absolutely necessary to give special attention to this position and to the player respectively, with the dominant characteristic of this preparation process being individualised training.

The player must possess the physical qualities necessary to implement a decision, otherwise, his decision would not be a valid one. This means that the goalkeeper must adjust his decisions to his skills and actual physical ability, for example, it is useless to observe an unmarked teammate and decide to send the ball, if the player situation is too remote and the goalkeeper is not strong enough, at that moment, to successfully perform the pass.

With regard to the physical capacity of the goalkeeper, another aspect to consider is fatigue. This is not an issue of lack of physical qualities, but a loss of these over a game or training session. The goalkeeper must keep in mind that there are actions he can take in normal conditions and cannot perform with the onset of fatigue.

When structuring the goalkeeper specific physical preparation, the efforts of the player should be analysed first. Checking the workload that he supports in the development of a game, depending on its characteristics, which can be long and varied, and that despite that the player could have similar characteristics with other teammates, their efforts are different, then, their work program may be inappropriate.

The coaches should take into account their statistics applied to their own players (or benchmark) when scheduling the annual general model. It has to be analysed quantitatively, on one hand, the physical and physiological, and by the other, their behavior in the competition. Further, as an orientation, are some considerations which were followed when conducting the physical training for handball goalkeepers, subjects of this investigation.

Strength

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Force has a fundamental importance in the motor aspect of the athletes. The lack of it negatively affects every one of the factors of his physical condition, because in a greater or lesser degree it is related to all training systems. The loads during training have to exceed normal daily activities enough to induce the stress which produces neurological adaptations in the first instance to give rise to structural ones (García et al., 2005). The number of days of training and the frequency is of vital importance to achieve the objectives. The same authors conducted a study in which the method of integrated training was used. The method consists of six integrated training exercises for seven weeks with two days of stimulation a week, and the results revealed that there are significant changes in maximum force, both for men and healthy young women. This model is very useful for working with the goalkeepers, as the maximum force is the base for increasing both power and speed.

**Resistance**

Can be defined as the ability to physically and mentally withstand a load over a long period of time until there is a significant decrease in performance due to fatigue, or the ability to recover as soon as possible after a physical or psychological stress. Fatigue should be regarded as an important factor when it comes to sports performance, being caused by actions maintained of diverse intensity, so we have to consider the body's ability to recover from it.

When considering the work of resistance for handball goalkeepers, we not only have to consider the aerobic-anaerobic lactic or alactic, but also the time period fractions for each attack of the opposing team. Each team and each country has its own style of play, with longer or shorter attack periods, and a pattern of partial recovery will depend on these characteristics. Competition is the main reason for any sport. Handball, whose season is usually quite long, sometimes with long interruptions due to different European and international competitions, we have to seek a high level of fitness for as long as possible, and also an adequate preparation to withstand the season.

**Speed**

Grosser (1992) defines the speed as the "Capacity to achieve, based on cognitive processes, maximum volitional strength and functionality of the neuromuscular system, a fast reaction and movement in certain conditions". Speed is the quality that enables the athlete to perform one or more movements in the shortest time possible, and may or may not be a displacement.

There are several types of speed: displacement, reaction, mental, etc. Speed over a distance is measured by the ability to get from one place to another as soon as possible. The movements of the goalkeeper are usually mostly lateral, diagonal in front, so that the speed, will be trained primarily taking into account: the direction, possible variations and the difficulty of the half-stop at the right time needed in order to arrive and meet with the ball launched by the attacker, considering the space-time relation.

Another very important type of speed, to work with the goalkeepers, is the reaction speed, aiming to reduce the time which it takes to the goalkeeper to respond to a stimulus (visual, decision making, etc.), in our case the throw. The higher the concentration, the lower the reaction time, and this is also related to the effort, because fatigue diminishes the capacity of the reaction. Pokrajac (1980) cited by Parraga et al. (2006) studied the time which it takes for the ball to reach the goal after it leaves the throwers hand. The data range between 0.36 and 0.51 seconds for throws from a distance of 10 m, while for those performed from a distances of 9 m, the data range between 0.32 and 0.46 seconds. Zeier (1987), quoted by the same authors, has conducted research in analysing the reaction time and movement time for elite goalkeepers. The values range from 0.57 and 0.39 seconds. From the comparison of both studies, it is clear that the values of ball speed when it leaves the thrower hand and the high levels of precision in the elite handball, mean that the goalkeeper should use techniques of anticipation in their interventions. Vignais et al. (2009) conducted a study using virtual throws to work with the goalkeepers and a considerable improvement in the performance of these has been observed. Needing more time to move that the one needed for the ball to travel from the thrower’s hand until it crosses the goal line, the goalkeeper needs to be very concentrated and should train the mental speed. This type of velocity has its component in the decision making, meaning the speed and decisiveness. This involves making a decision (mentally) and perform the move with the higher intensity (motive).

**Flexibility**

It is one of the physical abilities that are used to develop the movement and ability to move of a joint. For proper functioning, the joints need strong tendons and flexible muscles. This improves the range of movement, reducing pain, stress and injury. Systematic work aimed at improving the flexibility has to be a constant for any athlete. For the goalkeeper it is a condition without which he can not develop his game. Generally, flexibility training, is a component of the training program at which less attention is payed. But flexibility has several benefits among which the most important is the prevention of injuries. Can be developed through dynamic stretches, after warm-up and before starting to train or play, and through static stretching after training. The latter prevents muscle soreness, improves the speed and increases the muscle length, and by that it prevents injuries and improves performance. A goalkeeper who has good flexibility can easily get to the ball thrown far from their position.
What the research is trying to achieve with the specific physical training is the effectiveness of the goalkeeper game, and to enable the player to meet the physical demands required by the modern game of handball. But times have changed and at the traditional physical training now incorporated a new trend of psychological training which takes into account the stress arising from the competition. Given the particularity of this position and the reason to build an optimal model for the handball goalkeeper, the physical preparation has to be completed with good psychological preparation.

For this reason we must consider the intelligence and character of the player, his willpower and motivation. Courage is a very important quality of the goalkeeper and is the first consideration that arises and must be remembered constantly to try and promote it further. When training is structured, there should be a link between the conditional aspects, complementary and psychological. Depending on the objectives and the player style it may be necessary to make adjustments to the work being done.

Improved endurance, strength, speed, flexibility, etc., should result in improved physical ability, but if that improvement is developed separately, without achieving a union between them and the player's mental preparation, it will not be transferred to the sports performance.

Nowadays, it is usual to apply psychology in the sports field. The need for a mental training program to optimise athletic performance is clear, since a large percentage of the potential of an athlete depends on his mental preparation and he may not achieve maximum performance without the help of specific mental training. A good coach is not the one with the best physical and technical-tactical training knowledge, but the one that considers the player as a person, with all the complexity involved and who manages to realize an adequate preparation and inspire the player.

With the training we aim to learn specific skills, and modify or improve the existing ones, but we have to consider not only motor skills, but also the way in which the player receives and processes the information, in other words the cognitive skills (thinking, imagination and memory).

For the handball goalkeeper it is very important to have courage, to face the strong throws that sometimes come from very close to his body. A goalkeeper who is afraid cannot be effective. The fear may be a reflex caused by the pain produced by the impacts between the goalkeeper body with the balls thrown by the field players. To help to remove this fear, apart from specific physical preparation it is very important that the goalkeeper carries out a good warm up before entering the goal. The warm up plays an important role in the preparation program of the goalkeepers.

Another important aspect to consider is the self-confidence. For this, the goalkeeper needs to "feel" the ball, that is, the more balls he touches the more confident he will become. When a goalkeeper feels unsafe or out of shape, coaches have to help him to regain this confidence, working with the team and conducting a specific training with throws already known by the goalkeeper.

From the above aspects, which were taken into account in the preparation of the handball goalkeepers, comes this study on the influence of a specific warm-up in the performance of this player.

Objectives

It is hypothesised that the goalkeepers were afraid of the impact of the ball with their bodies due to improper warm-up to the throws and were discouraged by the lack of attention from the trainer. Previously, it was observed that over the working sessions, in general, the coaches worked most of their time to a single goal, and the goalkeepers who were not directly involved at this time, did not perform any work, and this led to excessive relaxation and an implicit no motivation on the side of the respective players. Given the relevance of the aspects mentioned above, the study had the following objectives:

- Analyse the degree of the influence of a specific warm-up in the performance of a handball goalkeeper
- Establish the relationship between the specific warm-up and the confidence and motivation of the player, if any.

Methods

The study was conducted during the period 2007-2008 with a Spanish handball Club which had two teams, a team participating in Top League consisting of 18 female handball players, aged between 16 and 34, and the other team involved in the Second League consisting of 14 players, aged between 16 and 30.

The sample consists of five goalkeepers, aged between 17 and 28 years (M = 23). The three goalkeepers, aged 28, 20 and 26 years old (M = 24.67), belonging to the Top League team had participated in international meetings with the national junior teams representing their countries.

The 28 years old goalkeeper being a senior team player in her country with considerable international experience, participating in World and European Championships with her national team. The other two goalkeepers, 17 and 24 years old (M = 20.50), belonging to the Second League team, did not have much experience. The 17 years old goalkeeper also belonged to the same club's Junior team, and had achieved the previous year as runner-up in Spanish Junior Championship.
Goalkeeper | Age | Height (cm) | Weight (kg)
--- | --- | --- | ---
Nº1 | 28 | 178 | 59
Nº2 | 20 | 180 | 74
Nº3 | 26 | 176 | 81
Nº4 | 17 | 165 | 80
Nº5 | 24 | 169 | 59
Average | 23 | 173.6 | 70.6

Table No 1. Data of the goalkeepers

The team returned for work, after the holidays, seven weeks before starting the league and the first official game of the season. The first five weeks, the goalkeepers did the same physical work as the field players. Following, after the general warm-up and before the field players had thrown to goal, the goalkeepers had made a specific warm-up for 20 to 30 minutes with the help of the second coach. Following the planning and the strategy intended for the next matches, the order in which the goalkeepers began to work with the team was changed. In this way obtaining an alternate, in each session having a goalkeeper who started the specific warm-up, one who continued, and another one remaining at the disposal of the team work under the supervision of the main coach, and therefore not performing a specific warm-up work and training.

The warm-up consists of a variety of exercises with and without the ball, specific for the goalkeepers, both physical and technical-tactical training. For the analysis of the data statistics have been used, taken during the 20 official matches of the women's League, Top League and the Second League, considering the number of throws received. The data processing was performed using Microsoft Office Excel.

Results and discussion

According to the statistics taken over the games, the results show that the goalkeepers of the Top League have had an average of 42.45 throws to goal per game and the Second League goalkeepers have had an average of 33.30 throws to goal per game. It was noted also that the average stopped throws per game it were around 17 for the Top League team and 10 for the Second League team.

<table>
<thead>
<tr>
<th>League</th>
<th>Total Stopped throws</th>
<th>Total goals received</th>
<th>Total throws to goal</th>
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<tr>
<td></td>
<td>1st</td>
<td>2nd</td>
<td>1st</td>
</tr>
<tr>
<td>Game 1</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Game 2</td>
<td>12</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Game 3</td>
<td>18</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Game 4</td>
<td>20</td>
<td>13</td>
<td>30</td>
</tr>
<tr>
<td>Game 5</td>
<td>16</td>
<td>9</td>
<td>24</td>
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<tr>
<td>Game 6</td>
<td>19</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Game 7</td>
<td>22</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Game 8</td>
<td>13</td>
<td>12</td>
<td>29</td>
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<td>Game 9</td>
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<td>12</td>
<td>21</td>
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<td>16</td>
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<td>Game 17</td>
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<td>11</td>
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<td>Game 19</td>
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<tr>
<td>Game 20</td>
<td>10</td>
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<td>31</td>
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<tr>
<td>Average</td>
<td>16.75</td>
<td>10.00</td>
<td>25.70</td>
</tr>
</tbody>
</table>

Table No 2. Data of the throws to goal per game
First, we performed a descriptive analysis of the throws received by the field area from which these throws were initiated (average and percentage of stops). These throws are reflected in the twenty games analysed and represented in the following tables. According to statistics, it appears that depending on the different goalkeepers playing, the area from which the throws were made also differed in relation to the weaknesses of each goalkeeper. The first goalkeeper was available 50% of the total time of a match while the second and the third goalkeeper, 40% and 10% respectively.

### Statistical data 1st Ligue

<table>
<thead>
<tr>
<th>Players</th>
<th>Average of throws received per game</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 m</td>
<td>Wing</td>
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<tr>
<td>Goalkeeper n°1</td>
<td>G</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>5,63</td>
<td>1,74</td>
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<tr>
<td>Goalkeeper n°2</td>
<td>2,50</td>
<td>2,00</td>
</tr>
<tr>
<td>Goalkeeper n°3</td>
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<td>0,50</td>
</tr>
</tbody>
</table>

G = Goals; S = Stopped Throws; T = Total; C = Counterattack

Table No 3. Data of the average of throws to goal over the season

The data obtained from the statistics of the Second League team goalkeepers are similar to the previous ones.

### Statistical data 2nd Ligue

<table>
<thead>
<tr>
<th>Players</th>
<th>Average of throws received per game</th>
<th>Total</th>
</tr>
</thead>
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<td>6 m</td>
<td>Wing</td>
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<td>Goalkeeper n°4</td>
<td>G</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>4,67</td>
<td>1,60</td>
</tr>
<tr>
<td>Goalkeeper n°5</td>
<td>4,19</td>
<td>1,25</td>
</tr>
</tbody>
</table>

G = Goals; S = Stopped Throws; T = Total; C = Counterattack

Table No 4. Data of the average of throws to goal over the season

The graphics below show the analysis of the received throws, both the goals and the stopped throws, which shows the performance of the goalkeepers throughout the season.

The results show from the collected data an improvement in the performance of the goalkeepers who performed the specific warm-up, with a greater extent for the “starting” goalkeeper. (With * the goalkeeper who started the specific warm-up, with ** the second, and not performing the work is not marked at all). Only the results of the first team are shown because they are more relevant.

### Goalkeeper No. 1

Graph No 1. Throws per game received for the Goalkeeper No. 1
This research studied the influence of a specific warm-up for the handball goalkeeper on the performance of the players. The results demonstrate the importance of such specific warm-up.

Reflected in the charts presented, the improvement of the performance for the goalkeepers when they did a specific warm-up. The results have proved that the specific work with the goalkeepers was very profitable for the team. In addition, talking with the players, it has been confirmed that they have had more confidence in their own performance for two reasons.

First, finding themselves in an optimal state of physiological warm-up, made them to feel no pain when they hit the ball with their body, therefore the reflex fear of the ball disappeared. And second, they found more confidence and motivation to stop more balls as a result of the progressive intensity of the throw performed during the specific warm-up and more confidence and feel of the ball, given by the successful, repetitive interventions on the throws launched to known positions.

As a guideline is presented below the percentage of the stopped throws for the goalkeeper throughout the season.
The reality reflected in these studies and the results obtained with the described work encourages the coaches to consider a specific warm-up for goalkeepers at the same time when planning their daily training sessions.

The results obtained in this investigation show that the goalkeepers need specific attention according to the particularities of their position and personal abilities.

Conclusions
In conclusion, it is important for the players along with coaches, technicians and instructors to learn more about the physical, technical, tactical and psychological preparation, and the impact of these on the players performance. To carry out specific training appropriate to the handball goalkeeper functions it is important to know the physical qualities present in their figure and which are to be developed through training.

To make a good program of the training which this position needs, it is important to specify the context in which it develops, and the characteristics of the players.

It would be desirable to carry out additional research in this direction with a larger sample of goalkeepers to confirm the results found in this work.

Bibliography