



## THE MOTRIC STRUCTURE AND DYNAMIC OF HANDBALL

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### Abstract

Motric structure of the game is the size cause the effect that leads to the phenomenon and determine at a later date is determined by the nature of stress, psychological energy, physiology, etc. The structure of the game is on the way of organization and coordination of actions (forms, principles and factors) in the phase of attack and defense. The content of the game is composed of the various technical processes: keeping the ball, catching and passing, dribbling, throwing at the gate, integrated in various actions, namely technique in attack and defense. Modern handball game requires biotips, which acts at a pace where you merge elert in terms motric speed and strength with strength and skill. Effort in handball is characterized by submaximal intensity efforts, alternate, depending on concrete conditions of the game, with the maximal intensity efforts, an average or even breaks.

**Conclusions:** We can affirm that the handball is a sport which is characterised by the involvement of the two horses: aerobic and anaerobic metabolism in which effort has features, explosive types of flashing and movement are repeated in addition to high intensity depending on the situations of the game.

**Key words:** game dynamics, motric structure.

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### The motric structure of the handball game

#### Introduction

The motric structure of the game represents the dimesion that causes the phenomenon, in other words, it determins and then it is determined by the physiological, energetic and psychological demands of nature.

The structure of the game is given by the organization and coordination of actions (shapes, principles and factors) in the phases of attack and defense. The game consists of various techniques: holding, catching and passing the ball, dribbling, integrated in various game actions, meaning the technique of attack and defense.

The structure of the game in attack and defense is given by the attack and defense actions in different shapes based on the principles of coordination, objectively necessary, such as tactical execution of passing combinations in attack, attack preparation. The activity of players in a match game is basically the content of that game.

Modern handball is a fast game characterized by outstanding athletic performances made by athletic players. In fact, the modern handball players are able to perform very different movements: walking, side trips, various runnings, jumps, change of directions, turnings and technical elements performed in a very

short time and in a certain order determined by the tactical situation.

Running straight with and without the ball, the jumpings, the throwing, catching and passing the ball from a place or running are the characteristics of the modern handball player.

**The content.** The distance covered during a handball match is different depending on the position, that meaning that it depends on the position they play and the game pace. Hard games are always very demanding ones, stressful both in physiological and psychological point of view.

A handball match lasts 60 minutes, and it is divided into two halves with a duration of 30 minutes each. In this time the players cover distances between 4000 - 6000 metres depending on the rhythm of the game, the level of tiredness, their place on the ground, the attack and defense tactics characteristic of the team.

One of Cuesta G's works shows how the distances were covered by the national team handball players of Spain, during a match, depending on their position in the field. For example: for left has come 3557 meters; for right 4083 meters, inter left 3464 meters, inter right 2857 meters; pivot 3531 meters.

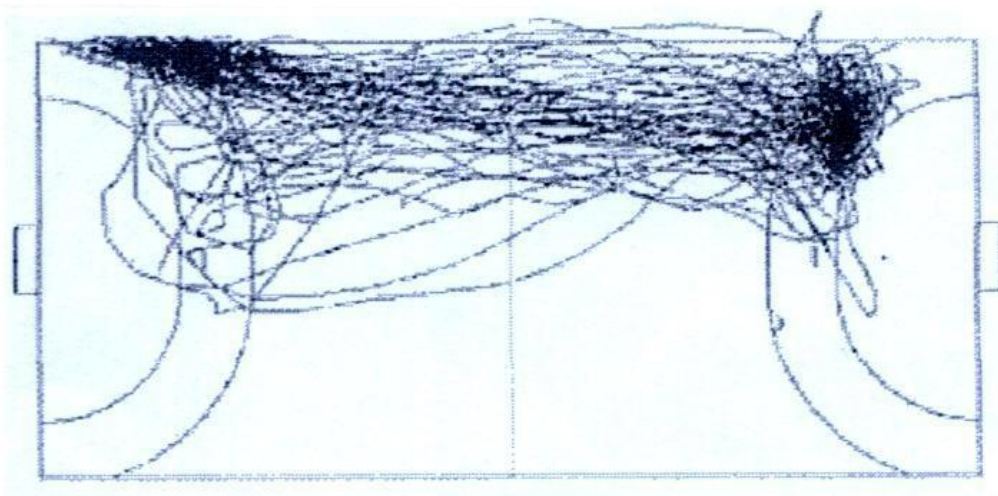
In one study in Italy, with a specific device (Play Controller) 5000 meters were covered by the right wings during an official Italian league match

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**Figure 1** – analysis of extreme right during an official Italian league match. The player`s routes

It is very important to mention that the placement of the player in the field is determined by different parameters: their tactical distribution, their position in the field, the characteristics of the game, all of these being factors that might influence the area covered by players.

The data we collected show that handball is on the first division for the following reasons:

-the activities of a player in the first league ( in the center ) during a match:

- slow running 40`
- 160 throws
- 40 catchings
- 30-35 active defensive actions.

M. Buchheit offers us some illustrative figures for the activity during a game, of an international player who performs in Division 1 Championship in France.

#### **Offensive actions**

- 47 runnings to the gate
- 20 stops
- 5 actions 1x1
- 10 throwings
- 101 passes.

#### **Defensive actions**

- 66 defensive moments without control the striker (4`32`)
- 78 defensive moments controlling the striker
- 13 outputs the pressing
- 14 neutralizations of the attackers
- 5 ball blockings.

#### **Offensive and defensive moments**

- 4 sprints of 2` (the maximum speed)
- 38 fast moments 2` / 3` (between 15-20 m )
- 6` , 20` moderate moments
- 38` , 12` walking.

As an indication, Cuesta (1991) showed that during a handball match, the players have 190 variations of the rhythm, make two changes of direction and 16 jumps. Based on what he says, a performant handball player has a total of 4 high intensity changes in 60 minutes. (in average of 8 per minute). So, it is about many short and explosive actions, those actions requiring high effort during a physical education activity. Remarks were made on these figures be in a very weak game or an international game. The score at the level of the match is very close to each other 50 – 60 goals. Reporting these results to the percentage of successful results (in each attempt were scored x goals) , the lower striker needed more attempts than the international one,so , as a consequence, there are much more actions performed. This phenomenon that we quality for cavalcada is regularly observed ((<http://www.martinbuchheit.net>).

It is an important element that allows us to tell that the higher level of the game is, the less we run (there are less crossings of the field); in addition to this, he must be strong in order to improve his percentage of success.

The physical training at an inferior level refers to the amount of work, and at the superior level to it's quality ( the amount being automatically provided,

starting from the idea that the superior team trains two times daily) (<http://www.coachesinfo>).

This data taken from the specialty literature must be studied and used in the process of teaching by coaches, in order to ensure the quality and the efficiency of the training process.

#### Dynamic of effort in a handball game

The modern handball game supposes special biotypes that acts at a rapid pace and combines, metrically speaking, the speed and the force together with the resistance and ability.

The effort in handball is characterized by alternated submaximal intensity efforts, depending on the specific circumstances, together with maximal intensity efforts, medium effort or even pauses.

The more the player evolves at a high performance level, the better are the energy requirements and the stress during the match. The match at a high intensity is still possible if the players pay enough time for training and if the training is conceived starting from the specific requirements of the positions of the players in the team.

The intensity of the game depends on the level of the players level of qualification. The higher the level is, the higher the intensity is, too.

The most important fact underlined here is that the handball player covers the entire distance, alternating the high intensity activities (jumps, changes of direction, sprints) with the phases of a game, characterized by the metabolic needs due to the high necessities of the activities during the match. One may say that the metabolic demands of the modern handball

imply aerobic and anaerobic energetic mechanisms of the player.

Handball is a discontinuous activity which is determined by the high intensity moments (the energy is largely provided by ATP-CP and the anaerobic ways) and also by the low intensity moments (where the aerobic mechanism function as an active rehabilitation).

In one of Lupo`s works on the Italian national team sports men during friendly games, it was found an average number of cardiac frequency of 145 beats per minute. The maximum rate of cardiac frequency was 190 beats per minute and the lactate amounts were 4 mmol/l. (Lupo S, 1996)

Other figures found between 1996- 1998 showed that the cardiac frequency rises from 140 beatings per minute to 200 beatings per minute. The values of a cardiac frequency may be incorrect, unless an accurate analys is made and it is not taken into account the distribution of the Sport men on the field. In fact, the average of these information doesn`t express useful information about the handball players activity during a match.

For example, in Figure 2 we can see the frequency of a heartbeat of a handball players during an official match.

If we consider the medium rate of a cardiac frequency (150 beatings per minute) and the time spent in the aerobic area (70-85% of maximum FC, see the pictures 2 and 3), we may likely say that the aerobic metabolism is the most important physiological mechanism in handball.

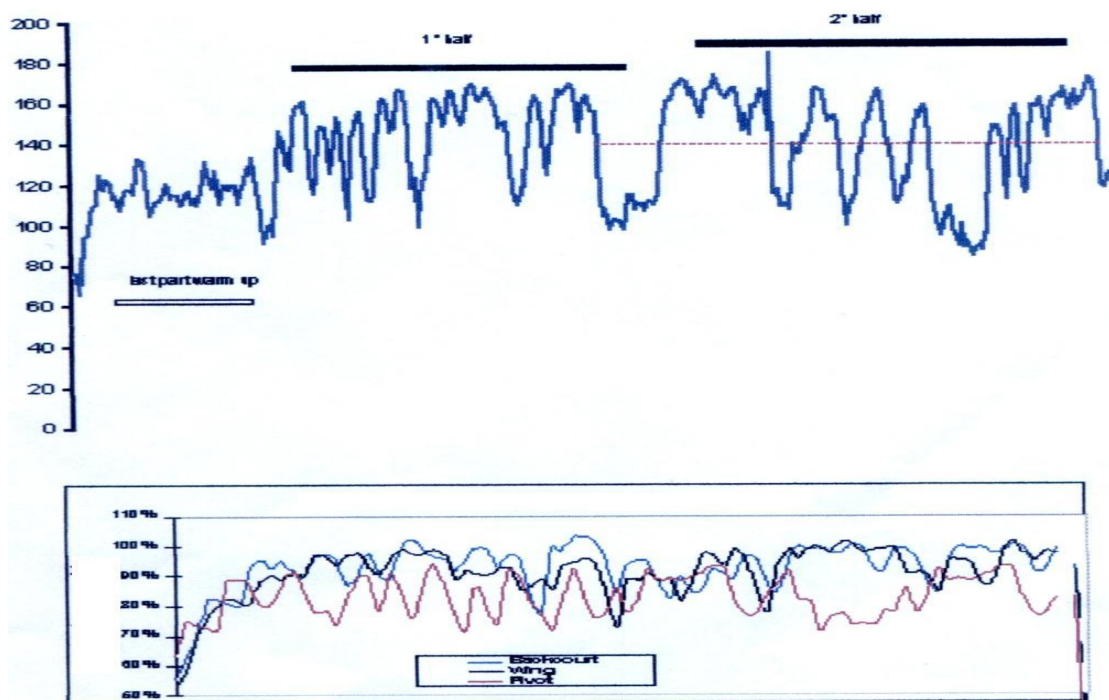


Fig.2 a) heart rate of a handball player in the Italian national team during the match  
 b) heart rate as a percentage of OBLA threshold measured by Mader test in handball  
 c) players in the game (Colli, 1997).

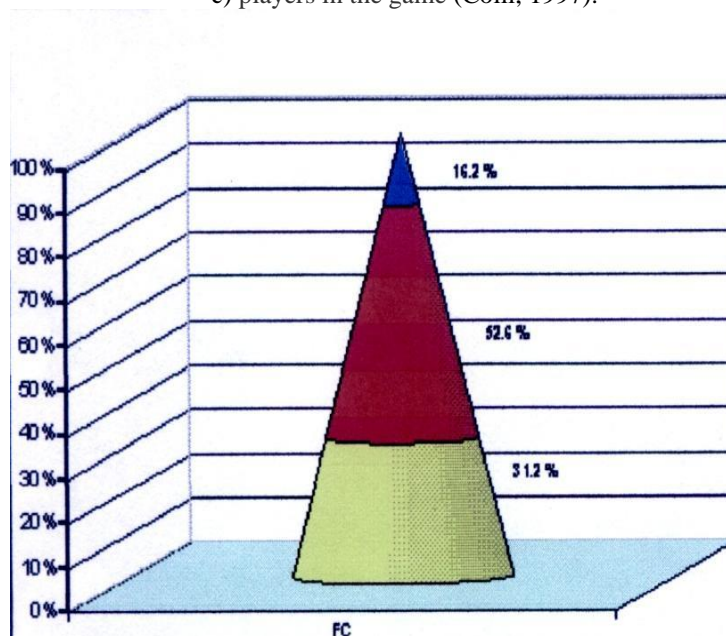


Fig.3. The distribution of the cardiac frequency in match. The data refers the heartbeats in picture 2. This data are expressed as a percentage of the total time. The red colour shows the aerob time measured with the Mader's test.

This conclusion was drawn many years ago and many coaches are still convinced of the importance of the aerobic capacity and its power in training in order to achieve high performance.

A process analysis of a handball performance should take into consideration that the most important actions (those ones which make the difference), are the short high intensity moments that may lead to an increasing of hydrogen ions (H<sup>+</sup>) allowing the formation of lactic acid in muscle cells, causing the decreasing of the P-H cells and the inhibition of muscle contraction processes.

The intense activities are followed by low rate activities or pauses (the active recovering), during which the oxygen consumption is directed to facilitate the transport of hydrogen ions, to recharge ATP → S from APP and AMP and to promote the Cori cycle through which the lactic acid is turned into glycogen. The lactic levels in a handball match are under 10 mmol/l, this being a medium compared to a 400-100 m running (Hirvonen 1992).

This means that the lactose is not a limiting factor in handball, although it should be emphasized, that training should contain exercises that should lead to this quantity of lactose to cause the particular adjustments for the handball players.

In Delamarche's research work, the lactose levels measured in a French league match reached values between 4-9 mmol/l. The highest value was certainly reached by the most active players. (P. Delamarche 1997).

Similar values 7-10 mmol/l were found during international games of professional teams.

In conclusion, based on these observations, we can say that handball is a sport characterized by the involvement of the two metabolic pathways; the aerobic and the anaerobic ones, in which the effort has discontinuous characteristics and the explosive types exercises are repeated in addition to a high intensity depending on the circumstances during the game. Equally important is to understand that it is impossible for the power to increase from one year to another, without first to increase the strength.

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