

**THE MINISTRY OF EDUCATION, RESEARCH, YOUTH AND SPORT
THE NATIONAL ACADEMY OF PHYSICAL EDUCATION AND SPORT BUCHAREST**

**CONTRIBUTIONS TO THE INCREASE IN PLAY EFFICIENCY, BY
UPDATING AND TAILORING THE SPECIFIC PHYSICAL TRAINING
TO THE REQUIREMENTS OF THE GOALKEEPER**

DOCTORAL THESIS ABSTRACT

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**BUCHAREST
2011**

CURRENT SIGNIFICANCE, IMPORTANCE AND THE MOTIVATION BEHIND THE TOPIC OF THIS THESIS

The studies prepared by the specialists in the field, as well as their entire accumulated experience are focused on the continuous improvement of the game. They strive to devise game concepts, which are able to meet the requirements of international elite handball on one hand and match the ever-changing global trends of the game on the other hand. Such concepts must actively operate in correlation with the principle of constant and continuous improvement.

There were several main reasons in choosing this particular subject, namely:

The author of this paper has scientific and practical competence in this field, as she is part of the elite performers in Romanian women's handball, a former high-performance goalkeeper, a member of the Romanian Olympic team and a coach in the first echelon of value in the field.

The author was committed to using analysis and research in order to thoroughly study the phenomenon of goalkeeper-oriented physical training in specialised players. This study is seen from a professional perspective, with the view to develop certain competencies for coach management in women's handball.

A proper and goalkeeper-oriented physical training approach is essential to achieving superior results, both in further training and competitions.

This is a key position, as the goalkeeper is the last line of defence and often the fate of the game rests on her shoulders.

This paper also brings along the opportunity to carry out an experiment pertaining to the teams in the National Women's Handball League.

CHAPTER I

CURRENT PURSUITS AND THE THEORETICAL AND METHODOLOGICAL CONSENSUS IN THE PHYSICAL TRAINING OF THE GOALKEEPER IN HANDBALL

I have studied the field-oriented and field-related literature up to date. However, I found that there are rather few papers treating this particular subject. They also lack clarity in their approach to the physical fitness and preparation of the handball goalkeeper.

For such games, we cannot conceive discussing a specific pattern of selection and training without basing it on a certain game standard or model.

By examining the traits and features of the players, as well as the trends in the development of the game, the specialists have been able to devise certain standards or archetypes, if you will, in the selection and training process of the players, depending on their positions. Consequently, the models of position players and the match models identified in international competitions (Olympic Games, World Championships or European Championships) have thus become standards of reference in such processes as orientation, selection, training and playing in competitions.

It is nevertheless important to understand that one cannot simply reach the final levels of achievement in match models or position players' models, without first going through all the formative stages of handball players.

The greater the value of the goalkeepers, the greater the value of the team. In addition to specific mental, motor, psychological social requirements, as well as technical and tactical abilities, a goalkeeper must learn to overcome a series of different challenges pertaining to every match or competition. The specialists seem to reach a consensus on the exact nature of such challenges, namely:

- The increased complexity of game play;
- Swift handling of specific match-related actions;

- Blocking the swift and accurate attack waves of the opponents, most of the times being 1 on 1;
- Reacting to the feinting and counter-feinting actions of the offensive.

This paper tries to present a solution to several methodological issues, which have yet to be fully clarified by the field literature, namely:

- Determining the features and characteristics of the current game play by the players, for the position of goalkeeper;
- Determining the tests and techniques required for the assessment of the abilities and qualities of a goalkeeper in performance team handball;
- Setting the main operational objectives and preparing the methodological sheets or training programmes for the goalkeepers;
- Implementing the training exercises and means in order to improve the goalkeeper's game.

The current team handball game requires for the elite players to be trained according to the specificity of their positions. The customisation of the training process must be extended to every player, regardless of their level or classification.

CHAPTER II

PRELIMINARY STUDY TO UNDERLINE THE STRUCTURE AND QUALITY OF THE STANDARD IN GOALKEEPER-ORIENTED PHYSICAL TRAINING IN ROMANIA

The technology applied in preliminary research

The issue of handball players' physical training has always been a problem of the day, as it represents the base on which all other factors in sports training rely. To this effect, the specific, goalkeeper-oriented physical training helps optimise their performances, given the great effort put into their drill process and matches. It is only those players, who are able to face and successfully overcome the barriers appearing in great matches, that will decisively contribute in reaching the training and performance goals set by the club or national teams.

The goal of the preliminary trial is to verify, in practice, the current level of physical fitness of the elite handball goalkeepers in the National League of Women's Handball, in order to be able to proceed further with the actual experiment. Another aspect would be to outline the scope of opinion of the specialists in the field, with respect to the role, significance and optimisation means of the specific goalkeeper-oriented training.

As a starting point, I conducted a survey among the specialists in the field, as well as among the theorists teaching team handball at Romanian sport universities, because it is my belief that their expertise can clarify several issues related to how goalkeeper-oriented physical training should be approached and treated. I had 32 such specialists and professionals, all over the country, answer the questionnaires, directly or via email. The survey was conducted during March – August of 2010 and the results were analysed in the following September.

The questions were devised in such a way as to allow me to extract from the answers received exactly what I needed: to identify the current, actual level of physical training of the players in this position of goalkeeper, to point out the differences between what is written in the field-oriented literature and what is actually applied in the training process, as well as to define the means required to optimise the performances of the teams as a whole, and individually, of the players. The third chapter deals with the analysis of these answers and the conclusions derived there from, thus allowing me to pertinently update the process of physical training and render the performance of the goalkeeper more efficient.

Organisation and development of the research

For the experiment I chose eight control tests that I considered to be representative in my attempt to assess the general, as well as specific goalkeeper-oriented physical fitness of the players in this position, competing on the first echelon of value in Romanian team handball.

To this effect, in cooperation with the coaches of the teams involved in the research and taking into account the match schedule, we set the dates for the tests, spreading them throughout the return matches of the championship that has recently ended. The results of the tests were to be interpreted and analysed from a statistical and mathematical perspective.

The selected goalkeepers passed the tests before the actual competition period, in agreement with their respective coaches. We then gathered all the data collected in a centralised data base, in order to analyse them and determine the current level of physical condition of the players in the position of goalkeeper. It should be noted that their performance were also interpreted in accordance with the requirements of the handball federation and the standard set for the elite goalkeeper.

As control tests for the goalkeepers, we opted for the following: throwing the ball from a distance, moving in a triangle; lifting the torso vertically, for 30 seconds; a 30 m sprint, with a standing up start; lifting the torso horizontally, for 30 seconds; starting vertical jump for 30 seconds; a penta jump; the Cooper test; a run 5x200 m.

The readings of the preliminary study to underline the structure and level of physical fitness of Romanian goalkeepers

The research conducted for the experiment we carried out allowed us to extract some conclusions, derived both from the interpretation of the answers given by the specialists surveyed, as well as from the analysis of the results recorded by the goalkeepers, during their control tests.

1. According to the specialists in the field, the questionnaire we drew up gives us information and data regarding the means to approach the training process of the goalkeepers and to identify a modern methodology in their training.

2. The field literature, my personal experience and the opinions of the specialists are concurrent in paying a special attention to the role and the significance of the elite goalkeeper.

3. If the general physical preparation stands as a ground base for the other factors in sports training, then it is specific physical preparation that represents the main factor behind performance growth. Moreover, this is actually a noticeable trend in international matches - to increase the importance and weight of such specific shaping in the overall training process.

4. Following the experiment, I found that the opinions of the specialists regarding the level of physical fitness of elite goalkeepers are actually confirmed by the results obtained by the players at their control tests. The values thus obtained were compared to the values of reference for elite handball players, as determined by the Romanian Handball Federation.

5. In terms of technical and tactical content, which is particular to the goalkeeper, during the training process one must give special attention to the development and improvement of all motor abilities, with a focus on the velocity of acting and reacting, as well as the general and segmental strength.

6. Practice has shown that during the training process, most of the coaches don't define and underline the individual qualities and the specificity of the players' positions. Few actually take the time to focus on the specific physical training of the goalkeeper. However, more than 93% recommend a specific goalkeeper-oriented training process.

7. In present day handball, goalkeepers are selected according to a somatic type criterion. They must have remarkable physical abilities (strength, speed, endurance and agility), as well as mental abilities (focus, stress resistance, visual and motor coordination, and so forth).

8. The standard of the goalkeeper is determined and set also based on the technical and tactical content of this position, the specificity of the effort required during the match, the possibilities to combine motor abilities and the traits of the competition system.

9. Players in a superior physical state have better performances during the game. A better aerobic capacity allows the player to play faster, enabling him to fully use his technical or tactical skills. This also comes in handy during the training and recovery processes.

10. The structure of the goalkeeper-oriented physical training must take into account first and foremost their motion abilities, which must be further developed in order to create an identity between the actual requirements of the position and the individual skills of the player.

11. Furthermore, it is essential to select the proper means for a tailored, goalkeeper-oriented training. Excessive use of inadequate and unspecific elements may induce defective habits and incorrect skills, which in turn leads to poor performance.

CHAPTER III

PERSONAL RESEARCH IN THE AREA OF IMPROVEMENT, WITH THE VIEW TO UPDATE AND TAILOR THE GOALKEEPER-ORIENTED PHYSICAL TRAINING, FOR A MORE EFFICIENT OVERALL PERFORMANCE

The goal of my research is to mould the elements of goalkeeper-oriented physical training, in order to increase the player's game efficiency and performance. Furthermore, this research aims at outlining a more modern approach in the process of customising physical training for goalkeepers, which should in turn improve and optimise the overall performance rating during drills and matches.

Another objective was to identify the effects derived from the implementation of the training programmes and operational structures we had proposed. These were mainly devised to increase the efficiency of the handball goalkeepers, in relation to the quantity and quality of all the physical, technical, tactical and psychological modifications made.

Research hypotheses

Today, more than ever, in the handball training methodology there is a strong and continuous need for factors, which are able to stimulate the performance capacity. More and more specialists and professionals, from various fields, get involved in performance sport (coaches, doctors, kinetherapists, psychologists, IT specialists, etc.).

If we have a look in the national and foreign field literature, we find that most of the papers involving this sport, deal with the means required to optimise and improve teams' performances, rather than with the specificity of the players' positions. Furthermore, there are very few books and papers dedicated to performance women's handball and even less focused specifically on the goalkeeper.

The theoretical and explorative research was intended to go through the phase of creating research hypotheses. Practically, I used information from the field literature, as well as data gathered from personally applied performances. Consequently, the pedagogic experiment attempts to verify some of the assertions made in the preamble of this thesis.

Therefore, given all of the above, as well as my personal experience as a former elite player and coach in the Women's National Handball League, projected onto my personal investigations on the field (surveys, discussions with various coaches of elite women's teams, discussions with the goalkeepers and the specialists of the Romanian Handball Federation), I hereby set forth below the following **work hypotheses**:

The inductive hypothesis

Here we have the assumption that the method promoted hereunder, to update and shape the goalkeeper-oriented physical training, might have multiple effects on the increase in the goalkeeper's efficiency and performance.

The deductive hypothesis

Given the direct personal expertise regarding the international game play, as well as the discussions with various coaches, in the country and abroad, we make the assumption that the creation of a current and forward looking model or standard will contribute to maintaining an optimal level in the physical fitness and preparation of goalkeepers.

Approach hypotheses

1. If the physical training process is done according to the method of tailoring the training to the custom requirements of the player, then the teams may reach their performance objectives.
2. If it is used, creatively, a scientific projection of the customised physical training, with a role to optimise the organisation and development of the training cycles, then the emerging effects of all the factors involved in the training process may be influenced.
3. The value of the motor, technical and tactical coefficients obtained by handling the independent variable in the experimental group, might ensure a solid base of performance for the players, during matches.
4. If we identify the relevant aspects in the model created, as well as in the specific physical training, this could lead to the division of the training process, in several optimisation strategies, which can in turn conduce towards an improved game efficiency for the goalkeeper.
5. The expectation is that once the correlation between the qualitative, structural and implementation traits of the new standard in specific physical training is set up, then this would highlight the potential of goalkeepers and offer a better and more important performance-oriented physical preparation.

Methods and approaches used

The following research methods were employed during the experiment, to ensure its proper development: the bibliographic research method; the pedagogic observation; the pedagogic experimental method; the statistic-mathematical approach; the table form and graphical method; the control tests.

The players' performances were assessed using the **testing method, the Bosco Protocol applied using the Kistler Quattro Jump force plate type 9290AD**. The equipment is located at **CCPU Pitești**.

The Bosco protocol and the Kistler platform make general and specific determinations. They further measure the independent variables, as an experimental rationale for the hypotheses used.

The organisation of the verification experiment

My research was conducted throughout the entire year of competition in the Women's National Handball League and was focused on the players in the positions of goalkeeper. To this effect, at the beginning of the experiment, the players in the two groups underwent 6 control tests, which were created by the specialists for this exact position. It was also used the testing method, applying the Bosco Protocol with the Kistler Quattro Jump force plate. At the end of the research, the players underwent the tests again. The reading were analysed and interpreted using the statistic-mathematical approach.

The subjects of the experiment were the goalkeepers in the National League (n=24) divided into two groups, an experimental group (n=12) and the control group (n=12).

Theoretical conclusions

The goalkeeper model is determined by the technical and tactical structure of the position, the characteristics of the effort specific to the goalkeeper's play, the possibilities to combine various motor abilities and the traits of the match system.

Players in a superior physical state have better performances during the game. A better aerobic capacity allows the player to play faster, enabling him to fully use his technical or tactical skills. This also comes in handy during the training and recovery processes.

The effort made during the drills or the match is quite complex and it shouldn't be understood as a sum of all the efforts made by the athlete, because without taking into account the biochemical and physiological aspects of the mutations, as well as the control of their dynamic, one cannot obtain high results.

Practical and methodical conclusions

With respect to the **Inductive hypothesis**, I should mention that it was stated based on an inductive reasoning and it represents the main trigger behind the experiment. The inductive argument, as a general conclusion, is derived from the particular nature of all the facts, which were known and the phenomena, which were studied. These were available by observation, personal experience and experiment and because of them it became possible to fully explain and generalise the causality links with the variables analysed. Therefore, the training procedure applied, as well as the moulding of the specific physical training proved to be true and fundamental in the generalisation and projection of the principles and the general training model, specific to elite goalkeepers. In this context, one can recommend the implementation of this model in the national training system.

With respect to the **Deductive hypothesis**, it was verified using the deductive argument. I began with the general game model, used internationally, then with discussions with various specialists in this field, both in Romania and abroad and I studied the applicable literature and the generally known training principles for elite handball players. Based on all these, I can bring forward certain contributions to the development of a more modern and tailored physical training standard or model, for the elite goalkeeper.

With respect to the **work hypothesis**, I can conclude that:

As to Hypothesis 1, stating that *if the physical training process is done according to the method of tailoring the actual training to the custom requirements of the player, then the teams may reach their performance*, one can draw the following conclusions:

The individual performances of the goalkeepers involved in the research, during official matches, contributed in full to reaching the overall performance targets of the teams. This was also confirmed by the match recordings. The efficiency percentages were quite revealing.

Therefore, if the training process follows the tailored goalkeeper-oriented approach, then the team will be able to achieve its performance objectives.

As to Hypothesis 2, stating that *if it is used, creatively, a scientific projection of the customised physical training, with a role to optimise the organisation and development of the training cycles, then the emerging effects of all the factors involved in the training process may be influenced*, one can draw the following conclusions:

Influencing the goalkeeper-oriented specific training lead to positive influences on the other factors involved in the training process. This was confirmed by the results obtained by the subjects in the experimental group to the control tests passed.

The use of a scientific projection, fully correlated with the schedule of the matches, the motor structure specific to the goalkeeper, as well as the individual traits of every player lead to the appearance of new traits of the factors involved in the goalkeeper-oriented training.

A customised and tailored physical training and preparation for the players, in all the stages and training cycles, will bring forward new characteristics of the other factors involved in the overall training process (technical, tactical, mental, biological preparation and so on).

As to Hypothesis 3, stating that *the value of the motor, technical and tactical coefficients obtained by handling the independent variable in the experimental group might ensure a solid base of performance for the players, during matches*, one can draw the following conclusions:

By applying the experimental programme within the pedagogic experiment, I observed significant progress on all the parameters under analysis, namely:

The marker for the height of the jump, at the Bosco test, shows significant improvements on all the other tests, at a significance threshold of $p < 0.001$. It is thus confirmed that at this jump height marker, the progress is quite considerable, proving the superiority and efficiency of the training approach used. The evolution of the marker for average jump force, on Bosco, also shows measurable improvement for $p < 0.001$. This supports the progress of the experimental group regarding the traits of the force jump, derived from the implementation of the experimental programme.

The results obtained by the experimental group at the control tests, specifically designed by the specialists for the goalkeepers, are statistically significant for the threshold $p < 0.01$. This proves that the independent variable used throughout the experiment was a successful contribution to improving the performances of the players. They further confirm the experimental group's superior play during the matches. This group had better results than the control group in terms of the balls thrown / balls blocked ratio: 38.1% for the experimental group as opposed to 32.6% for the control group.

The experimental group had a superior performance for all the markers analysed by comparison to the control group: 48.2% as opposed to 43.3% for the balls blocked from distance shots; 31.5% as opposed to 25.8% for the shots from near the crease; 45.8% as opposed to 38.2% for shots from the sides and 27.0% compared to 16.3% for the 7 m shots.

The players in the experimental group also recorded superior performances in counter-attacks, with a 77.9 % of successful counter-attacks compared to 77.0 % for the control group.

As to Hypothesis 4, stating that *if we identify the relevant aspects in the model created, as well as in the specific physical training, this could lead to the division of the training process, in several optimisation strategies, which can in turn conduce towards an improved game efficiency for the goalkeeper*, one can conclude that:

The efficiency of the goalkeeper can be considerably improved by optimising their specific physical training, according to individual preparation programmes.

Such training programmes must have a determined number of exercises, of repetitions, of series, all based on the effort made, the length and nature of the recovery process. The programmes should also account for a means to evaluate the progress made in relation to every training objective.

As to Hypothesis 5, stating that *the expectation is that once the correlation between the qualitative, structural and implementation traits of the new standard in specific physical training is set up, then this would highlight the potential of goalkeepers and offer a better and more important performance-oriented physical preparation*, one can draw the following conclusions:

The experimental group recorded a significant progress on all the tests, with a significance threshold of $p < 0.01$, regarding the testing of the specific physical preparation. However, by comparison, the players in the control group recorded significant differences for $p < 0.01$, at the 5x30 m run, the throw and passes to a fixed point, for $p < 0.05$ at the triangle move. They recorded insignificant results at $p > 0.05$, at the specific test and sideway moves. The statistically insignificant results at $p > 0.05$ obtained by the experimental group were for those tests which particularly point out the specific training, such as sideway move and the specific test. This confirms the efficiency of our approach in training the experimental group.

Methodological prescriptions

In the assessment process of the goalkeeper-oriented physical preparation, the specialists must use control tests that are in full accordance with the driving structure of the current game, as well as with the technical and tactical content of this particular position. These tests should also enhance the essential skills required for athletic performance.

There is a strong recommendation for all the specialists involved in the training process of the elite handball teams to direct their focus on the praxeological circuit objectives-content-assessment, in all the organisational forms of the training, frontally or individually.

A tailored approach in training elite handball goalkeepers will ensure the optimisation of their performances and remove certain insufficiencies or deficiencies that might still reside following the accidents they have suffered. It is imperative to select only the most adequate specific means for the physical preparation of the player. Excessive use of inadequate and unspecific elements may induce defective habits and incorrect skills, which in turn leads to poor performance.

To ensure valuable results, it is required that one assess the biological, psychological and social availability of the players, before setting the operational objectives, by applying certain control tests. Such tests are devised to accurately examine the effort required for the game and specific for the position of goalkeeper.