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**ABSTRACT  
Doctoral thesis**

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**Introduction**

The knowledge, the inspiration of the coach, and the athlete's talent, all working to exhaustion every training – they accompany and seal the great victory together, the purpose of every athlete and coach after each championship. But one cannot reach performance in any particular sport if, in addition to the coach's guidance, you, as a careful and passionate trainer don't use the newest textbooks that allow you the transfer of modern methods and practices based on competence. In summary, all contribute to the "art of sport". Any team aims to achieve superiority over the adverse one dissimulating its actions and, at the same time, trying to discover the opponent's game plans. Throughout this scheme, the goalkeeper has an essential and irreplaceable role, a central point in the general concept of training in handball.

The handball goalkeeper's attitude towards oneself, teammates and everyone else around, is an important part of the road to great performance. Not all goalkeepers know how to cultivate the moral, technical, and tactical strength. The spirit of fighting, sacrifice, and effort can be educated and those who possess such traits are the valuable athletes that shine. If, in addition, they master the necessary tactical and technical knowledge, we can say that they possess the potential to achieve a high degree of performance. Regardless of the playing system chosen to be applied, a competitive team approach is characterized by an active defense, advanced and aggressive, with a clear emphasis on individual actions and coordination of the defense by the goalkeeper.

To do this effectively we need well defined training methods and techniques pertaining to the goalkeepers.

Based on my previous researches, I found that the special literature for the general and specific preparation of the handball goalkeepers is very poor, and the studies in this field are very rare.

Which is why I choosing this topic for research.

**Rationale**

Although the handball goalkeeper is part of the team, with the same rights and obligations like the other players, most coaches allocate very little time for their preparation. Goalkeeper training is in fact just an aid for field players preparation by sieving or delimitation of land. The goalkeeper performs much of her work without the help of teammates and, unlike field players, her mistakes cannot be compensated. The goalkeepers operate in an area where they have access only to the semi-circle. Success or failure of their actions are immediately visible to all, with direct implications in obtaining the victory or being defeated.

Handball goalie performs a wide range of technical movements and gestures, with and without the ball, always alternating the speed and strength, simultaneously and in collaboration with the teammates, but also in connection with the adverse team players. The practice of handball, especially at a high-performance level, requires a specific and sustained effort. Duration and intensity of this effort, as the technical complexity of movements and gestures, determine the training conditions in different periods.

Based on my practice of almost 20 years playing, with over 140 selections at the gate of Romanian national teams, 80 of them in the first representative of seniors, with experience at Baia Mare, Oltchim Ramnicu Valcea, Cornexi (Hungary) and Itxako (Spain), I do believe that the next step for revolutionizing the Romanian handball should start with the goalkeepers' coach. It is important to create a school in Romania dedicated to training and preparing goalies, that considers each segment of the training as a challenge of the competition, surmounting routine, inefficiency, and compromise, not only relying on chance and talent to reveal accomplished goalkeepers.

### **Structure of the research topic**

The paper is structured into three main parts, divided in 13 chapters and subsections accordingly.

Part I - Theoretical and conceptual fundamentals of the research topic  
Theoretical foundations and methodological research topic

Part II - Preliminary research shaping of training of handball goalkeeper  
Preliminary study on modeling the training of handball goalkeeper

Part III - Experimental research and personal contributions on better preparing high performance handball goalkeepers

In the first part of the thesis they were presented theoretical concepts of modern trends in training and preparing goalkeeper handball in compliance with requirements, criteria, means and procedures.

The second part of the paper details a preliminary study, conducted over a period of eight months, between August 2010 and March 2011.

Specifically, I developed a questionnaire distributed to 55 handball coaches with an average of 30 years' field experience in the sport, in order to define the role and the importance of the goalkeeper and its specific training.

Another part of the experimental approach, conducted at the level of handball goalkeepers selected in the national teams of the Romanian Handball Federation, took place in the handball halls and athletics stadiums and tested the defended balls efficiency rates for conventional gate areas.

In this study, we started from the hypothesis that the use of individual means and methods for goalkeeper training from an early age can provide a decisive advantage in shaping the preparation for this role.

Upon completion of the preliminary study we have reached the following conclusions:

- performing the ANOVA test to each type of defended ball validated statistically the research approach. Thus, ANOVA test applied to each of the three types of thrown balls: low, medium and high, lead to the rejection of the hypothesis of the homogeneity for the mean values of the two tests, the calculated values being higher than the theoretical values, which

means that specific training for seniors, youth, juniors and cadets have had a significant influence, according to the collected data.

- the sample used for the questionnaire is representative in terms of age distribution and we noted that more than 45% of the respondents believe that a goalkeeper is the most important, the next option being the post of playmaker, with about 40%.

- the respondents considered that the most effective exercises are those for mobility and speed. Moreover, over 80% of those interviewed gave the maximum score for mobility, and 2/3 of respondents for speed.

- about 55% of the coaches believe that goalkeepers, after the warm-up period, prepare sometimes with the team, only one in six coaches preparing them individually.

- 3 of 5 coaches appreciate in a significant way that goalkeepers must be prepared by a specialized technician; over 70% of the respondents consider in a significant way that there should be organized special courses for goalkeeper coaches.

- the fact that the amount of time assigned to goalkeeper's preparation is insufficient, was proved by the answers to the question: "Do you think you allow enough time for the goalkeeper specific training?"; only 35% of respondents consider this amount of time as being sufficient, the remaining appreciating the time as insufficient.

- the analysis and interpretation of data regarding the somatic model of the subjects included in the experiment, one can see an average level of the selection model for some subjects and a high level of selection for the athletes in the senior category.

- data regarding the model of the individual actions of the goalkeepers in relation to conventional areas of gate show that the application of specific training increased the percentage of defended balls, an increased influence being observed for the groups of lower age goalkeepers, which demonstrates the effectiveness of goalkeepers' specific training starting from an early age.

Synthesizing the aspects outlined above we can conclude that we have the premises of a scientific research based on an individual specific of the goalkeepers. The hypothesis of preliminary research, "Using of individual training means and methods for the goalkeeper from an early age may be a decisive step in training modeling for this role" being confirmed.

The last part, the third one, includes the research itself. It was conducted between August 2011 - March 2012 at the level of handball goalkeepers selected to be part of national teams of the Romanian Handball Federation in regular handball sport halls (Floreasca, Bucharest, Energetic High-school Sports Hall) and athletics stadiums (Lia Manoliu, Bucharest, Râmnicu Vâlcea-Zăvoi).

Research Hypotheses:

- Conducting individual training leads to further improvement of preparation and an increased performance of handball goalkeepers.

- Implementation from an early age of this type of training leads to faster assimilation process of the tactical and technical techniques specific to the handball goalkeeper.

Research Objectives:

- Optimizing the training methodology using the selection of most efficient training means specific to the high-performance handball players specialized as goalkeepers.

- Assessing the physical condition of the handball players specialized as goalkeepers by measuring the somatic and motor parameters.
- To acquire theoretical and practical knowledge for performing independent specific goalkeeper exercises during a 24 weeks' period.
- Evaluating the results obtained during the initial testing of the control samples and comparing them with the results from the final testing.

Control samples used:

At the beginning and the end of the research the players have undergone a number of 8 control tests, five developed by the Romanian Handball Federation, and three adapted by the author, two of them for the very first time in Romania after a Swedish model, and another one after a model of the Romanian Handball Federation:

1. The efficiency rate of defending the balls in conventional areas of the gate. During the training process, after specific warm-up and preparing the subjects on the methodology of scoring, it runs a set of 15 throws from 10, 8 and 6 meters, executed by teammates that correspond to the same level of training and age category, in a random order, by groups of five athletes. Each one of them carries three throws, one in each conventional area of the gate, without the goalkeeper knowing which part of the gate is targeted. Points are awarded based on the number of points accumulated by each subject for the five throws in each category (there is a maximum of 30 points)

2. Anticipating the timing of launching the ball.

During the training process, after specific warm-up and preparing the subjects on the methodology of scoring, it runs a set of 15 throws from 10, 8 and 6 meters, executed by teammates that correspond to the same level of training and age category, in a random order, by groups of five athletes. Each one of them carries three counterattacks, without the goalkeeper knowing the shooting distance to the gate. Points are awarded based on the recorded number of points accumulated by each subject for the five throws in each category (there is a maximum of 30 points)

3. Long Jump from rest (test prepared by Romanian Handball Federation)

4. Running speed - 5 x 30 m. (test prepared by Romanian Handball Federation)

5. Cooper test (test prepared by Romanian Handball Federation)

6. Moving in the gate area (sample adapted by the author for goalkeepers instead of dribbling through cones - sample for field players drafted by Romanian Handball Federation)

7. Moving in triangular pattern (sample prepared by Romanian Handball Federation)

8. Long range ball throwing in three 3 steps (sample prepared by Romanian Handball Federation)

All of the eight control samples had a correspondent in the training program content, specific exercises for the goalkeepers, (a total of 19), each one performed in several variants.

Theoretical Conclusions:

1. Researching the literature and the survey conducted among the coaches in charge with the handball goalkeepers training, highlighted the need for the research regarding the general and specific training methods of the goalkeepers.

2. The modern approach to training goalkeepers is achieved by increasing the performance capacity as a result of optimizing the components of athletic training (physical training, technical and tactical training, psycho-motor training, theoretical, etc.).

3. Regardless of the implemented defense system of a team, there is a trend toward an active defense, advanced and aggressive, with an emphasize on the individual actions and coordination of the defense by the goalkeepers.

4. Handball goalkeepers training can be approached as a system where teaching conditions are created for analysis, theoretical and practical intervention on the factors favoring sport performance.

5. Handball goalkeeper performs an extended range of technical movements and gestures, with and without the ball, always alternating the speed and the strength, simultaneously in collaboration with teammates and opposing the adverse team players. Making them in a proper and effective way requires specific training.

6. Practice of handball, especially at a high performance level, requires a specific and sustained effort, duration and intensity of effort, as well as the technical complexity of movements and gestures being conditioning factors in goalkeepers training.

7. From the methodical point of view, the specific studies for goalkeeper training in other countries are oriented towards optimizing the means of evaluation and training, particularly on developing models of intervention of the goalkeeper as the main coordinator of the defense.

8. Experimental studies for goalkeepers training highlight the need of following a specific methodology of forming and programming of the operational objectives, preceded by a schedule of general and specific educational objectives to be implemented.

9. Scheduling the means and the methods of general and specific training is particularly important, underlining the need of training tailored for this role, throughout the regular season. This concept justifies both the linear and the concentric scheduling model for the educational objectives and of the training means to achieve them.

10. The dynamic of morphological development of investigated subjects characterize a somatic type specific to the handball goalkeeper by: height, arm span, hand size and weight.

11. The evolution of the physical training results is uneven, always upward, as demonstrated by the significant increase in the final evaluation results. The evolution of the technical and tactical preparation results shows an increase, uneven, but ultimately ascending compared to the initial tests results.

12. To conclude, the performance capacity of the goalkeepers is a result of the interaction between functional systems and organs, based on the energetic potential energy and psychomotor specifics.

#### Practical Conclusions:

1. One conclusion revealed by the research is related to the multi-criteria ranking that can be applied to every player in the lot, for each of the variables included in the research plan.

2. Data regarding the somatic model of the goalkeeper obtained during the research (span, height and weight of the players) show a framing between the usual average limits for the first two indicators and a very low level for the weight of the subjects compared with the international requirements.

3. For the long jump from standstill test, at the end of the experiment, there was a significant increase in results for all subjects, according to the values of the "t-test". Value higher than the critical table value, at a significance level of 0.01, confirmed the initial hypothesis. The calculated value of "t" is 23.303, much greater than the table t-value of 2.921. Consequently, with a probability of 99%, the differences between the two tests are significant.

In conclusion, there was a significant improvement on the lot preparation of this exercise, conclusion revealed also by Cohen coefficient which shows that the effect is very high.

4. For the 30 meters running test, at the end of the experiment, there was a significant increase in results for all subjects, according to the value of "t-test". The experiment result was greater than the table value, for a significance level of 0.01, confirm the initial hypothesis. The calculated t-value is 8.806, was greater than the critical table value of "t" 2.921. Consequently, with a probability of 99%, the differences between the two tests are significant. In conclusion, there was a significant improvement on the lot preparation of this exercise, conclusion revealed also by Cohen coefficient which shows that the effect is very high.

5. For the Cooper test, at the end of the experiment, there was a significant increase in results for all subjects, according to the values of "t-test". The experiment result was greater than the table value, for a significance level of 0.01, confirm the initial hypothesis. The calculated t-value is 10.872, greater than the critical table value of "t" 2.921. Consequently, with a probability of 99%, the differences between the two tests are significant. In conclusion, there was a significant improvement on the lot preparation of this exercise, conclusion revealed also by Cohen coefficient which shows that the effect is very high.

6. For the move along the gate test, in the final evaluation of the research itself, there is a significant increase compared to the initial test results, the calculated value of "t" (22.119) was significantly greater than the critical table value of "t" (2.921), for a significance level of 0.01, which confirm the initial hypothesis.

7. For the triangle pattern displacement test, the final evaluation of the research itself reveals that the calculated value of "t" 4.081 is significantly greater than the critical table value of 2.921. In conclusion, there was a significant improvement on the lot preparation of this exercise. The results confirmed the positive effect of the specific means used during the experiment.

8. For the handball throwing test, the final evaluation of the research itself, as a result of the specific training during the experiment for all subjects, it appears that the calculated value of the t-test of 10.731 was much greater than the critical table value of  $t = 2.92$ . The same conclusion was revealed also by Cohen coefficient which shows that the effect is very high.

9. For defended balls shoot from close range test (6m), during the final evaluation of the research itself, there is a significant increase compared to the initial test results, the "t-score" of 4.160 being greater than the critical table value of 2.921 at a significance level of 0.01 confirming the initial hypothesis of the research and the adjustment of subjects' defense reaction by individual actions. Also, the high value of the Cohen coefficient Cohen shows a significant effect.

10. For defended balls in connection with the conventional areas of the gate shoot from average range (8m), during the final evaluation of the research itself, there is a significant increase compared to the initial test results, the calculated t – score of 5.943 is greater than the critical table of 2.921 at a significance level of 0.01 confirming the initial hypothesis of the research and the adjustment of subjects' defense reaction by individual actions. Also, the high value of the coefficient Cohen shows that the effect is high.

11. For defended balls in connection with the conventional areas of the gate shoot from long range (10m), during the final evaluation of the research itself, there is a significant increase compared to the initial test results, the calculated t – score of 5.922 is greater than the critical

table of 2.921 at a significance level of 0.01 confirming the initial hypothesis of the research and the adjustment of subjects' defense reaction by individual actions. Also, the high value of the coefficient Cohen proves that the effect is high, showing as well a high level of goalkeeper adaptation of goalkeepers to reactions with very short latency time specific those throws.

12. The statistical indicators for total accumulated points, during the final evaluation of the research itself, are showing a significant increase compared to the initial test results, the test  $t$  – score of 10.121 is greater than the critical table value of 2.921 at a significance level of 0.01 confirming the initial hypothesis of the research and the adjustment of subjects' defense reaction by individual actions. Also, the high value of the coefficient Cohen shows that the effect is high. This indicator is considered the most important for optimizing the efficiency model of the goalkeeper. The subjects are ranked based on their accumulated experience on high-level competitions. (Example: subjects of the first four tabular positions).

13. To anticipate the shooting moment of the balls from close range, there is a significant increase compared to the initial test results, the test  $t$  – score of 5.060 being greater than the critical table value at a significance level of 0.01 confirming the initial hypothesis of the research and the high level of goalkeepers' adjustment to complex reactions. The Cohen coefficient has a very high value, which indicates a consistent effect.

14. To anticipate the shooting moment of the balls from average range, there is a significant increase of the results compared to the initial test results, the calculated  $t$  – score of 3.026 being greater than the critical table value at a significance level of 0.01 confirming the initial hypothesis of the research and the high level of goalkeepers' adjustment to complex reactions. The Cohen coefficient has a very high value, which indicates a consistent effect.

15. To anticipate the shooting moment of the balls from long range, there is a significant increase of the results compared to the initial test results, the calculated  $t$  – score of 3.576 being greater than the critical table value at a significance level of 0.01 confirming the initial hypothesis of the research and the high level of goalkeepers' adjustment to complex reactions. The Cohen coefficient has a very high value, which indicates a consistent effect.

16. An overwhelming percentage of respondents, respectively 45% of the total intervened subjects, considered that the development level of general and specific motor skills is low, which is highlighted by more than 50% of respondents, suggesting the need to address the improvement of the motoric qualities by training sessions on a permanent basis.

17. The experimental study highlights a series of results, which compared with similar data collected from the two trials (initial and final), shows the importance and the necessity of a training schedule based on operational objectives at the level of high-performance goalkeepers. Comparative data recorded initial and final, show the results of physical training tests. The analysis of data confirms that, for all the physical trials, the level of improvement favors the experiment group, thus confirming the hypothesis of the research.

#### Recommendations and Proposals:

Continuation of experimental researches on cadet and junior teams to build objective models and correlate them with those of the youth and seniors, in order to assure training purposes and a continued improvement of the goalkeeper's performance of in our country and beyond.

In a handball team the goalkeeper plays an essential role. Unfortunately, the coaches prepare them on a limited scale. The first reason for this lack of attention is the absence of



information and specific methods of preparing athletes for this role. Often times, training sessions omit special plans for goalkeepers. For many technicians preparing the goalkeepers seems complicated and, most often, they blame the lack of time as an excuse for this absence.

There are frequent situations when, after the usual warm-up heating of 10-15 minutes, goalkeepers are left alone to prepare themselves, following old methods which have become standard, or, they are integrated in the training plan imposed by the coaches for the field players.

Unfortunately, there are coaches who simply ignore the special training of goalkeepers, using them only as auxiliaries in performing the proposed exercises during the preparation. Often, there is a tendency to use the goalkeepers as supportive material such as poles, or simple delimiters for exercises of the field players. All those factors lead to the transformation of the goalkeeper, from an essential player of the handball team into just an observer of how her colleagues are trained.

Based on my previous arguments we can conclude that in any handball team, especially those operating at the top level of the championships, there is an acute requirement to have a goalkeepers' coach able to supervise their preparation based on a rigorous scientific planning, targeting the elimination of the repeated mistakes and following the general trend of handball players training in this role.

Providing specific training starting with the juniors will lead to a faster and better assimilation of technical and tactical methods.