

CONTRIBUTIONS REGARDING THE IMPROVEMENT OF THE TRAINING PROCESS AT JUNIORS IN RHYTHMIC GYMNASTICS BY OPTIMIZING THE TECHNICAL PREPARATION

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Abstract

The improvement of the technical preparation represents a strict request in the preparation process in Rhythmic Gymnastics, and that is why with the paper, “*Contributions regarding the Improvement of the Training Process at Juniors in Rhythmic Gymnastics by optimizing the Technical Preparation*”, we proposed to bring consistent contributions and real solutions for the efficiency of technical preparation, sustained by the results of the scientific intercession.

The biomechanical analysis in 2D that we took offered us enough data, as a strong feed-back, regarding the correctness of technical executions but also as a fast way of perception of own movements and formation of more correct representations.

Identifying preparation aspects that can be improved we chose using new technologies which could lead to the improvement of execution technique of main action types with the two apparatus, could sustain learning/correcting the technical elements and could lead to increasing performance in individual exercises with ball and hoop in order to obtain superior results in competitions.

The improvement represents a definite way to approach the training process structure, based on the unity of sportive training principles, of the particularities of the studied theme, of the ensemble of methods and means which can be used, of age particularities and real possibilities of sportsmen.

The conscious choice is taken, scientifically grounded, and not accidental, based on the systematic analysis of these elements, of the best way to structure the sportive training process, according to the given concrete conditions.

The research that we made regarded the improvement of the training process in Rhythmic Gymnastics, emphasizing the improvement of technical preparation.

In this way, following the biomechanical analysis of the technical elements it has been elaborated the means system and it has been experimented under the aspect of accessibility and efficiency.

At the same time it has been aimed at the maximum possible improvement of the realization conditions of the chosen variants and the analysis of the competitions results, according to optimizing criteria.

The purpose of the research has been:

- To improve the execution technique, by calculating some parameters of the action types (based on biomechanical analysis) at hoop and ball, in order to increase the performance and to reevaluate them in competitions;
- To improve the execution technique of the main action types at ball and hoop, by rationalizing and normalizing the preparation means;
- To improve the execution technique by physical training with new means, in order to improve technical preparation of the two apparatus under research.

The premises that led to the formulation of the hypothesis and grounded the research were:

- Formulating a theoretical and methodical synthesis of technical preparation in Rhythmic Gymnastics, at juniors level;
- The necessity to elaborate and systemize the most efficient means of technical preparation, at juniors level in Rhythmic Gymnastics;
- The application possibilities of new technologies, in order to improve the technical preparation and improve the training process.

The research methods used were: the method of studying the literature and specialty documents; the observation method; the method of biomechanical analysis; the experiment method; the mathematical method; the statistic method.

The hypotheses of this research have been stated as follows:

- The elaboration and application of specific physical preparation means significantly influence the technical preparation at hoop and ball, at junior level.
- Rationalization and standardization lead to efficiency of means applied in the training process for the two apparatus under research.
- Biomechanical analysis in two dimensions (2D) of the action types at hoop and ball contribute to improving the technical preparation for the two apparatus under research.

Research tasks

For this purpose we established the following tasks:

- The nomination of the physical and technical preparation level at the initiation stage of the research;

- Conception, selection and application of the specific physical preparation means proposed as independent variable in the experiment;
- The nomination of the physical and technical preparation level at the final stage of the research;
- The initial testing of the technical elements at hoop and ball and the data processing in 2 dimensions (2D);
- The calculation of the “Spearman” correlation coefficient for the rationalization and standardization of the preparation means at hoop and ball;
- Selection of the technical preparation means proposed as independent variable for the two apparatus and their insertion in the training process;
- The realizing with great precision of the film with the main action types at hoop and ball, with final testing;
- Film processing with the soft Simi Motion;
- Digitalization of the proposed research elements;
- Processing and interpretation of the obtained data.

The tests of the preliminary research regarded 8 tests of physical preparation and 8 tests of technical preparation, as follows:

Physical preparation tests

1. Standing long jump;
2. Body lifting in extension from recumbent – abdominal force;
3. The mobility of the spine in anterior plan;
4. Detention;
5. Coxal-femoral mobility;
6. Skipping rope;
7. Equilibrium;
8. Commutation 5 x 10 m.

Technical preparation tests

1. Hoop release with rolling and takeover;
2. „Cosaque” jump through hoop;
3. Hoop back-rolling and grand écart equilibrium;
4. Ball release with rolling and takeover;
5. Ball ricochet with step jump;
6. Ball rolling with a la seconde equilibrium;
7. Full hoop exercise;
8. Full ball exercise.

The values obtained at the physical and technical preparation tests have been transformed in points, on a scale from 0 – 20 (points) according to „*Tables de cotation de la valeur physique*” (Paris, 1995) and then compared by calculating the „t” Student test to observe if the results have been significant.

Experimental design

The research regards the improvement of the technical preparation of the sportswomen who practice performance Rhythmic Gymnastic at the School Sport Club „Anghel Saligny”, which is among the first three clubs in the country, with special results in Rhythmic Gymnastics and has given years in a row sportswomen for the national team.

The team in research consists of 8 junior gymnasts, who activate at this club, with 3rd and 2nd classification category.

The experiment realized by using the biomechanical analyze method took place in the period 2006 – 2007 and consisted of video taping the technical elements realized simultaneously with the main action types at hoop and ball.

After the processing of the data obtained in 2-D, with the soft **Simi Motion**, we calculated and obtained values regarding: release high, release angle, speed, time and distance.

As outcome of the obtained data we conceived a means series to improve the technical execution of the elements under research, their rationalization and standardization and inclusion in the training process, as independent variable of the experiment.

After the experimental intervention (2007) it took place a new video taping of the technical combinations and the obtained data procession in 2-D.

The obtained data processing and analyze have been made at University „Albert Ludwigs” Freiburg – Germany, in GYMLAB – FIG Equipment Testing Laboratory, together with professor Ludwig Schweizer from Biomechanical Chair of the Institute and collaborator of the International Gymnastic Federation.

Research stages

The research took place in the period 2005 – 2008 and included the following stages:

First stage (year 2005) – within this stage we studied the specialty literature, we documented on the phenomena in research, we established the purpose, the experimental team, we presented the hypothesis and selected the elements that have to be researched.

Second stage (year 2006 - 2007) – this stage consisted of:

- Video taping and data processing in 2-D of the technical combinations at hoop and ball:

Hoop: hoop release, forward rolling and taking over; back-rolling with forward „grand écart” equilibrium; hoop passing with „cosaque” jump.

Ball: ball release, rolling and taking over; ball rolling from the right arm to the left arm with „a la seconde” equilibrium; ball ricochet under the step jump;

Third stage (2008) – data registration and static - informatics processing; enunciation of conclusion and recommendations.

In order to improve the action technique of the apparatus, hoop and ball, we used in our research the biomechanical analyze method, using the specialized soft *Simi Motion*.

The exercise systems proposed for the experimental intervention have been rationalized and standardized by calculating the Spearman coefficient and those which proved a considerable correlation have been introduced as independent variable in the experiment.

As main operations in the hierarchy of the training means in Rhythmic Gymnastic we used their *rationalization* and *standardization*.

After the findings over a long period on the efficiency of the training means, in order to obtain a fast achievement of the sport performance at a high level, we draw the conclusion that many of the used exercises have a low compatibility level with the specific elements or procedures of Rhythmic Gymnastics.

The study regarded the technical preparation at the two apparatus in research (hoop and ball) and has been realized starting from the whole means inventory used in training, afterwards being established the real usability level of each action mean.

As support of this selection action we used the calculation of the „*Spearman*” (r) graded correlation coefficient having as starting point the analysis of the elements in the contest.

The exercise systems proposed for the experimental intervention that proved a considerable correlation have been introduced as independent variable in the experiment.

The yield of our intervention regarding the technical preparation at the two apparatus (hoop and ball), has been realized by the second test of the technical combination, applied after a training year and that took place in the same conditions as the first one.

Conclusions

The relation between the physical and technical preparation is an important indicator to determine the subsequent orientation of the training. Especially, it highlights the gaps between the two sectors of training; it explains rationally the involutions that affect both of them and that are often the basis of new strategies for training organization embraced to face these involutions.

This confirms that not only a permanent equilibrium between these two activity poles, equilibrium obtained through continual re-adaptations, can give a concrete efficiency to the training process.

- Following the calculation and interpretation of the „t” Student test we can remark as follows: at the 8 physical preparation tests the values of the „t” Student test are among - 37.49 and 17.58 and the technical preparation tests (8) have values between – 22.53 and – 6.24, at a signification scale $p < 0.001$.
- These values indicate that there are significant differences between the two measurements, in the sense that at the final testing the results are significantly higher compared with the results obtained at the initial testing.
- After the transformation of the obtained values in points, on a scale from 0 – 20, we compared the averages at the final testing of the 8 physical tests with the averages at the final testing of the 8 technical tests, obtaining the „t” test value of – 4.114, with a signification scale $p < 0.001$.
- This value indicates that the physical preparation means significantly influenced the technical preparation at the two apparatus under research, ***confirming in this way the research hypothesis.***

The originality of this theme consisted of the *biometrical analysis in two dimensions* of the technical elements, at junior level and the *rationalization and standardization of the technical preparation means*, operation realized for the first time in Rhythmic Gymnastics.

The improvement of the juniors teaching process in Rhythmic Gymnastic has been realized by optimizing the physical and technical preparation, in order to increase the performance capacity in a short time and to obtain notable results in competitions.

The researches permitted us to establish:

- Substantiation within specialty scientific limits of the concepts “biomechanical analysis”, “rationalization and standardization” and their inference in the teaching process in Rhythmic Gymnastic;
- Assignment of the specific methodological requests in Rhythmic Gymnastics at junior level;
- Screening and delimitation of exercise system for this preparation level and their application way in order to realize the proposed assignments.

After the obtained results interpretation, in order to confirm the research hypothesis, we present the formulated conclusions as follows:

- As rationalization and standardization action support of the means introduced in the experiment, stood the calculation of the „Spearman” (r) graded correlation coefficient, having as starting point the dynamic analysis of the elements in the contest.

After the obtained results, the means introduced as independent variable have proved a significant correlation with the value of the wished performance; so they had a positive coefficient value, between 0,810 and 0,977, value which is very near from the probabilistic possible maximum.

The rationalization and standardization of the means have been made in direct correlation with the tests and contest specificity, in order to orientate the training as exactly as possible and to obtain performances as soon as possible.

These operations led to the efficiency of the means applied in the training process at the two apparatus under research, and that is why we can sustain that according to the obtained results ***the second research hypothesis has been confirmed.***

- After the biomechanical analysis in two dimensions of the technical elements under research, we present the following conclusions:

By applying the biomechanical analyze method one can observe the progress realized in this period, as well as the earned time to realize the technical preparation at the two apparatus.

This method led to gymnasts' awareness regarding their own exercises, which induced a more real and correct self-appreciation.

Also it has been observed a positive attitude of the gymnasts, in the sense of eliminating the frustration about contest exercises appreciation and continuity in training.

Pursuant to the obtained results at the 6 technical elements within the research and the obtained marks, we can state that the means introduced by us in the experiment, after the biomechanical analysis in two dimensions, have proved their efficiency, fact that led the execution technique optimizing at the two apparatus, ***the third research hypothesis been confirmed in this way.***

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