Biological Perspectives in the Preparation of Basketball Students

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Abstract

Today's basketball involves superior manifestation of speed capacity, which implies consistent physical effort doubled by corresponding psychological effort. Therefore, besides the means of manifestation of general and specific speed, resistance and coordination in carrying actions, articular mobility and muscular fitness, and force in the context of these means, the necessity of developing 'ball sensing' is required, which secures catching and passing the ball, as well as the precision of finalizing actions. Today, general and specific physical preparation in the context of basketball training has a different distribution throughout preparation periods, corresponding to age intervals and competition levels.
Both general and specific physical preparation lay a foundation for obtaining athletic performance in basketball, being considered the starting point in approaching all elements of physical training. In order to obtain a more authentic analysis of the efficiency of implementing the physical preparation model for basketball players, applied within the didactic experiment, the main investigated area was the impact on the improvement of physical and morphofunctional development of the body as well as their level of specific and technical physical preparation. In the scientific endeavor, the obtained results were centralized within the two assessments (initial and final), charted and interpreted using the statistical mathematical method, more specifically the statistical indicators used in specialized literature: average, error and deviation, variability coefficient, and in order for the hypotheses to be confirmed the Student test has been calculated. Following the application of the experimental program, it has been noticed that the functional assay results both for the control group and experimental group participants are positive at the final testing, however the progress of the experimental group compared to the control group are relevant from a statistical-mathematical point of view, for a significance threshold of $p<0.05$ in four of the examinations (vital capacity, Lorenz resistance index, Ruffier test, Sargent test), and insignificant differences for BMI/Quetelet, demonstrating that the body's accommodation to effort is perfectible.

Keywords: basketball, students, biological perspectives

Introduction

Today's basketball involves superior manifestation of speed capacity, which implies consistent physical effort doubled by corresponding psychological effort. Therefore, besides the means of manifestation of general and specific speed, resistance and coordination in carrying actions, articular mobility and muscular fitness, and force in the context of these means, the necessity of developing 'ball sensing' is required, which secures catching and passing the ball, as well as the precision of finalizing actions.
Sport skills, reflected in the level of manifestation in technical and tactical individual or collective action development, turn out to be strongly linked to game play acceleration. In this context, besides general and specific physical training, special attention and continuous documentation are required, regarding game play and training. The permanent evolution of training sessions mandatorily influences the analysis and acquirement of the progressive traits of this endeavor.
Today, general and specific physical preparation in the context of basketball training has a different distribution throughout preparation periods, corresponding to age intervals and competition levels.
Both general and specific physical preparation lay a foundation for obtaining athletic performance in basketball, being considered the starting point in approaching all elements of physical training.

Research purpose

The purpose of this experimental research is the development and implementation of a general and specific physical training program for basketball players, based on exercise sets meant to improve the level of manifestation of conditional and coordinative capacities, and that of implementing technical methods specific to the basketball game meant to obtain superior performances in university level sports competitions.

At the same time, another aim is improving effort capacity correlated to body mass indices.

Research hypotheses

Approaching general and specific physical preparation from biological perspectives will lead to increased effort capacities of basketball players and therefore to enhanced athletic performances.
Selection of the content of physical preparation based on scientifically founded conclusions will lead to improved performance technique.

Targets and tasks

The main targets were:

-studying specialized literature;

-improving functional, morphologic and motor changes in the experimental group, necessary for obtaining superior university athletic performances;

-designing a training program with results collected from investigations based on particularizing the means in accordance with the level of general and specific physical training of the experimental group;

-verifying the content's validity.

The tasks we have settled were:

-formulating the working hypotheses;

-implementing, as a result of anterior objectives, the general and specific physical training program, over the course of an academic year of training for basketball players, from the university's representing team, as part of the experimental group, with the purpose of obtaining superior performances in university championships;

-determining additional tests besides the initial assessments deemed significant in this scientific endeavor;

-evaluating the level of general and specific physical preparation of basketball players in the experimental group, directly related to the objectives of training and participating in competitions, physical development and its link to body mass index, vital and effort capacity;

-collecting, sorting, analyzing and comparing data subsequent to initial and final testing of the participants;

-stating the conclusions regarding the experimental research;

-disseminating results.

Methods and techniques applied in the study

a. Experimental method

b. Testing method

c. Statistical mathematical method

d. Graphical and table method

Research data

In order to obtain a more authentic analysis of the efficiency of implementing the physical preparation model for basketball players, applied within the didactic experiment, the main investigated area was the impact on the improvement of physical and morphofunctional development of the body as well as their level of specific and technical physical preparation.

In the scientific endeavor, the obtained results were centralized within the two assessments (initial and final), charted and interpreted using the statistical mathematical method, more specifically the statistical indicators used in specialized literature: average, error and deviation, variability coefficient, and in order for the hypotheses to be confirmed the Student test has been calculated.

Moreover, a comparative analysis of the coefficients and athletic test has been applied within the two assessments.

In order to determine the level of general physical training of basketball players, measurements have been made using six dynamic examinations: 50m speed run, push-ups, chin-ups, raising stretched legs up to 90 degrees while suspended, extending the core while lying face down, and resistance running. Evaluating the students from both test groups (control and experimental) was done both previously and subsequent to the didactic experiment.

The experimental group performed the training based on the program and the preparation and competitive plans established by the coordinating teacher for the respective period, modifying the didactic strategy using means, exercises and technical tactical structures, directed towards developing the motor skills necessary for the basketball game and improving general effort capacity.

Results

Analysis of specific and general physical training coefficients of basketball players

Specific physical preparation for the basketball game represents the determining factor in winning a game or a university sports competition.

Sports training for general and specific physical preparation was given priority in the development of the training program for the students in the experimental group, by optimizing its corresponding content and technology, operationalizing and algorithmizing the means.

The preparation program model we proposed was implemented over the course of an academic year. We point out that the control group carried out the preparation under traditional models, without insisting predominantly on physical preparation training.

In order to evaluate the level of general and specific physical preparation in basketball players, we used five athletic tests: speed running 30 m/s, vertical/detent jump, half marathon, specific examination and free throws.

The students participating in the didactic experiment - both from the experimental and the control groups - scored a positive performance dynamic, with a higher frequency throughout the experimental group, according to the table above.

Anthropometric and physiological values have a particular importance in determining the effects of general and specific physical preparation on optimizing the morphofunctional capacity of the body of the basketball-practicing students. Comparing and reporting these values offers us the possibility of exerting a level of control regarding the preparation plan, reorientation and operationalizing the means of preparing in order to adapt this plan to the limitations and capacities of each student, thus targeting the final purpose, which is obtaining the anticipated dynamic performances.

In our attempt to precisely determine the efficiency of the specific physical preparation program of the students in the group undergoing the experiment lasting over the course of one competitive year, we used 5 functional coefficients approved by specialized researchers: vital capacity, body mass index (BMI) or Quetelet index, Lorentz index for the respiratory system, Ruffier test and Sargent test for the cardiovascular system.

In order to appreciate the influence level of motor skills on the level of technical preparation and vice versa, an analysis of the correlating links based on data obtained in the experimental group, by calculating the 'r' index was carried out.

Correlating links between physical and technical assessments demonstrate that development and improvement of physical qualities using technical and tactical structures specific to the basketball game within the training sessions, contributed to the development of motor indices, which furthermore influenced the superior manifestation of technical execution.

We can assume that motor skills are influenced by the means, technical tactical structures used for perfecting technical executions, as well as by somatic parameters.

Thus, somatic parameters influence technical execution and motor skills.

Conclusions

Following the application of the experimental program, it has been noticed that the functional assay results both for the control group and the experimental group participants are positive at the final testing; however, the progress of the experimental group compared to the control group are relevant from a statistical-mathematical point of view, for a significance threshold of $p<0.05$ in four of the examinations (vital capacity, Lorenz resistance index, Ruffier test, Sargent test), and insignificant differences for BMI/Quetelet, demonstrating that the body's accommodation to effort is perfectible.

The first hypothesis of the present experimental research is therefore validated, stating that the approach of general and specific physical preparation from biological perspectives will lead to the enhancement of effort capacity and subsequently of performance in university sport competitions in basketball players.

The efficiency of the experimental program is also demonstrated regarding the statistical coefficients reflecting the level of specific physical preparation tests.

The correlating links between physical and technical assessments demonstrate that development and improvement of physical qualities using technical and tactical structures specific to the basketball game within the training sessions, contributed to the development of motor indices, which furthermore influenced the superior manifestation of technical execution.

We can assume that motor skills are influenced by the means, technical tactical structures used for perfecting technical executions, as well as by somatic parameters.

The second hypothesis of the experimental research, stating that content selection of physical preparation based on scientifically founded conclusions will lead to an improvement in execution technique, is therefore confirmed.

References

Per-Olof Åstrand, Kaare Rodahl, Hans A. Dahl, Sigmund B. Stromme, (2003), *Textbook of Work Physiology: Physiological Bases of Exercise*, Fourth Editon, Human Kinetics, United States of America, pg. 237-313.

Platonov, V. N., (2015), *Periodizarea antrenamentului sportiv. Teoria generală şi aplicaţiile ei practice*, Editura Discobolul, Bucureşti.

Wasserman, K., (2002), *Cardiopulmonary exercise testing and cardiovascular health*, USA, Wiley-Blackwell, apud Cordun, Mariana, (2009) *Kinatropometrie*, Bucureşti, Editura CD Press, p. 307.

Weineck, J., (1994), *Entreinmento optimo*, Barcelona, Editorial Hispano Europea, S.A, p. 15.