

Improvement of physical preparedness of qualified volleyball players

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Abstract:

Systematic training by a rationally-developed program of physical training of qualified volleyball players with consideration to individual profiles and model parameters of physical preparedness can guarantee efficient development of adaptation processes and physical qualities. The aim of the paper is to define efficiency of improvement of physical preparedness of qualified volleyball players via application of multidirectional approaches to differentiation of their physical training. Results. Comparison of training influences of different methodologically-oriented programs of differentiated physical training of qualified volleyball players by 20 indices of physical preparedness throughout doubled macrocycle proves their different efficiency. The program of differentiated physical development of insufficiently developed physical qualities regarding individual profile of physical preparedness of each athlete caused more positive changes of physical preparedness of qualified volleyball players in 11,4% of cases. Throughout the first competition period of the doubled macrocycle, true positive changes ($p \leq 0,05-0,001$) occurred in three put of eleven indices of general physical preparedness with volleyball players EG-1, while with volleyball players EG-2 – in four out of eleven indices. At the level of special physical preparedness development with volleyball players EG-1, true ($p \leq 0,05-0,001$) results increased in eight out of nine indices, while with volleyball players EG-2, the results increased in seven out of nine indices. Throughout the second training period of the doubled macrocycle, true positive changes ($p \leq 0,05-0,001$) occurred in six out of eleven indices of general physical preparedness with volleyball players EG-1, while with volleyball players EG-2, true positive changes ($p \leq 0,001$) occurred only in one index. At the level of development of special physical preparedness, true results ($p \leq 0,05-0,001$) increased with athletes EG-1 in four out nine indices, while with athletes EG-2 – in three out of nine indices.

Key words: differentiation, programs, physical preparedness, qualified volleyball players, efficiency.

Introduction

Increase of competition in volleyball at national and international levels calls for further improvement of leading experience and general scientific substantiation of the system of volleyball players training. Appropriate level of physical preparedness is an important component of improvement of technical and tactical mastery of athletes during educational and training process as well as of increase of efficiency of competition activity. Only systematic training by a rationally-developed program of physical training of qualified volleyball players with consideration to individual profiles and model parameters of physical preparedness can provide efficient development of adaptation processes and physical qualities (Giatsis, 2003; Briskin, 2015, 2016; Karatnyk, 2015; Khimenes, 2016; Pityn, 2017; Sulyma, 2017).

In the process of studying the issue of training of qualified volleyball players, we have found out that appropriate level of development of physical qualities creates prerequisites for quality training and competition activity (Bishop, 2003; Duda, 2007; Burton, 2009; Giannousi, 2016). Numerous scientific works (Maffioletti, 2002; Giatsis, 2003, 2005; Hnatchuk, 2007) prove that structure and content of physical preparedness must correspond to the structure of competition activity. In 1980-1990s, a lot of researches (Black, 1999; Hnatchuk, 2007; Sheppard, 2007; Pereira, 2009; Pushparajan, 2010) were carried out, in which positive interrelation between the level of physical preparedness and efficiency of competition activity of qualified volleyball players was revealed. However, in late 90s significant changes and additions to regulations for volleyball competitions were made, which led to changes in the structure and content of competition activity. Moreover, we have not found works that substantiate physical training of qualified volleyball players with consideration to changes in the structure and contents of competition activity.

The aim of research is to define efficiency of improvement of physical preparedness of qualified volleyball players via application of various approaches to differentiation of their physical training.

Methods

Theoretical analysis and generalization (analysis of data taken from scientific and methodological literature, information from Internet, analysis of theoretical and empirical data); analysis of documents (analysis of competition reports, analysis of training plans in yearly macrocycle, analysis of curricula and plans for training of volleyball players in Children's and Youth Sports School of Olympic Reserve and Specialized Youth Sports Schools of Olympic Reserve); pedagogical observation (analysis of indices of physical preparedness of qualified volleyball players); pedagogical experiment (testing efficiency of the program of differentiated training of qualified volleyball players); methods of mathematical statistics (processing empirical data at different stages of research.)

Results

Comparative analysis of the development level of indices of general and special physical preparedness of volleyball players having different qualifications (major league of national championship, first-league leaders and outsiders) allowed revealing interrelations between efficiency of competition activity and level of physical qualities development as well as physical qualities that are core for qualified volleyball players. Also, peculiarities of the structure of physical preparedness of players at different positions have been determined (Pereira, 2009). The obtained scientific results prove the need to develop programs of physical training that would take into account structure and content of competition activity in modern volleyball, level of qualification and volleyball players' positions, individual profiles of players' physical preparedness and would be based on fundamental basics of theory of adaptation, theory of development of physical qualities and construction of structural units of training process (lessons, microcycles, mesocycles etc).

Differentiated development of athletes' physical qualities is one of topical methodological approaches to designing physical training of athletes (Basilchuk, 2004; Chichkan, 2004; Linets, 2005, 2017).

According to fundamental basis of the theory of development of athletes' physical qualities at the beginning stages of a multi-year training, preference should be given to complex physical training with the aim to provide all-round physical development and, when working with adult qualified athletes, to shift accents to oriented development of those physical qualities of an athlete that dominate in his/her physical preparedness. In other words, the aim is to develop athlete's primary physical qualities. It is considered that these physical qualities of a certain person have wider zone of adaptation, thus possibilities for their further development are more expressed. However, in a work by Basilchuk (2004) it has been proven that differentiated physical training that envisages combination of complex physical training (around 70% of overall time for physical training) and emphasized development of insufficiently developed physical qualities (around 30% of overall time for physical training) of each female athlete allows obtaining more expressed training effect (at identical workloads and intensity of training exercises) not only in the work with young athletes Chichkan (2004), Linets (2005, 2017) but also at training qualified female handball players. This prompted us to analyze the efficiency of programs of differentiated physical training of opposite methodological orientation.

In the theory and practice of training of qualified athletes, including qualified volleyball players, there are various approaches to the methods of development of physical qualities (Hnatchuk, 2007; Sheppard, 2007). Author's training program was developed with consideration to model characteristics of physical preparedness of volleyball players developed by us. Methodological base of programs of physical training of qualified volleyball players is combination of complex development of physical qualities and differentiated development of physical qualities of each player according to his/her individual profiles of physical preparedness. At the same time, two totally opposite methodological approaches were experimentally checked:

a) program 1 – combination of complex development of physical qualities that are important for modern volleyball – 70% of overall time for physical training of qualified volleyball players and emphasized development of insufficiently developed physical qualities (form of their manifestations) of a specific volleyball player (30% of overall time for physical training).

b) program 2 – combination of complex development of physical qualities that are important for modern volleyball – 70% of overall time for physical training of qualified volleyball players and emphasized development of their primary physical qualities (forms of their manifestation) of a specific volleyball players (30% of overall time for physical training).

Preparatory period starts a new cycle of volleyball players training. It is sometimes called a period of fundamental training. In this period, coaches build base for future sports achievements. That is why this period should be long-term, if possible. According to many specialists (Pereira, 2009; Karatnyk, 2015; Khimenes, 2016) the term and duration of the period is different. It depends on tasks of training, competition calendar, preparedness and qualification of athletes. For high-qualification teams, a term of around 2-2,5 months is optimal. Training workload throughout the period gradually increases. It reaches its highest peak in the middle part of the period and then gradually decreases, but intensity grows. Its tasks are: to bring athletes to the appropriate level of mastery and sports shape before competition starts; achieve better teamwork. Preparatory period ends before schedules games of the national championship.

The first preparatory period lasted 68 days and included three mesocycles. The first and the second mesocycles consisted of four microcycles, while the third mesocycle consisted of five microcycles. In the first

two mesocycles, volleyball players of both experimental groups had trainings in the mode of 4-day microcycles (3+1) – three days, 4 hours each; development training workload. The 4th day of the microcycle is rehabilitation (40-50 mins.) In the first three microcycles, workload increases on 15-20% in each following microcycle, compared to the previous one after mesocycle. The fourth microcycle is supportive.

General training period lasted 32 days; structural elements of the program; structure and content of training sessions in a microcycle.

First microcycle, first day – morning practice. Volleyball players of both experimental groups worked on their speed and speed endurance. First-day evening practice: differentiated development of physical qualities of every player according to individual profiles of physical preparedness. Second-day morning practice: athletes from both experimental groups worked on their strength and strength endurance. Second-day evening practice: volleyball players from both experimental groups worked on coordination qualities and flexibility. Third-day morning practice: differentiated development of physical qualities. Third-day evening practice: volleyball players from both experimental groups worked on general and strength endurance. Fourth-day morning practice: rehabilitation processes stimulation. All other microcycles in the first two mesocycles were built in the same way.

Third mesocycle formed a special training period. It lasted 36 days and consisted of five microcycles. First three microcycles included gradational increase of workload (15-20% more in each). The fourth one was supportive, while the fifth one - leading up to competition. In the third mesocycle, athletes trained in the mode of 6-day microcycles (6+1) – first two day 4 hours each, third day – 2 hours, fourth and fifth day – 4 hours each, sixth day – 2 hours, seventh day of the microcycle was rehabilitation.

First competition period consisted of one mesocycle – rehabilitation and supportive, which included eleven microcycles. During eight of these microcycles volleyball players trained in the mode of a 4-day microcycle (3+1), while during three of them – in the mode of a 6-day microcycle (6+1). Their duration and sequence depended on the calendar of the first leg of national championship.

The second stage of pedagogical experiment included two mesocycles. The first one consisted of four microcycles. The first and the second microcycles included gradational increase of workload (15-20% more in each); the third one was supportive; the fourth one was preparatory for the first leg.

Second mesocycle lasted throughout the entire competition period and consisted of ten microcycles. During eight of them volleyball players trained in the mode of a 4-day microcycle (3+1), while during two of them – in the mode of a 6-day microcycle (6+1). Practices by complex program of development of physical qualities lasted for 148 hours. Practices by differentiated program lasted for 62 hour.

For profound analysis and comparison of efficiency by methodological orientation of programs of physical training of volleyball players from teams of the same qualification level (major league Ukraine), we have conducted pedagogical experiment that was done in two stages. The first stage consisted on preparatory period (25.07 – 30.09) and competition period (1.10 – 18.12 (first leg of the national championship)). At this stage, volleyball players from the first experimental group trained by the program of physical training that envisaged combination of complex development of physical qualities (70% of overall time for physical training) and emphasized (30% of overall time for physical training) development of primary physical qualities of each volleyball player (those physical qualities, final testing indices of which for each player were over 0.5 of standard deviation from average group indices). Volleyball players from the second experimental group were also engaged in complex development of physical qualities (70% of overall time for physical training), while the remaining time was spent for emphasized development of insufficiently-developed physical qualities of each volleyball player (those physical qualities, final testing indices of which for each player were under 0.5 of standard deviation from average group indices).

Prior to cross-pedagogical experiment, we defined the level of physical preparedness of volleyball players from four teams. Using the method of random sampling, we divided them into two equal experimental groups: EG-1 – teams: “Novator”, Khmelnytskyi, n = 13 and “Budivelnik-Dynamo-Bukovyna”, Chernivtsi, n = 13; EG-2 – teams: “Fakel-NTUNG”, Ivano-Frankivsk, n = 13 and “Luchesk-Pidshypryk”, Lutsk, n = 13. By 18 indices of physical preparedness, differences between volleyball players from the given experimental groups were unreliable ($p > 0,05$). Volleyball players EG-1 showed better indices only in high jump from a 3-meter running start ($p \leq 0,05$), while volleyball players EG-2 showed better indices in reaction and decision making speed ($p \leq 0,05$).

Planning of training of qualified athletes must be done according to the principle of orientation on maximum achievements. Rational planning promotes meeting the goals, solution of current and perspective tasks of training of each player and team in general. Effectiveness of planning of the process of training of qualified volleyball players is directly dependent from objective information about the content of educational and training process and the level of general and special physical preparedness (Chichkan, 2004; Basilchuk, 2004; Linets, 2005, 2017; Hnatchuk, 2007; Khimenes 2016). The need to use such information is stipulated by the study of dynamics of the development level of individual physical qualities of athletes throughout a microcycle, its comparison with model parameters of physical preparedness, and defining, based on this, trends of further orientation of the training process. Comparison of different methodologically-oriented programs of differentiated

physical training of qualified volleyball players will allow studying their efficiency at different stage of a microcycle and in a micocycle as a whole.

The analysis of indices of physical preparedness of qualified volleyball players throughout the entire pedagogical experiment shows that effectiveness of different methodologically-oriented programs of physical education differed drastically.

Judging by the results of testing of general physical preparedness (1-11 test exercises), practices by the program of differentiated development of insufficiently-developed physical qualities of each athlete promoted more expressed increase of the level of training of volleyball players in 10 out of 11 (fig. 1). Only at the level of the development of explosive strength of leg muscles (5th test exercise), more expressed positive changes occurred as the result of the program of physical training with emphasized development of primary physical qualities.

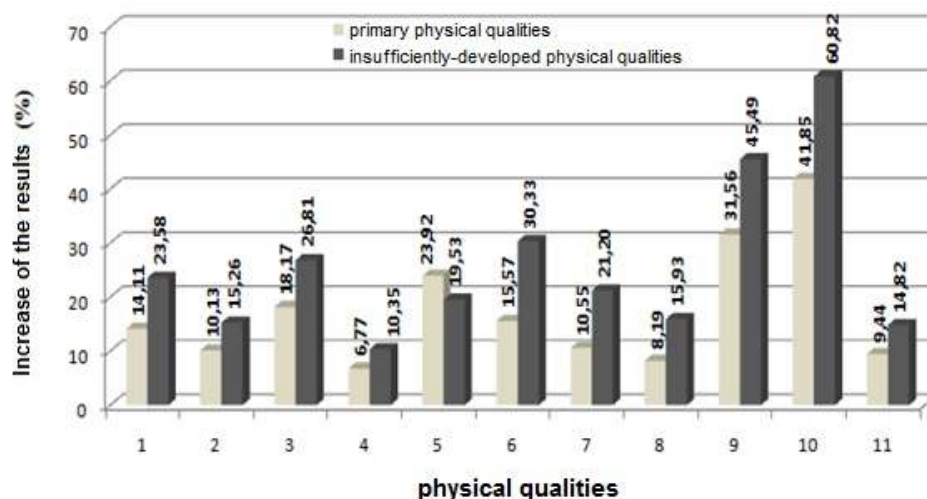


Fig. 1. The increase of the results of general physical preparedness of volleyball players throughout doubled macrocycle depending on orientation of the programs of differentiated development of physical qualities 1-wrist strength of the leading arm; 2-state strength; 3-time of simple reaction; 4-speed at 20-meter dash from high start; 5-explosive strength of leg muscles by Abalakov; 6-speed strength of belly muscles; 7-explosive strength of arms and body muscles; 8-agility; 9-static balance; 10-flexibility, sitting on the floor; 11-overall working capacity.

The analysis of indices of general physical preparedness of qualified volleyball players shows practices by the program of differentiated development of primary physical qualities the increase of the results throughout pedagogical experiment varied from 6.77% to 41.85%. However, practices by the program of differentiated development of insufficiently-developed physical qualities promoted 10.35% - 60.82% increase of indices of general physical preparedness.

The most positive changes of indices of general physical preparedness, regardless of methodological orientation of the programs, occurred in three stages of the development of mobility of femur joints (41.06% and 60.82%) and static balance (31.56% and 45.49%), which corresponds to literary data regarding reserves of adaptation to training influences of the development of these qualities. The least positive changes (6.77% and 10.35%) were observed in 20-meter dash running speed from high start. The obtained results are confirmed by numerous scientific works, namely that speed qualities are less prone to development than physical qualities (Lynets, 2005, 2017).

The results of testing of indices of special physical preparedness (12-20 test exercises) showed that practices by the program of differentiated development of insufficiently-developed physical qualities significantly dominated in 8 out of 9 indices over the same practices by the program of physical training with emphasized development of primary physical qualities (fig. 2). Only by index of special physical preparedness (maximum high jump from running start), practices by the program of differentiated development of primary physical qualities slightly dominated (0.38%).

As the results of pedagogical experiment regardless of methodological orientation of training programs show, the highest increase of the results of training occurred in the same indices of special physical preparedness, namely in accuracy of hit power reproduction, which constitutes 25% and 50% of maximum hit power (38.01% and 71.36% as well as 40.99%) as well as strength endurance (37.89% and 55.19%). As in the case of indices of general physical preparedness, the lowest increase of the results of special physical preparedness (6.07% and 12.85%) was observed at the level of speed qualities display (6-meter dash from high start).

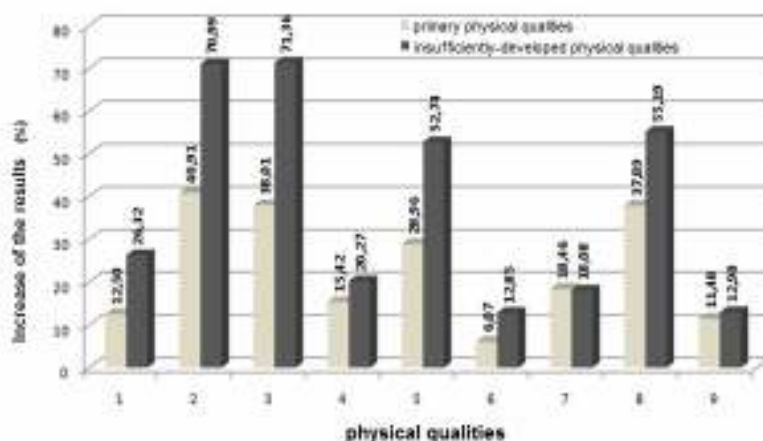


Fig. 2. The increase of the results of special physical preparedness of volleyball players throughout doubled macrocycle depending on the orientation of the programs of differentiated development of physical qualities 1-hitting power with a leading hand; 2-accuracy of hitting power reproduction, that constitutes 50%; 3- accuracy of hitting power reproduction, that constitutes 25%; 4-time of reaction and decision making; 5-time of reaction of a moving object; 6-speed at 6-meter dash from high start; 7-maximum high jump from a 3-meter running start; 8-strength endurance in high jumping; 9-speed endurance.

By other indices of special physical preparedness throughout pedagogical experiment, there were also some positive changes (6.07% and 71.36%). This is quite natural as special preparedness is characterized by the level of development of those physical qualities that are stipulated by the structure and content of competition activity in the respective spot.

Comparison of training influences of opposite methodologically oriented programs of differentiated physical training of qualified volleyball players by 20 indices of physical preparedness throughout doubled macrocycle show their different effectiveness. Thus, training by the program of differentiated physical training with emphasized development of insufficiently-developed physical qualities of each athlete promoted overall increase of physical preparedness (averaging 31.25%), while by the program of differentiated physical training with emphasized development of primary physical qualities of each athlete it increased only by 20.01%.

Hence, the program of differentiated physical development of insufficiently-developed, in terms of individual profile of physical preparedness of each athlete physical qualities caused 11.24% more positive changes of physical preparedness of qualified volleyball players throughout doubled macrocycle of their training, which proves their more expressed effectiveness.

Discussion

Practices by differentiated programs of physical training of qualified volleyball players, regardless of their orientation, promoted further true ($p \leq 0,05-0,001$) increase of the majority of indices of general and special physical preparedness. The overall average increase of physical preparedness at the second stage of cross pedagogical experiment, doubled macrocycle for qualified volleyball players EG-1 was 10.50%, while for athletes EG-2 it was 4.31%, which proves effectiveness of the proposed programs. It should be noted that the level of physical preparedness of qualified volleyball players increased ($p \leq 0,05-0,001$) both in preparatory and in competition periods, which gives reason to affirm rationality and balance of the proposed programs of physical preparedness and their organic combination with other kinds of preparation in the system of qualified volleyball players training.

At the same time, in the preparatory period, better increase of the results was observed at the level of development of indices of general physical preparedness, while in the competition period – indices of special physical preparedness, which can prove rationality and balance of the proposed programs of physical training and their organic combination with other kinds of preparation in the system of qualified volleyball players training.

However, average increase of physical preparedness at the second stage of cross pedagogical experiment (6.19% increase) was more expressed with athletes EG-1, training program of who envisaged combination of complex physical training (70% of overall time for physical training) and differentiated development of insufficiently-developed physical qualities of each volleyball player (30% of overall time for physical training).

Results of the research give reason to affirm that different methodologically-oriented programs of differentiated physical preparedness of qualified volleyball players promoted significant increase of their general and special physical preparedness. Regardless of training programs orientation, more expressed increases of training level were observed in the indices of special physical preparedness.

Results of the pedagogical experiment show that, regardless of the stage of the experiment and contingent under research, a better training effect (11.24%) was stimulated by differentiated physical training that combined complex development of physical qualities (70% of overall time for physical training) and emphasized (30% of overall time for physical training) development of insufficiently-developed physical qualities of each athlete.

Conclusions

Comparison of training influences of opposite methodologically-oriented programs of differentiated physical training of qualified volleyball players by 20 indices of physical preparedness throughout a doubled macrocycle proves their different effectiveness. The program of differentiated physical development of insufficiently-developed, in terms of individual profile of physical preparedness of each athlete, physical qualities caused 11.24% more positive changes of physical preparedness of qualified volleyball players.

Throughout the first competition period of a doubled macrocycle, true positive changes ($p \leq 0,05-0,001$) occurred in three out of eleven indices of general physical preparedness with volleyball players EG-1, while with volleyball players EG-2 – in four out of eleven indices. At the level of development of special physical preparedness of volleyball players EG-1, the results ($p \leq 0,05-0,001$) increased in eight out of nine indices, while with volleyball players EG-2 the results increased in seven out of nine indices.

Throughout the second preparatory period of a doubled macrocycle, true positive changes ($p \leq 0,05-0,001$) were observed in six out of eleven indices of general physical preparedness with volleyball players EG-1, while with volleyball players EG-2 true positive changes ($p \leq 0,001$) were observed only in one index. At the level of development of special physical preparedness of volleyball players EG-1, the results increased ($p \leq 0,05-0,001$) in four out of nine indices, while with volleyball players EG-2 – in three out of nine indices.

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