

Influence of motor coordination indicators on efficiency of game activity of volleyball players at the stage of specialized basic training

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Abstract.

The purpose of the research is to define influence of general coordination abilities' indicators on efficiency of game activity of 15-17 years old volleyball players.

Material: in a research 15-17 years old volleyball players participated (n=20).

Results: It is presented the correlation interrelations between indicators of coordination and technical and tactical training of volleyball players at the stage of specialized basic training. It is defined the training orientation priorities of influences of coordination orientation at different stages of long-term sports improvement in volleyball. It is found reliable positive interrelation between a total score of coordination training and efficiency of game activity of volleyball players. From 90 calculated correlations between indicators of the general coordination abilities and technical training investigated 19% of reliable interrelations. The reliable correlations formed practically all studied coordination abilities. It confirms existence of the mechanism of compensations in the course of motor coordination demonstration's by volleyball players' athletes.

Conclusions: technical and tactical skills don't directly depend on the only one coordination ability. It is defined by a combination of all or the majority of coordination abilities. The athletes with the highest level of coordination training demonstrate the best efficiency of game activity. The application of wide coordination training at the first two stages of long-term sports improvement is a necessary condition for the subsequent improvement technical and tactical skills of volleyball players.

Keywords: volleyball players, training, coordination, abilities, manner, correlation.

Introduction.

The high level of modern volleyball, escalating competition on the international level demand continuous improvement of educational and training process and identification of efficiency means of training increase of volleyball reserves (Rycarev, 2015; Zhelezniak, Portnov, & Savin, 2001). The direction of search of such means first of all is connected with the analysis of competitive activity of volleyball players that is the solution of complex coordination motor tasks in conditions that constantly change at hard deficiency of time. The wide range of factors which the progress of game activity depends on, predetermines special importance of improvement of adaptation mechanisms and reorganization of athlete's motility according to the requirements of a game situation (Deprez, Franssen, Lenoir, Philippaerts, & Vaeyens, 2015; Boichuk, Iermakov, Nosko, & Kovtsun, 2017; Kozina, Iermakov, Crețu, Kadutskaya, & Sobyenin, 2017). The complex structure of game actions in volleyball makes demands to improvement of motor skills of the athlete which depend on the level of coordination abilities' development (Nosko, Vlasenko, & Manievich, 2001; Doroshenko, 2013; Boichuk, Iermakov, & Nosko, 2017).

Liakh V.I. (2006) and Sadovskij E. (2003) recommend distinguishing:

- specific coordination abilities which characterize psycho-physiological functions which provide processes of motor coordination;
- general coordination abilities which determine the person training for management and regulation different by origin and contents by physical actions;
- special coordination abilities which characterize abilities to management and regulation by motor actions in the course of special competitive activity.

Today, proceeding from requirements of system consideration of the phenomena which are studied by experts of the theory and a technique of sport causes finding of interrelations between different parties of athletes' training (Pion et al., 2015; Arziutov, Iermakov, Bartik, Nosko, & Cynarski, 2016; Kozina et al., 2016). In particular, other authors (Zimmerman, 1988; Boichuk, 2010; Zerf, 2017) indicate mutual conditionality of

coordination, technical and tactical training of sport games' representatives. According to Bal'sevich V.K. (2009) and Liakh V.I. (2006) similarity of skills and special coordination abilities is that both one and others are according to representations (Bernshtejn, 1996) multilevel hierarchically organized structures of central nervous system. They provide together with sense and motor organs an optimal solution of motor task. However the skills are always connected with the solution of one concrete motor task and extends to the separate motor action (or its part). The coordination abilities on the contrary have more general character and act as the general coordination prerequisites of the solution of the whole and certain class of the motor tasks similar by the main neuro- and psycho-physiological mechanisms of management and regulation.

As other authors note ((Farfel', 2011; Gierczuk, & Sadowski, 2015) close interrelations of motor abilities, skills and coordination abilities, draw on activity of a functional complex of motor coordination. In particular, it is the general mechanisms of reception and processing of information, accumulation and realization of motor experience, elements of programming and mechanisms of correction and also the general performing components of coordination process.

In volleyball the value of technical and tactical skill especially increases at the stage of specialized basic training. The elder athletes have main special skills and adequately developed motor abilities. The young athletes of post-puberty age also demonstrate the subsequent increase in the level of coordination abilities' development (Zhelezniak, Portnov, & Savin, 2001; Liakh & Vitkovskij, 2010; Sogut, 2017).

It allows to claim that the problem of interrelation of coordination abilities and technical, tactical athletes-volleyball players in abilities at a stage of specialized basic training needs more detailed research. It will allow to define priorities of orientation of training influences of coordination orientation at different stages of long-term sports improvement.

Hypothesis. It is provided that definition of influence of indicators of the general coordination abilities of volleyball players of 15-17 years on efficiency of game activity will allow to determine the strategy of the choice of development tools of coordination abilities at different stages of long-term sports improvement.

The purpose of the research is to define influence of the general coordination abilities' indicators on efficiency of game activity of young volleyball players of 15-17 years.

Material and methods.

Participants. in an experiment volleyball players who are at a stage of specialized basic training participated (n=20, age – 15-17 years) participated.

Organization of the research. For evaluation of the general coordination abilities were used indicators of abilities to balance, a rhythm, reaction, kinesthetic differentiation, spatial orientation, coherence of motor actions and reorganization of different by origin motor actions. The corresponding tests were used for evaluation of the general coordination abilities of volleyball players (Boichuk, Iermakov, Nosko, & Kovtsun, 2017).

Expert assessment. The method was applied to determination the quality of performance by athletes the main techniques of volleyball in the course of competitive activity. The evaluation was carried out from 5 basic technical elements: serve a ball, spike, reception a ball after serving, blocking and a defensive play. The volleyball players played in several games at one of tournaments. The experts were two qualified professionals. The quality of performance by athletes of each technique was evaluated by experts in a five-point score.

The level of coordination abilities' interrelation with indicators of technical skill of young volleyball players was found on the basis of the correlation analysis where the following interrelations were analyzed:

- between separate indicators of coordination abilities and expert evaluation of each of five above-mentioned techniques of playing volleyball;
- between separate indicators of coordination abilities and an integrated indicator of efficiency of game activity of volleyball players;
- between the general level of coordination training and an integrated indicator of efficiency of game activity of volleyball players.

Statistical analysis. The obtained data were processed by means of the SPSS 17.0 program, the correlation analysis was used.

Results

It was considered 90 correlations between indicators of the different coordination abilities and technical training investigated the percent of reliable interrelations doesn't exceed 19%. In this case reliable correlations formed practically all studied coordination abilities. Probably it is connected with the fact that the highest level of technical and tactical training of players directly doesn't depend on the only one coordination ability. Technical and tactical skills defined by a combination of all, or majority of coordination abilities. Due to the mechanism of compensations insufficiently high level of development separate of them can be compensated by strength of others.

Analyzing the studied correlations we note the average level of interrelation (from $r=0,45$ to $r=0,53$, $p<0,05$) between efficiency of ball's reception after serve and abilities to reorganization of motor actions of a rhythm and an integrated indicator of coordination abilities (tab. 1).

Table 1. Interrelation of general coordination abilities' indicators, technical and tactical actions of volleyball players

Indicators of coordination training	Indicators of technical and tactical training					Effectiveness of play activity
	Ball reception	Attack	Defensive play	Blocking	Serve	
Ball throw to target with back pointed to the target (differentiation of motor parameters), quantity of hits	,270	,030	,270	-,009	,232	,192
Overstepping of gymnastic stick (motor coordination), sec.	-,007	-,070	-,064	,238	,119	,022
Test "ten eights" (motor coordination) sec.	-,343	-,173	-,394	-,219	-,152	-,389
Run to numbered balls (orientation), sec.	-,284	-,278	-,393	-,406	-,386	-,400
Difference between time of run to numbered balls and shuttle run 5×3 m (orientation), sec	,257	,027	,187	-,202	-,117	,092
Stance on one foot with closed eyes (static balance), sec	,192	,334	,279	,193	,271	,337
Rotations on gymnastic bench (dynamic balance), quantity of rotations	,335	-,038	,339	-,085	,091	,141
Run 3×10 m with back pointed forward, sec.	-,528	-,261	-,518	-,339	-,396	-,465
Correlation of 3×10 m run time (face and back forward) (reconstruction of movements), sec.	-,331	-,034	-,289	-,132	-,311	-,235
30 m run on hoops, sec	-,445	-,412	-,456	-,327	-,249	-,455
Difference of 30 m run and 30 meters' run on hoops, sec.	-,049	-,410	-,299	-,435	-,243	-,328
SVMR, m.sec.	-,132	-,139	-,243	0,09	,049	-,120
RCh1-3, m.sec	-,291	,501	,440	,495	,396	,465
RCh2-3, m.sec.	-,109	,164	,030	,178	,136	,057
Integral indicator of coordination abilities	,472	,195	,498	,209	,358	,401

Note: SVMR – simple visually quick reaction, RCh1-3 – choice reaction of one signal from three, RCh2-3 – choice reaction of two signals from three.

The reliable interrelation is found between efficiency of the attacking actions of volleyball players (from $r=0,41$ to $r=0,50$, $p<0,05$) and abilities' indicators to feeling of a rhythm and complex reaction. The average level of interrelation (from $r=0,40$ to $r=0,50$, $p<0,05$) is investigated between efficiency of blocking of volleyball players and indicators of spatial orientation and choice reaction. Close to significant certain interrelations (from $r=0,36$ to $r=0,40$, $p<0,05$) between efficiency of ball serve investigated and abilities to spatial orientation, reorganization of motor actions, choice reaction and an integrated indicator of coordination abilities.

Also, it was important to learn interrelations of separate indicators of coordination abilities and the generalized evaluation of technical training put down by experts. Materials of this analysis are given in tab. 1. In this case every fourth correlation was reliable. Special interest is attracted by result of interrelation between a total score of coordination and technical training. In this case the coefficient of correlation is reliable ($r=0,40$, $p<0,05$).

Discussion.

Trainers have to focus attention on those qualities, abilities and components of training which are directly connected with efficiency of game activity. As experts note (Zhelezniak, Portnov, & Savin, 2001; Raiola, 2012; Korobeynikov, Korobeynikova, Iermakov, & Nosko, 2016), at all levels of sports skill efficiency of competitive activity in sport games depends on different quantity of factors. The quantity of such factors extends with athletes' growing up. However the attention is focused on fundamental factors which define effectiveness of sports activity irrespective of age of players. The demonstration of different coordination abilities belongs to their number (Zimmerman, 1988; Boichuk, 2010; Pion et al., 2015). Specialists of this problem (Baginska, 2017; Kolumbet, 2017) note close interrelation between coordination abilities and technical and tactical skills and point that they are in one factor of athlete's achievements – "technique coordination". It is also consider as one of the main criteria which should be considered during selection of children and youth to sports games. Obtained data demonstrate that between separate indicators of the general coordination abilities

and indicators of technical training there are positive interrelations of the low and average level. It is established that between a total score of the general coordination abilities and efficiency of game activity there is a positive reliable interrelation. The value of coefficient of correlation is in limits 0,4. In actual practice it is possible to claim that athletes with the highest results in the general coordination abilities tests in 40% of cases demonstrate the highest effectiveness during game activity.

However, as some authors note (Sadovskij, 2003; Hirtz & Ludwig, 2009; Liakh & Vitkovskij, 2010), a training of coordination abilities at a stage of specialized basic training and the subsequent stages of long-term improvement will be effective only if it is carried out in the conditions of concrete sport. The matter is that with professional development of the athlete generalization and positive transfer in the sphere of abilities and skills decreases. The specificity, complexity and individualization in the choice of coordination exercises increases (Cazzola, Pavei, & Preatoni, 2016; Druz, Iermakov, Nosko, Shesterova, & Novitskaya; 2017). The general coordination exercises don't give that training effect which was at a stage of initial and previous basic training (Liakh & Vitkovskij, 2010).

Farfel' V.S. (2011) and Liakh V.I. (2006) point to especially rapid development of various coordination abilities in children from 7 to 11-12 years. The authors considered that in mentioned age there are exclusively favorable social, mentally intellectual, anatomo-physiological and motor prerequisites for fast improvement of coordination abilities.

Other authors (Khudolii, Iermakov, & Ananchenko, 2015; Platonov, 2015; Ivashchenko et al., 2017) pay special attention to need of use of large volume of all-coordination exercises at a stage of initial and previous basic training. It is necessary to create at young athletes the wide coordination basis, fund of various motor actions in muscular memory. This fund is saved up on thousands exercises which are demonstrated in cyclic and acyclic lokomotions, gymnastic and acrobatic exercises, throws on range and well-aimed, outdoor games, sports game. In the course of this process the training means were used. They were directed to improvement of abilities to connect together motor acts and to transform the developed forms of motor actions according to conditions. Also were systematically used the exercises of the general perception of motor actions in the form of sense of space, time, proportion of muscular efforts, sensomotor reactions, formation of language-cognitive and intellectual processes, motor memory and imagination of motor actions. It is excellent material for the subsequent successful technical and tactical improvement of athletes at the stage of specialized basic preparation. Pedagogical influences are aimed at the development of the general coordination abilities. They give the greatest effect if systematically and purposefully to carry out them at the first two stages of long-term improvement.

Other authors (Khudolii, Ivashchenko, Iermakov, & Rumba, 2016) recommend to use widely in training process of young athletes a method of the connected influence to simultaneous improvement of coordination abilities and technical and tactical skills. In practice the young athlete has the high level of development and master technique of motor action in standard conditions. But can't optimum apply them in variable situations. The positive interference (transfer) of one more integrated factor (abilities) can consider this phenomenon as result on another – less integrated (technique of a game) (Liakh, 2006; Zimmerman, 1988).

Other authors (Sadovskij, 2003; Liakh & Vitkovskij, 2010; Pion et al., 2015) prove that purposeful development and improvement of coordination abilities of young athletes will allow:

- to acquire much quicker and more rational the various physical actions;
- to acquire new programs at the more qualified level and to reconstruct old training programs;
- to move ahead to the heights of sports skill quicker and to remain longer in professional sports;
- to improve successfully the sports technique and tactics;
- to cope easier with tasks which demand high level of psychophysiological functions' development in the sensomotor and intellectual spheres;
- to acquire the skill to spend own energy resources rationally and economically;
- to adapt quicker to the new rivals, partners and conditions of competitive activity.

Conclusions.

1. It is revealed rather small amount of reliable interrelations between indicators of coordination abilities and technical and tactical readiness of volleyball players at the stage of specialized basic preparation.

2. Technical and tactical skills don't depend directly on the only one, even advanced coordination ability. The skills are defined by a combination of all or the majority of coordination abilities. At the same time, insufficiently high level of development of separate coordination abilities can be compensated by strength of others.

3. It is investigated that athletes with the highest level of coordination training demonstrate the best efficiency of game activity.

4. It is confirmed the expediency of wide coordination training's application at the first two stages of long-term sports training as necessary condition for the subsequent successful technical and tactical improvement.

Conflict of interests

The authors declare that there is no conflict of interests.

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