

INFLUENCE OF COORDINATION WORKOUT WITH FOCUS ON THE PHYSICAL ABILITIES OF ADOLESCENT VOLLEYBALL PLAYERS

Original scientific paper

Petar Kolev

Department "Sports games and Mountain sports", Department of Sports
University "St. Kliment Ohridski, Sofia, Bulgaria

Abstract

Volleyball is sport with high coordination demands in relation to motor activity of volleyball player. Typical for volleyball are the uniqueness of gaming situations and big time deficit. Meanwhile it is a sport that requires good physical condition for those who practice it needed for the effective implementation of game elements. This determines the need for high level of motor development, good coordination and physical skills to enable the athlete to perform fast and accurate response to ongoing changes in the gaming environment.

Keywords: locomotor coordination, motor tests, volleyball players, physical and coordination abilities, analysis of variance, Student's T-test

INTRODUCTION

In volleyball sport motor skills depend on complex physical attributes and functional abilities that clearly are shown during the game. The diversity of these qualities determines the success of locomotor activities, ensures correct decision making and selection of gaming maneuvers under different conditions and situations characterized by serious shortage of time.

Volleyball is a sport that places high demand in terms of coordination in relation to motor activity of volleyball player. Typical for the game are the uniqueness of gaming situations and big time deficit. Each situation itself is different from the preceding in spatial, temporal, spatio-temporal and dynamic characteristics [2]. For this reason the level of development of coordination abilities - CA is of great importance, enabling the athlete for fast and accurate response to changes in the environment. The ability to apply various high level technical means and rapid adaptation in intensive changing environment is a distinctive feature of competitors with well developed CA. Meanwhile volleyball is a sport that requires high level of physical training. The game has over a long period of time the elements of high overshoots, moving short distances at maximum speed, quick reactions to a moving object (ball, teammate, opponent) acrobatic landings [4]. Taking into account also the age aspects in the development of CA and physical abilities makes it clear that our sample age period is extremely important in terms of raising and preserving the high level of motor abilities of teenage volleyball players.

All said so far defines the goal of the study, i.e. to trace the extent to which training with coordinating orientation affects the improvement in physical skills of 13-15-year volleyball players.

METHODS

Object of the study is sports-pedagogical process for development of coordination abilities of 13-15-year volleyball players and its impact on the level of physical training.

Subject of the research are the physical abilities of boys at age range 13-15 years.

Scope of the study are 36 athletes from volleyball teams of Sofia University, "Slavia" and "Miner" teams from the town of Pernik (born in the period January 2000 - December 2001)

The survey was conducted from August to June of sports competition year 2014 - 2015.

Two groups were formed for the survey:

- Experimental group (EG) - 12 boys practicing in volleyball team at the Sofia University;

- Control group (CG) - 24 boys practicing in volleyball teams "Slavia" and "Miner".

In our work with adolescent volleyball players from the Experimental group we used the specially designed training program. It is based on development of coordination abilities of adolescent volleyball players, raising the level of motor skills and technical capabilities. Alongside with traditional methods we use techniques aiming the development and improvement of the CA.

Traditional methods were used to prepare the CG adolescents volleyball players tailored to their age specifics and methodology guidance programs for the training of the relevant age group.

Test battery of 8 indicators is used to establish the level of surveyed characteristics (Table 1.)

Table 1. Battery tests

Indicators	Mesuring units	Accuracy in measurement	Direction of Increase
1. Shuttle running 9-3-6-3-9	sec.	0,01	-
2. Speed 20 m.	sec.	0,01	-
3. Speed and agility	sec.	0,01	-
4. Long jump from place	m.	0,01	+
5. Vertical jump from place	cm.	1	+
6. Vertical jump with velocity (vertical flyer)	cm.	1	+
7. Solid ball throwing	m.	0,01	+
8. Flexibility	cm.	1	+

Two tests were conducted during the survey. The first is at the beginning of the experiment, in September 2014, and is aiming to define the input level of the examined indicators for technical training. The second testing was made in June 2015, aiming to determine the level of respondents' technical abilities at the end of the experiment and to track the positive changes.

The methods of research are:

- analysis of variance;
- benchmarking Student's T-test

RESULTS AN DISCUSSION

The indicators' results aimed to determine the level of physical abilities of volleyball players from EG and CG at the beginning of the study, obtained after applying the analysis of variance, are presented in Fig. 1. We can see that both groups showed similar mean values of results. The experimental group had better performance

results for indicators 1, 2 and 7, while the control group showed better results for indicators 3, 4, 5, 6 and 8.

The experimental group average indicator obtained for speed endurance (running shuttle 9/3/6/3/9) is 8.8 sec. which is higher achievement compared to the control group result of 9.18 sec. The average result for speed indicator of the experimental group is also better - 3.87 sec. (20 m. sprint) vs. 4.18 sec. for control group. The third indicator that the experimental group showed better average result at the beginning of the experiment is explosive power of the upper limbs - 5.5 m. vs. 5.27 m. for the control group.

For indicator 3 for agility the control group showed better initial result - 15,21 sec. against the result of the experimental group of 16.26 sec. Again better are the representatives of the control group for the three indicators of explosive power of lower limbs. Jump from place - 214.6 cm. for the control group and 210.08 cm. for the experimental. With small differences in the range 0.17 - 0.41 cm. the control group has higher results in vertical jump – both from place and with velocity. Average values shown are 43.66 cm. and 48.67 cm. (CG) and 43.25 cm. and 48.5 cm (EG).

Flexibility is of big importance for the high level of mastering of a number of elements of the game was again better developed for the representatives of the control group. The average value there is 4.79 cm. against 2.67 cm. in favor of CG.

When checking the statistical significance of differences in physical abilities indicators recognized prior to the experiment (the results are exported in Table 3.) by comparing the empirical values for t-test with critical value $\alpha = 2,03$ to this set of respondents we reach conclusion that values obtained for the t-criterion (Table 4.) are lower than the tabular value (ranging from 0.07 to 1.66). This gives us grounds for accepting the authenticity of H0 for lack of statistically significant differences between the two groups studied in the experiment. Only for the indicator for speed (sprint 20 meters) calculated temp. - 3.34 exceeds the critical value that leads to rejection of H0 and acceptance of the alternative hypothesis, according to which the observed differences in quality speed for the two groups were statistically significant in favor of the EG volleyball players.

Table 2. Comparative analysis of physical abilities' indicators for experimental group (EG) and control group (CG) before the experiment

Indicators	Groups	
	EG	CG
9/3/6/3/9/	8,8	9,18
20 meters	3,87	4,18
Speed and agility	16,26	15,21
Long jump	2,1	2,15
Jump from place	43,25	43,66
Jump with velocity	48,5	48,67
Solid ball	5,5	5,27
Flexibility	2,67	4,27

Table 3. Credibility of differences in average levels of both groups: experimental group (EG) and control group (CG) for physical abilities indicators

Indicators	EG			CG			D	T	P(t)
	n1	X1	S1	n2	X2	S2			
9/3/6/3/9/	12	8,8	0,46	24	9,18	0,73	0,38	1,66	89,3
20 meters	12	3,87	0,16	24	4,18	0,3	0,31	3,34	99,8
Speed and agility	12	16,26	1,24	24	15,21	1,98	1,05	1,67	89,6
Long jump	12	210,08	16,82	24	214,6	25,84	4,54	0,55	41,5
Jump from place	12	43,25	4,59	24	43,66	7,03	0,42	0,19	14,6
Jump with velocity	12	48,5	4,06	24	48,67	8,25	0,17	0,07	5,2
Solid ball	12	550,4	90,11	24	527,1	96,84	23,33	0,69	50,9
Flexibility	12	2,67	7,54	24	4,79	7,98	2,13	0,78	55,2

Table 4. Significance of differences between the average indicators levels of physical abilities before the experiment

Indicators	t-criterion
9/3/6/3/9/	1,66
20 meters	3,34
Speed and agility	1,67
Long jump	0,55
Jump from place	0,19
Jump with velocity	0,07
Solid ball	0,69
Flexibility	0,78
α	2,03

Table 5. Comparative analysis of physical abilities indicators after the experiment

Indicators	Groups	
	EG	CG
9/3/6/3/9/	8,39	8,96
20 meters	3,62	3,99
Speed and agility	13,92	14,46
Long jump	2,3	2,23
Jump from place	53,42	46,63
Jump with velocity	60,33	53,17
Solid ball	6,7	5,93
Flexibility	8,5	7,67

The indicators results for physical abilities of EG and CG recorded at the end of sports pedagogical experiment are presented in Table 5.

Different to the first testing in which only for three of the indicators examined where the EG had higher score, now we notice that in all eight criteria representatives of the EG have achieved better average results. Especially good results show for indicators explosive force of lower limbs, speed, agility and flexibility. This fact is of great value because of the exceptional importance of these qualities for the successful development of volleyball player.

The existence of differences between the average performance levels of physical ability is not sufficient for serious conclusions. It is necessary to check the statistical significance of these differences. The results from comparative Student's T-test for independent samples are presented in Table 6.

After comparing the values obtained for t-criteria of the various indicators critical to this set of respondents $\alpha = 2,03$ we notice that for three of those temps has lower values. In speed and agility test we have temp= 0,9, for explosive force (option long jump) temp= 0,85 and for the indicator flexibility temp= 0,32. For them we accept the null hypothesis and report that at the end of the study there are no significant differences in levels between the two groups (Table 7.).

Table 6. Reliability of differences in average levels of both groups in indicators of physical abilities at the end of the experiment

Indicators	EG			CG			D	T	P(t)
	n1	X1	S1	n2	X2	S2			
9/3/6/3/9/	12	8,39	0,33	24	8,96	0,69	-0,57	2,7	99,8
Speed 20 meters	12	3,62	0,16	24	3,99	0,35	-0,37	3,4	100
Speed and agility	12	13,92	0,97	24	14,46	1,93	-0,54	0,9	62,8
Long jump	12	229,6	16,74	24	222,9	24,5	6,7	0,85	60
Long jump from place	12	53,42	6,84	24	46,63	6,4	6,79	2,94	99,4
Jump with velocity	12	60,33	7,54	24	53,17	7,04	7,17	2,81	99,2
Solid ball	12	670,4	103,6	24	593,1	88,1	77,25	2,34	97,5
Flexibility	12	8,5	6,9	24	7,67	7,45	0,83	0,32	25,2

Table 7. Significance of differences in average levels in indicators of physical ability after the experiment

Indicators	t-criterion
9/3/6/3/9/	2,7
20 meters	3,4
Speed and agility	0,9
Long jump	0,85
Jump from place	2,94
Jump with velocity	2,81
Solid ball	2,34
Flexibility	0,32
t_{α}	2,03

For the remaining five indicators temps with values ranging from 2.34 to 3.4. These results lead us to conclusion that under the influence of experimental training program of EG volleyball players significantly increased the level of speed, speed endurance, explosive strength of upper and lower limbs.

Tables 2. and 5. show that the three indicators which do not report statistically significant difference between the EG and the CG at the end of the study, EG from lower average level in the first testing shows better results in the second one.

In order to follow up the effects of the training methods we used a comparative analysis of growth results (dEG and dCG) for these indicators. A comparative Student's T-test for independent samples with high probability warranty $P \geq 95\%$ was applied to establish the statistical significance of differences. The data obtained after processing of the results is presented in Table 8.

Table 8. Credibility of the differences in growth results for indicators of physical capacity for EG and CG

Indicators	d EG	d CG	Difference	T	P(t)
Speed and agility	-2,34	-0,75	1,58	3,75	99,9
Long jump	19,5	8,25	11,25	2,82	99,2
Flexibility	5,8	2,88	2,96	2,26	96,9

The table shows that all three indicators (speed and agility, long jump and flexibility) despite the lack of statistically significant differences in average levels at the end of the period between the EG and CG, we notice such in the impact of growth changes of these indicators. The values obtained for the temp is higher than the critical of the surveyed population of people $t_{\alpha} = 2,03$ and are padded with high guaranteed probability $P > 95\%$. For them we accept the alternative hypothesis H1 for statistically significant differences in

the growth in relevant indicators due to the methodology and tools applied during the experiment.

CONCLUSIONS

- Training aimed at improving the coordination abilities of adolescent volleyball players positively influences and enhances their physical abilities;
- At the beginning of the study adolescent volleyball players from the EG showed a lower level of physical skills against the 5 indicators compared to CG;
- At the end of the study from 8 indicators aiming to assess physical abilities of adolescent volleyball players under the influence of experimental training program, EG has achieved statistically significant increase in 7 of them, just for one where this difference kept the same level for the entire period of study;
- The training methodology greatly influenced indicators for explosive force of lower limbs, speed, agility and flexibility.

REFERENCES

- Aladjov, K. (1992). Физическата подготовка на спортиста [Physical training of the sportsman. In Bulgarian.] София: Издат. къща АСТРА.
- Gigov, D. (1984). Волейбол [Volleyball. In Bulgarian.] София: МиФ.
- Gurev, A. (2010). Методика специалной физической подготовки для повышения координационных способностей и вестибулярной устойчивости волейболистов с учетом их морфофункциональных особенностей [Methodology of special physical training for increasing the coordination abilities and vestibular stability of volleyball players, taking into account their morphofunctional specifics. In Russian.] (Doctoral dissertation, Moscow State Academy of Physical Culture, Moscow) Москва: Изд. Малаховка.
- Клочков, Б. (2004). Волейбол [In Bulgarian.] София: Национална спортна академия.
- Лях, В.И. (2002). Спортивно-двигательные тесты для оценки специфических координационных способностей футболистов [Sports and activity tests for assessment of specific coordination abilities of football players. In Russian.] Теория и практика физической культуры, 78(8), 6-41.
- Лях, В.И. (2002) Специфические координационные способности как критерий прогнозирования спортивных достижений футболистов [Specific coordination abilities as criterion for predicting athletic achievements of football players. In Russian.] Теория и практика физической культуры, 78(4), 21 - 25.
- Рачев, Кр. (1998). Теория и методика на физическото възпитание, част 1, Общи основи на теорията на физическото възпитание [Theory and methods of physical education, part 1, Basics of physical education theory. In Bulgarian.] София: Национална спортна академия.
- Рачев, Кр. (1998). Теория и методика на физическото възпитание, част 2, Общи основи на теорията на физическото възпитание [Theory and methods of physical education, part 2, Basics of physical education theory. In Bulgarian.] София: Национална спортна академия.

Correspondence:

Petar Kolev

University of Sofia "St. Kliment Ohridski"

Department of Sports

Department "Sports games and Mountain sports

15 Tsar Osvoboditel Blvd., 1504 Sofia, Bulgaria

E-mail: kolev.pepi@gmail.com