

TRAINING EFFECTS ON GENERAL AND SPECIFIC MOTOR SKILLS ON FEMALE VOLLEYBALL PLAYERS 13-14 YEARS OLD

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SHORT SCIENTIFIC PAPER

UDC: 796.325.012.1-055.2

doi: 10.5550/sgia.130902.en.007N

SUMMARY

The physical growth and development of motor skills, are important components that can be programmed to act physical exercise and training. The aim of this study is to present the impact of volleyball training at changing the general and specific motor abilities at female volleyball players 13-14 years old.

The sample represented 40 subjects, students at volleyball school "DIF" from Belgrade. In this study, the sample of variables is divided into two sub-samples (variable assessment of general motor skills and variables to assess specific skills in volleyball). On the first day, they made measurements of height and weight (in the gym) and conducted tests: long jump seats (SUD), easy to block (DUB), running at 20 m (TRC), and the second day were conducted in the remaining three tests (Russell Lang-test - fingers (RLTP), Russell Lang-test - "hammer" (RLTC) and service (RLTS)). Repeat testing (re-test) was carried out in three months.

Regarding the experimental factor that is active during the three months, it is important to mention that the trainings are held 4 times a week.

The results (applied comparative statistics and t-test for small dependent samples), indicating that there was a positive difference in all variables, three months after the programmed work, and particularly demonstrated statistical significance of the variable long jump places (SUD) and in all three specific abilities (RLTP, RLTC and RLTS).

The positive changes in the expression of general and specific abilities of volleyball players aged 13-14 years can be achieved only by well-programmed training sessions, conducted by trained specialists.

Key Words: female volleyball players, motor skills, training effects.

INTRODUCTION

Volleyball is very attractive, interesting, complex and dynamic sport, with a constant quick transfer of action from one half of the court to the other, in which the teams attempt to achieve victory by scoring a greater number of points, achieved by successful spikes and 'scheming' on the part of the opposing team. Physical development and improvement of motor skills are significant components that can be influenced through programmed physical practice (Bompa, 2005). Technical-tactical demands in large number of sport disciplines include frequent direction changes in frontal, and sagittal planes, as well as

different types of jumps, and among them jumps characteristic for certain sport discipline (Nešić, 2008). These features demand adequate preparedness, and high technical, and tactical ability, as well as basic, and specific physical ability, considering the large number of jumping techniques, in dependence of sport discipline specificity (Zatsiorsky & Kraemer, 2006). Modern volleyball shows an increasingly expressed connection with science, opening new paths and views on volleyball practice (Ivanović, Dopsaj, Nešić, & Stanković, 2010). Given the fact that basic volleyball elements include whole series of motorical actions in order for them to be performed right, at the same time efficient, it is understandable, and completely justified to expect

that training exercise conducted for the improvement of those elements will benefit the motorical skills as well (Nešić, Sikimić, Ilić, & Stojanović, 2011). Modern volleyball play demands the players to have a high level of general motor skills, as well as specific skills for volleyball play and certain player positions (Martinović et al., 2011). The players need to be prepared to perform each technical-tactical element perfectly. Maximum attention needs to be devoted to the phase of learning, adoption or perfect performance of these elements, so that they are performed in a proper, fast, strong, precise manner. Having in mind the gradual and metodical progress in training process, it is necessary to find the adequate “shortest route” from volleyball beginner to volleyball player who possesses the whole set of volleyball skills and knowledge which he can use (Jurko, Nešić, & Stojanović, 2013). Therefore, the phases of teaching the main elements of volleyball technique in junior competition categories (as well as volleyball schools), will never cease to be a primary imperative – an essential part in the process of “creating” a high-quality volleyball player (Nešić, 2005)!

The goal of this study is an overview and impact analysis of volleyball practice to the changes in some general and specific motor skills of female volleyball players aged 13-14, that is, whether a three-month volleyball technique practice would influence the alterations in observed variables.

METHODS

The research sample involved 40 examinees, attendants of volleyball school “DIF” from Belgrade. For the purpose of this research, the sample has been divided into two sub-samples (to monitor the variables for evaluation of general motor skills and variables for evaluation of specific skills in volleyball). The first day involved measuring of height and weight, upon which the following test were performed: standing long jump, block reach, 20 m running, and the second day involved the three remaining tests: Rassel-Lange test – overhand pass, Rassel-Lange test – underhand pass and Rassel-Lange test – serve.

The initial and final testing were performed through a battery of tests conducted on the attendants of volleyball school “DIF”, in the span of three months – by implementing the pre-test / post-test method. The results achieved through testing of general and specific motor skills were then further analyzed.

As for experimental treatment that lasted for three months, it is important to note that practice was held 4 times a week.

Testing procedure and the description of tests performed

On 1st and 2nd March 2013, from 10:00 to 13:00, the testing of motor skills of volleyball school “DIF” – Belgrade attendants was conducted (in the hall of the Faculty of Sports and Physical Education in Belgrade). The testing was performed through a battery of tests, with a 2-minute break between two obligatory attempts (better result being taken into account as final). The first day involved measuring of height and body weight and the tests in the following categories: standing long jump, block reach, 20 m running. The second day included the remaining three tests: Rassel-Lange test – overhand pass, Rassel-Lange test – underhand pass and Rassel-Lange test – serve.

On 1st and 2nd June 2013, from 10:00 to 13:00, in the hall of Faculty of Sports and Physical Education in Belgrade, the above mentioned tests were conducted again, in order to determine whether, and to what extent, there was a change in general and specific skills after three months of practice.

Before the testing, the examinees were measured height and body weight. This was followed by aerobic exercise and shaping exercise of moderate intensity, lasting 10 minutes. The testing was performed through a battery of tests:

Day 1

- Standing long jump;
- Block reach;
- 20 m running.

Day 2:

- Rassel-Lange test – overhand pass the wall;
- Rassel-Lange test – underhand pass the wall;
- Rassel-Lange test – serve (the number of successful serves).

For measuring anthropometric characteristics, the following instruments were used:

- Martin anthropometer
- a scale allowing measurement precision of 0.5 kg and allowing the option of regulating the pointer to zero position.

After measuring the height and body weight, the first day involved a battery of tests:

Standing long jump

Instruments: Flat, non-slippery surface with marked take-off point, the take-off area being at the same level as the landing area.

Task: Examinee jumps with both feet from behind the take-off line and lands as far as possible. The landing needs to be with both feet. The examinees

are entitled to two attempts. An improperly performed jump is repeated.

Evaluation: The point of measuring is the point of heel contact with the surface closest to the take-off line. The measurement value is 1 cm. The longest jump measured in cm is recorded.

Notes: The jump is performed with both legs taking off simultaneously. The examinees are allowed to raise on their toes before the take-off (Ivanić, 1988).

Block reach

Instruments: Volleyball net, height indicator.

Task: The starting position is standing, with feet spread shoulder width apart, arms in the block position. Examinee jumps with both feet taking off simultaneously, imitating hand block of a ball. The landing needs to be with both feet simultaneously as well. The examinees are entitled to two attempts.

Evaluation: The measured indicator is the height of reach. The measurement value is 1 cm. The highest jump measured in cm is recorded.

Notes: The jump is performed with both legs simultaneously. The examinees are allowed to raise on their toes before the take-off.

20 m running

Instruments: Whistle, stopwatch, two stands for marking the finish line.

Task: Examinee takes a standing start position behind the start line. The signal is only “set” and the whistle sound. Examinee runs towards the finish line. Two examinees run simultaneously. They have two attempts, and the better result is recorded.

Evaluation: The time from the sound of whistle to the point when the examinee crosses the vertical plane of the finish line with her chest. The time is measured in seconds.

Notes: The starter stands alongside the start line, and the time keeper is 5-7 m along side the finish line. The examinees should be instructed to run across the finish line in full speed.

On the second day, the remaining three tests are conducted:

Rassel-Lange volleyball test – overhand pass the wall

Instruments: Ball, whistle, stopwatch.

Task: Examinee is standing at a distance of 1 m from the wall. A line is drawn at the height of 2.28m. At a signal, she throws the ball against the wall and then sets the ball over the indicated line, with no breaks. The objective is to set the ball as many times as possible within the interval of 30 seconds. In case an examinee loses control over the ball, she returns to

the initial position. The marked line in front of the wall may not be crossed. She has the right to two attempts, better result is recorded.

Evaluation: The number of set balls is evaluated.

Notes: The time keeper stands next to the examinees all the time and encourages her to perform as many overhand pass as possible.

Rassel-Lange volleyball test – underhand pass the wall

Instruments: Ball, whistle, stopwatch.

Task: Examinee is standing at a distance of 1 m from the wall. A line is drawn at the height of 2.28m. At a signal, she throws the ball against the wall, and then digs it over the indicated line with no breaks. The objective is to dig the ball as many times as possible within the interval of 30 seconds. In case an examinee loses control over the ball, she returns to the initial position. The marked line in front of the wall may not be crossed. She has the right to two attempts, better result is recorded.

Evaluation: The number of dug balls is evaluated.

Notes: The timekeeper stands next to the examinee all the time and encourages her to perform as many underhand pass as possible.

Rassel-Lange volleyball test – serve (Figure 1)

Instruments: Ball, volleyball net, whistle.

Task: The test is conducted at a volleyball court. The examinees serve from one half, and the other half is marked in fields. Each examinee has the right to ten serves and tries to achieve a maximum sum of points, that is, as many successful serves as possible. She has the right to two attempts, and better result is recorded.

Evaluation: The number of successful serves is evaluated.

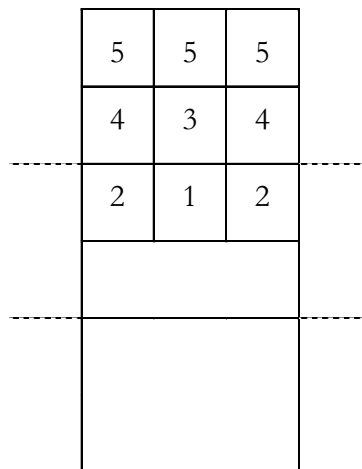
Notes: Overhand serve is used.

Experimental treatment

As for experimental treatment conducted during three months, it is important to note that the practice was held 4 times a week and they lasted for 90 minutes (Nešić, 2005). The practice was held on Wednesdays, Fridays, Saturdays and Sundays. As for the practice itself, it is important to stress that it mostly involved improvement of the adopted technique elements – through a wide range of exercises, and continued teaching of new elements of volleyball play. The practice largely focused on proper performance of volleyball technique elements, with correction of errors if necessary. In terms of targeted and specific (situational) exercises, they were slightly less

FIGURE 1

Rassel-Lange volleyball test – serve.



represented than those mentioned above – not meaning that this very important part of practice for competition age was treated to a significantly less extent. Volleyball school “DIF” orientation is that children should not be introduced in specialization too early (Kenny & Gregory, 2006).

Data processing

The data obtained through research will be analyzed

through processes of descriptive and comparative statistics. The data were analyzed using SPSS19.0 program.

In the area of comparative statistics, the research applied the T-test for small dependent samples – for evaluating the significance between average results acquired at the initial and final test for almost each variable (all variables from anthropometric area and all variables from morphological area).

TABLE 1

The program of training of volleyball school “DIF” - Belgrade.

	<ul style="list-style-type: none"> • Acrobatics, overhand pass, underhand pass. • Basic volleyball positions, overhand pass back, underhand pass back. • Running school, Underhand serve technique. • Rhythm and dance, The technique of standing float. • Acrobatics, overhand pass with movement, underhand pass with movement. • Basic volleyball positions, overhand and underhand pass overside. • Ball toss school, Combination of overhand and underhand pass. 	<p><u>Initial measurement:</u></p> <ul style="list-style-type: none"> • anthropometric characteristics • motor abilities
March	<ul style="list-style-type: none"> • Rhythm and dance, 6vs6 gameplay (introduction to game-rules, and 6:0 formation). • Acrobatics, Overhand pass forwards, underhand pass forwards. • Basic volleyball techniques poses, overhand backwards pass technique, underhand backwards pass. • Running school, Under-serve technique. • Rhythm and dance, Standing float serve technique. • Acrobatics, Overhand pass technique with movement, Underhand pass technique with movement. • Basic volleyball techniques poses, Overhand and underhand passing sideways. • Ball toss school, Overhand-underhand passing combinations. • Rhythm and dance, 6vs6 gameplay (introduction to game-rules, and 6:0 formation). 	
April	<ul style="list-style-type: none"> • Rhythm and dance, Spiking technique – coach holds the ball (zone 4, 3, 2). • Volleyball poses and positions, Standing float serve technique. • Running school, Repeating and underwriting all of the taught technique elements. • Rhythm and dance, Player positioning for 6:0 formation. • Acrobatics, Standing float serve technique. • Basic volleyball techniques poses, Under-serve and underhand reception technique. • Ball toss school, 6vs6 gameplay (introduction to game-rules, and 6:0 formation). 	

	<ul style="list-style-type: none"> • Rhythm and dance, Spiking technique – coach throws the ball (zone 4, 3, 2). • Acrobatics, Spiking technique – coach holds the ball (zone 4, 3, 2). • Volleyball poses and positions, Standing float serve technique. • Running school, Repeting and underwriting all of the taught technique elements. • Rhythm and dance, Player positioning for 6:0 gameplay formation. • Acrobatics, Standing float serve tehniqe. • Basic volleyball tehncis poses, Under-serve and underhand reception tehniqe. • Ball toss school, 6vs6 gameplay (introduction to game-rules, and 6:0 formation). • Rhythm and dance, Spiking technique – coach throws the ball (zone 4, 3, 2).
	<ul style="list-style-type: none"> • Acrobatics, 6vs6 gameplay (standing float and underhand serve, underhand reception, seting and attacking with overhand pass technique). • Volleyball poses and positions, Spiking technique – coach throws the ball (zone 4, 3, 2). • Running school, Individual blocking technique, sideways step. • Rhythm and dance, Underserve and standing float underhand reception. • Acrobatics, Individual blocking technique, sideways overstep. • Basic volleyball tehncis poses, Underserve and standing float overhand reception. • Ball toss school, 6vs6 gameplay (standing float and underhand serve, underhand reception, overhand seting and spiking).
May	<ul style="list-style-type: none"> • Rhythm and dance, Spiking technique – coach throws the ball (zone 4, 3, 2) • Acrobatics, Underhand defence tehniqe. • Basic volleyball tehncis poses, Individual blocking technique, sideways step and overstep. • Running school, 6vs6 gameplay (standing float and underhand serve, underhand reception, overhand seting and spiking). • Rhythm and dance, Standing float serve with aim (parallel, diagona). • Acrobatics, Spiking with aim (paralle, diagonal). • Volleyball poses and positions, 6vs6 gameplay (standing float serve, underhand reception, overhand seting and spiking). • Ball toss school, Two-player block tehniqe. • Rhythm and dance, 6vs6 gameplay (standing float serve, underhand reception, overhand seting and spiking).
	<u>Final measurement:</u>
Jun	<ul style="list-style-type: none"> • antropometric characteristics • motor abilities

RESULTS

Table 2 shows the main descriptive indicators of the tested girls, with data on age and basic morphological characteristics. Based on the results, it can be seen that the average height of examinees was 161.15 cm, the average body weight 49.63 kg, and the average BMI value 19.02 kg/cm².

Table 3. shows the main descriptive characteristics of explosiveness, speed and preciseness. It also shows the maximum and minimum values of test results, standard deviation results, coefficient of variation and average values.

Table 4 shows the results of main descriptive indicators of tested examinees, with the data on age and basic morphological characteristics. Based on the results after three months, it can be noted that there were no significant alterations in terms of height, body weight and BMI. Certainly, this fact is not determined by experiment, but it is the effect of growth factors.

Table 5 shows the main descriptive characteristics of explosiveness, speed and preciseness. It also shows the maximum and minimum values of test results, standard deviation results and average values.

DISCUSSION

Based on obtained results, it can be noted that, no significant alterations were seen in height, body weight and BMI (even though there was a minor increase of average value of body height and a decrease of average value of body weight and BMI). However, improvements (at varied degrees) were noted regarding general and specific motor skills after 3 months of volleyball practice.

As for general motor skills, the least improvement was noted at the “20m running” test. This comes as logical, because speed is a motor skill that is very difficult to improve, particularly at the age 13-14 – when the natural growth of speed skills is being finalized (Cole, Bellizzi, Flegal, & Dietz, 2000). Statistically, significant improvement was seen at the test

TABLE 2

The results of initial testing of main descriptive indicators of the tested examinees, with data on age and basic morphological characteristics.

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>cV%</i>
A	40	13.00	14.00	13.500	.513	3.80
BH	40	144.00	175.00	161.150	8.833	5.48
BM	40	33.00	65.00	49.625	8.547	17.22
BMI	40	15.07	24.14	19.040	2.292	12.04

Legend: **A** - Age; **BH** - Body High; **BM** - Body Mass; **BMI** - Body Mass Index; **N** - Total number of participants; **Min** - Minimum; **Max** - Maximum; **M** - Sample mean; **SD** - Standard deviation; **cV%** - % of coefficient of variation.

TABLE 3

The results of initial testing examinees– the data onevaluated motor skills.

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>cV%</i>
SLJ	40	160.00	190.00	176.750	8.472	4.79
BR	40	210.00	240.00	226.250	7.412	3.27
20R	40	4.00	5.00	4.530	.289	6.37
RLOP	40	22.00	30.00	27.050	2.724	10.07
RLUP	40	19.00	28.00	23.750	3.059	12.88
RLS	40	7.00	10.00	8.250	.967	11.72

Legend: **SLJ** - Standing long jump; **BR** - Block reach; **20R** - 20 m running; **RLOP** - Rassel-Lange test – overhand pass the wall; **RLUP** - Rassel-Lange test – underhand pass the wall; **RLUP** - Rassel-Lange test serve - the number of successful serves; **N** - Total number of participants; **Min** - Minimum; **Max** - Maximum; **M** - Sample mean; **SD** - Standard deviation; **cV%** - % of coefficient of variation.

TABLE 4

The results of main descriptive indicators of tested examinees, with data on age and basic morphological characteristics.

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>cV%</i>
A1	40	13.00	14.00	13.500	.513	3.79
BH1	40	145.00	176.00	161.950	8.982	5.54
BM1	40	33.00	64.00	48.800	8.340	17.09
BMI1	40	14.86	23.57	18.527	2.219	11.97

Legend: **A** - Age; **BH** - Body High; **BM** - Body Mass; **BMI** - Body Mass Index; **N** - Total number of participants; **Min** - Minimum; **Max** - Maximum; **M** - Sample mean; **SD** - Standard deviation; **cV%** - % of coefficient of variation.

“standing long jump”. In terms of “block reach” test, it was also determined that post-tests showed improved results – but the improvements were less significant (which can be explained with the fact that the methodology of teaching volleyball technique does not involve many exercises insisting on maximum

engagement of vertical component of speed power and leg extensor explosiveness – meaning that the practice does not include many vertical jumps – standing or running.

On the other hand, for specific motor skills, one may note that the post-test brought improved results

TABLE 5*The results of final testing – data on evaluated motoric variables.*

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>cV%</i>
SLJ1	40	170.00	200.00	184.750	8.347	4.52
BR1	40	210.00	245.00	229.750	8.347	3.63
20R1	40	4.00	4.90	4.450	.265	5.49
RLOP1	40	25.00	33.00	28.600	1.903	6.65
RLUP1	40	22.00	30.00	26.350	2.159	8.19
RLS1	40	7.00	10.00	8.850	.813	9.18

Legend: **SLJ** - Standing long jump; **BR** - Block reach; **20R** - 20 m running; **RLOP** - Rassel-Lange test – overhand pass the wall; **RLUP** - Rassel-Lange test – underhand pass the wall; **RLUP** - Rassel-Lange test serve - the number of successful serves; **N** - Total number of participants; **Min** - Minimum; **Max** - Maximum; **M** - Sample mean; **SD** - Standard deviation; **cV%** - % of coefficient of variation.

TABLE 6*The results of statistical difference (statistical significance) of tested examinees – comparison of initial and final testing and evaluation of morphological and motoric characteristics and skills (t-test for small dependent samples)*

	<i>t</i>	<i>df</i>	<i>p</i>
Pair 1	.498	39	.620
Pair 2	.190	39	.850
Pair 3	1.050	39	.300
Pair 4	-13.597	39	.000
Pair 5	-1.398	39	.170
Pair 6	.589	39	.560
Pair 7	-2.121	39	.040
Pair 8	-9.313	39	.000
Pair 9	-2.130	39	.040

Legend: **Pair 1** - Body height - Body height 1; **Pair 2** - Body mass - Body mass 1; **Pair 3** - BMI - BMI 1; **Pair 4** - Standig long jump - Standig long jump 1; **Pair 5** - Block reach - Block reach 1; **Pair 6** - 20 m running - 20 m running 1; **Pair 7** - Rassel-Lange test, overhand pass the wall - Rassel-Lange test, overhand pass the wall 1; **Pair 8** - Rassel-Lange test, underhand pass the wall - Rassel-Lange test, underhand pass the wall 1; **Pair 9** - Rassel-Lange test serve, the number of successful serves - Rassel-Lange test serve, the number of successful serves 1; **t** - Student's distribution; **df** - Degrees of freedom; **p** - Probability.

– at a more significant degree than with general motor skills. That is, the 3-month volleyball practice influenced the changes in observed variables, and statistical significance was determined in regards to specific motor skills tests, as well as the standing long jump test.

The results show that the applied model of volleyball practice dominantly influenced the specific motor skills, in comparison to general motor skills. The obtained results testify in favor of the applied model of volleyball practice to the educational component, as

opposed to the development component from the aspect of physical skills, which is consistent with the current theory of training methodology. The changes observed in the presentation of specific motor skills are the result of training program within the three months of practice performed on examinees. Namely, the practice program focused exclusively on the technique, that is, the specific motor skills, and therefore had to provide the above given results (Nešić, 2002). On the other hand, as for general motor skills tested, the long jump was the only indicator

that involved a significant difference – which can be interpreted as the product of movement and locomotion in the course of specific motor skills practice (Janković & Marelić, 1995). The movement and locomotion manifested hereby are in a horizontal plane, that is, they require sudden shifts of running direction and course (running forward-backward, sideways...). This is in line with the expression of agility, and certainly contributed to the development of leg extensor explosiveness – in terms of horizontal component, which is important for the result on standing long jump test in this case (Dopsaj, 1994; Milišić, 2003).

The results showed that, after three months of applied volleyball practice, there were certain improvements in the general and specific anthropometric skills tested. Certainly, one should take into account that it was not possible to form a control group, so for that reason, there is a possibility of certain error in the obtained result. In terms of height and body weight, there were no statistically significant changes during this period, therefore it can be considered that this error is negligible (meaning that the effect of maturation, as a measure of internal validity of statistical inference, was not significant).

CONCLUSION

This study involved a pre-test / post-test experimental research design, but without a control group. Based on the obtained results, it can be noted that both of the defined research hypotheses were confirmed. The results showed that, after three months of volleyball practice, there was certain improvement in the general and specific motor skills tested. Additionally, the results also showed that the impact of applied model of volleyball practice was more dominant in terms of specific motor skills, compared to the general. Pre-selection and selection make their full purpose only when they rely not only on the assessment of current characteristics and skills, but when they are observed and evaluated as part of estimation of development that should occur as a result of sports training process (Stojanović, Kostić, & Nešić, 2005, 2010).

Testing of motor skills is only an auxiliary information, which certainly cannot provide insight on the overall condition of trained skills, as practice is a much more complex skill development process – not only of physical skills, but their maximum application in specific competition circumstances (Zatsiorsky & Kraemer, 1995).

ACKNOWLEDGEMENTS

The study was developed within the project “The effects of applied physical activity on the locomotion,

metabolism, psycho-social and educational status of the population of the Republic of Serbia” classified under No. III47015, as part of sub-project “The effects of applied physical activity on the locomotion, metabolism, psycho-social and educational status of athletes population of the Republic of Serbia” financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia – The cycle of scientific projects 2011-2014.

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Received: November 1, 2013

Revision received: December 5, 2013

Accepted: December 13, 2013

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