Bulletin of the *Transilvania* University of Braşov
Series IX: Sciences of Human Kinetics • Vol. 11 (60) No. 1 - 2018

EVALUATION OF MOTOR DEVELOPMENT AND SKILLS IN MINI-VOLLEYBALL GAME (10-12 YEARS OLD)

I. S. SOPA[1] M. POMOHACI[1]

Abstract: *Our study focused on the efficient evaluation process of motor development, technical skills and anthropometric development of a mini-volleyball team. The research sample was composed of 22 players with aged between 10 and 12 years old that are registered at CSM Bucharest mini-volleyball team. The battery of anthropometric test evaluated the following indices: height, weight, the length of the superior members, the length of the inferior members, body mass index and wing span. The battery tests for motor and skills evaluation were composed from the following tests: T-test, Illinois test and some specific test for movement. The research results showed that our team had better performances in agility test and coordination test from the initial test compared with the final test and also we found that players developed their anthropometric parameters. Differences between the final and initial testing among pupils from the group were significant in all motor and anthropometric tests ($p < 0.05$).*
Conclusions have shown that the research hypothesis was valid, so we can say that inclusion of agility and coordination exercises in our programs can influence in a good way the student's motor performance at this age.

Key words: *agility, motor activities, motor evaluation, anthropometric measurement, physical development.*

1. Introduction

The characteristics of volleyball, including speed, jumping for spikes and blocks at high intensities over a short period of time result in fast and agile athletes who possess a high level of muscular strength and aerobic fitness [7]. Adolescents are selected for this sport based on their skills, performance levels, physique and muscular strength [2].

In this game it requires a periodic fast sprints and change of direction quickly and frequently. This study allows them to realize their potentials and also it benefits the beginners who can improve their fitness.

Therefore, the purpose of the study was to evaluate the speed and agility of our volleyball players. Some studies compared the indices of speed between handball and volleyball players and found out the

[1] University "Lucian Blaga" Sibiu.

intermittent characteristics that employ sprint speeds during attack and counterattack actions in the handball game, whereas volleyball generally uses reaction speed [1], [4], [8].

Volleyball is an intermittent sport that combines active and passive phases of play and requires players to compete in frequent short bouts of high-intensity exercise, followed by periods of low-intensity activity [3], [8]**.**

The most effective spike in volleyball is likely dependent on vertical jump height and the body position adopted before ball contact. Specifically, a high vertical jump in volleyball is a critical component in hitting and blocking [10]. Indeed, the vertical jump is a common tool used to assess explosive strength in volleyball athletes [5].

During volleyball competitive, players are involved in defensive and offensive jumping activities where power, strength, agility, and speed are required [9].

Practical activities of various sports, students can develop and harness the skills and their talent, ensuring also an ideal setting to strengthen the motor skills, the development of motor capacity, improving the major functions of the body [13].

During student activities life, motor activities have as the primary objective the continuous training and development of the youth [12].

The systematically and regularly practice of sports activities contributes to eliminating or reducing some deficiencies related to the somatic profile at the functional level of the body, supporting motivation for moving, controlling emotions, stress reduction, planning and organizing the work and leisure time activities, development of relationships, intra-group communication, and socialization improvement [12].

Assessing individual players during practice provides coaches with the information they need to make lineups, see the attack directions in practice, do special exercises for the attack directions of the own team, or even with basic information such as positive or negative attack points that each player has [14].

2. Objectives

The objectives of our investigation were to evaluate the motor and anthropometric development and to include in our investigation some agility and coordination exercises.

3. Materials and Methods

In our research we used as methods of scientific investigation the following materials and methods: the observation method and the experiment method (with somatic and anthropometric development).

4. Study Hypothesis

Using some specific volleyball tools for evaluation can offer us a complete picture of the development parameter of our team.

4.1. Student Samples

The experiment took place at the Gymnasium School Nr. 179, Sector 1 Bucharest on the mini-volleyball team of CSM Bucharest between 1 October 2016 and 1 September 2017. The group was formed from 20 male players that activates on CSM Bucharest at mini-volleyball level (11 ± 1.4 years old).

5. The Results of the Experiment

First step was to measure the anthropometric characteristics of our player. We can observe in Table No. 1 the results of the initial anthropometric evaluation at the following parameters: height, weight, bust, wing span, superior member length, inferior member length, thoracic perimeter and body mass index. And also we can see in Figure No. 1 the graphic interpretation of the initial anthropometric evaluation.

Data observed in the initial anthropometric evaluation

Anthropometric evaluation results – Initial test Table 1

Statistic indicators	Height	Weight	Bust	Wing Span	SML*	IML**	Thoracic perimeter	BMI
X	141.60	42.10	74.45	144.05	56.65	68.35	73.40	20.40
M_e	141.00	41.50	74.50	143.50	55.50	68.00	73.00	21.00
M_o	140.00	40.00	75.00	140.00	55.00	70.00	76.00	21.00
A_s	6.68	6.69	3.47	7.78	5.21	4.04	2.50	2.01
Var	44.57	44.73	12.05	60.47	27.19	16.34	6.25	4.04
A_m	30.00	27.00	12.00	33.00	20.00	15.00	8.00	9.00
Min	132.00	30.00	68.00	135.00	50.00	61.00	70.00	16.00
Max	162.00	57.00	80.00	168.00	70.00	76.00	78.00	25.00
C_v	0.05	0.16	0.05	0.05	0.09	0.06	0.03	0.10
Skewness	1.35	0.53	0.08	1.59	1.21	0.36	0.05	-0.14
Kurtosis	3.67	0.61	-0.72	3.75	1.79	-0.35	-1.19	1.13

*SML – superior limbs' length
**IML – inferior limbs' length

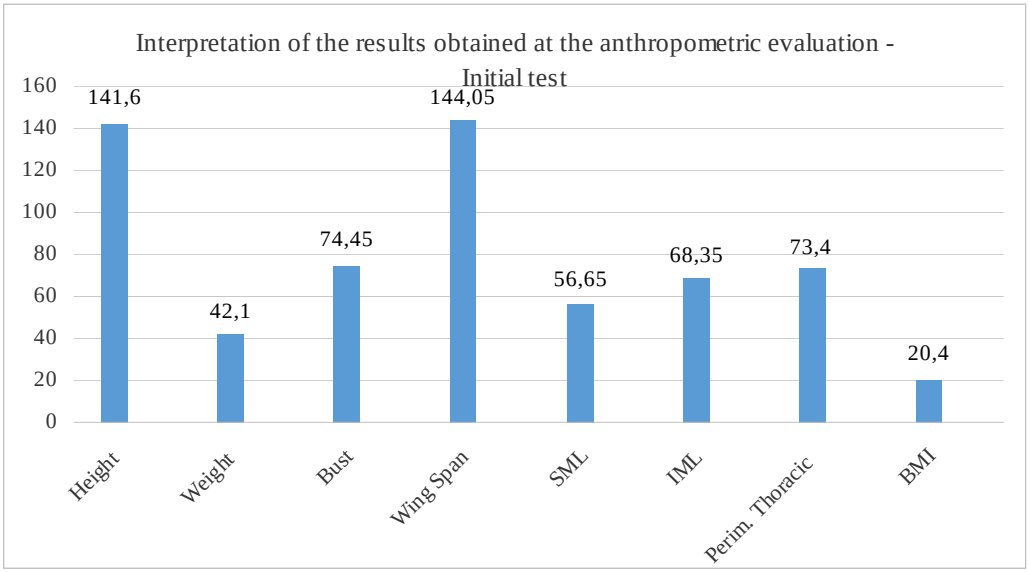

Fig. 1. *Interpretation of the results obtained at the anthropometric evaluation – Initial test*

Data observed in the initial motor evaluation

The next step was to evaluate our players at the motor skills. We used some specific agility test like Agility Illinois test, Agility T-test and Agility cone. Also we used the evaluation of static long jump, jump height, the speed of movement on 3 meters, 6 meters and 20 meters. The results found were then centralized in Table No. 2, and graphic illustrated in Figure No. 2.

Motor evaluation results – Initial test Table 2

Statistic indicators	Agility test Illinois	Agility T-test	Agility cone	Static long jump	Jump height	Speed movement on 10x3 m	Speed movement on 6x6 m	Speed movement on 20 m
X	21.15	15.10	11.30	145.80	35.20	12.20	16.40	5.20
M_e	21.00	15.00	11.00	142.00	35.00	12.00	16.50	5.00
M_o	21.00	15.00	11.00	150.00	35.00	12.00	17.00	5.00
A_s	1.53	0.97	1.22	10.53	5.33	1.40	1.67	1.01
Var	2.34	0.94	1.48	110.80	28.38	1.96	2.78	1.01
A_m	6.00	4.00	4.00	40.00	23.00	4.00	6.00	4.00
Min	19.00	13.00	10.00	135.00	30.00	10.00	14.00	4.00
Max	25.00	17.00	14.00	175.00	53.00	14.00	20.00	8.00
C_v	0.07	0.06	0.11	0.07	0.15	0.11	0.10	0.19
Skewness	0.99	-0.60	1.10	1.75	2.16	-0.14	0.72	1.28
Kurtosis	1.07	1.13	0.71	3.03	5.95	-1.09	0.47	2.23

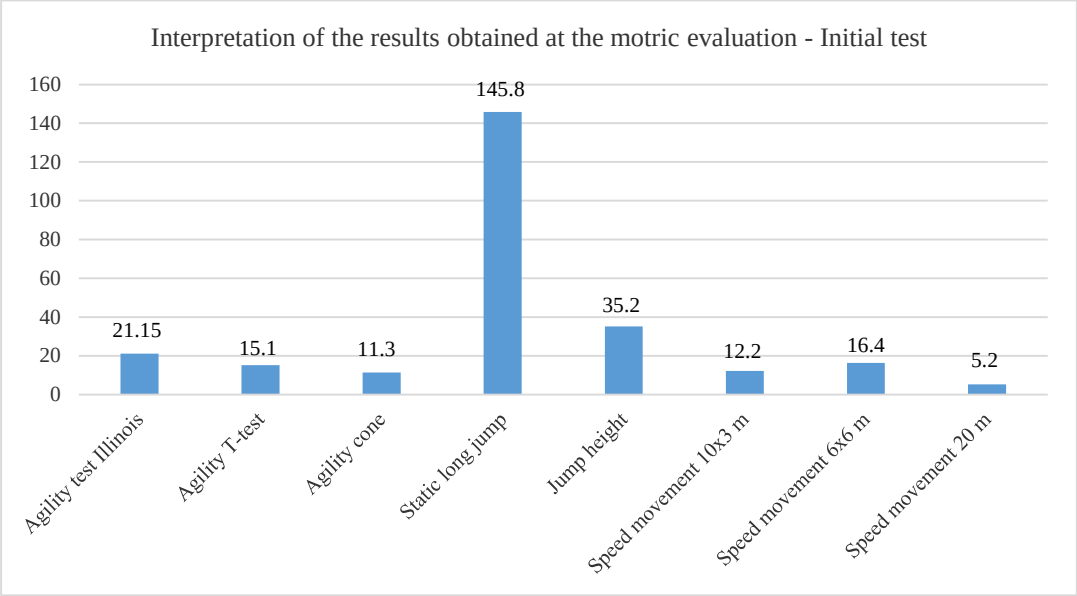

Fig. 2. *Interpretation of the results obtained at the motric evaluation – Initial test*

Data observed at the final anthropometric evaluation

After one year of trainings and special program with agility training we decided to take another evaluation and analyze the results. In Table No. 3 we registered the results at next indicators: height, weight, bust, wing span, superior member length, inferior member length, thoracic perimeter and body mass index. Also in Figure No. 3 we can see the graphic analyze of the final results.

Anthropometric evaluation results – Final test Table 3

Statistic indicators	Height	Weight	Bust	Wing Span	SML*	IML**	Thoracic perimeter	BMI
X	142.75	39.95	75.60	145.50	57.10	69.25	74.75	19.10
M_e	142.50	40.00	75.00	145.00	57.00	68.00	75.00	19.00
M_o	146.00	40.00	75.00	142.00	60.00	66.00	76.00	18.00
A_s	6.68	4.24	3.41	7.76	5.93	4.01	2.02	1.17
Var	44.62	17.94	11.62	60.26	35.15	16.09	4.09	1.36
A_m	30.00	16.00	12.00	34.00	26.00	15.00	7.00	4.00
Min	135.00	34.00	70.00	136.00	45.00	62.00	71.00	18.00
Max	165.00	50.00	82.00	170.00	71.00	77.00	78.00	22.00
C_v	0.05	0.11	0.05	0.05	0.10	0.06	0.03	0.06
Skewness	1.93	1.28	0.23	1.69	0.42	0.44	-0.60	0.90
Kurtosis	5.88	1.74	-0.62	4.38	1.06	-0.48	-0.53	0.33

*SML – superior members length **IML – inferior members length

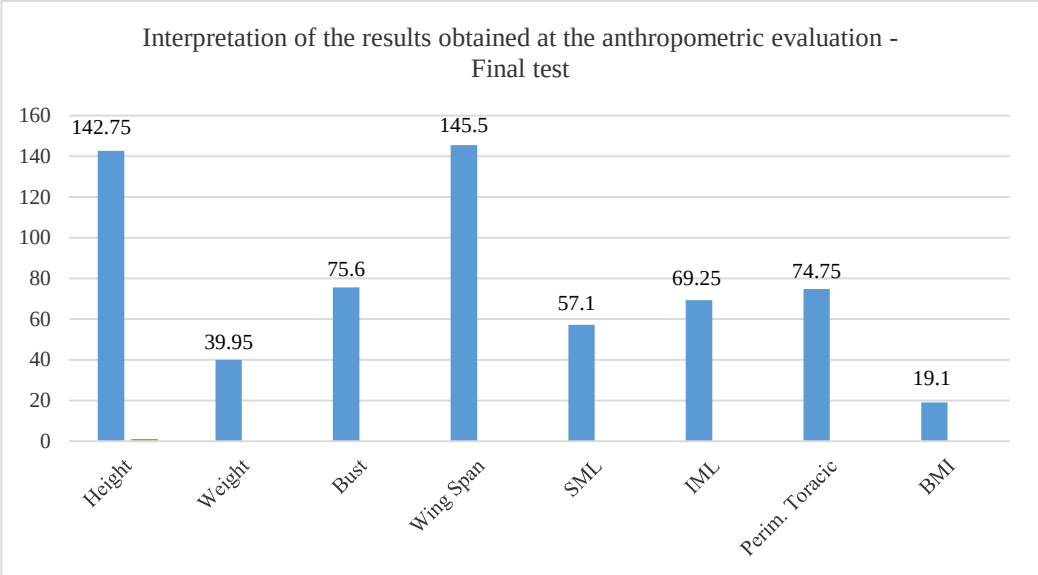

Fig. 3. *Interpretation of the results obtained at the anthropometric evaluation – Final test*

Data observed at the final motor evaluation

In Table No. 4 we can see the final results at the motor evaluation with the agility tests, test for jumping and speed. Also in Figure No. 4 we have the graphic analyze of the results.

Motor evaluation results – Final test Table 4

Statistic indicators	Agility test Illinois	Agility T-test	Agility cone	Static long jump	Jump height	Speed movement on 10x3 m	Speed movement on 6x6 m	Speed movement on 20 m
X	19.65	14.55	10.50	149.65	39.30	11.05	14.90	4.55
M_e	20.00	14.50	10.00	146.00	39.00	11.00	15.00	4.00
M_o	19.00	15.00	10.00	145.00	40.00	11.00	15.00	4.00
A_s	1.18	1.47	0.89	10.89	4.41	1.05	1.12	0.69
Var	1.40	2.16	0.79	118.66	19.48	1.10	1.25	0.47
A_m	5.00	7.00	3.00	40.00	20.00	4.00	5.00	2.00
Min	16.00	11.00	9.00	140.00	35.00	9.00	13.00	4.00
Max	21.00	18.00	12.00	180.00	55.00	13.00	18.00	6.00
C_v	0.06	0.10	0.08	0.07	0.11	0.10	0.08	0.15
Skewness	-1.35	0.11	0.25	1.92	2.42	0.19	0.72	0.89
Kurtosis	3.70	1.96	-0.50	3.50	8.36	-0.22	2.24	-0.24

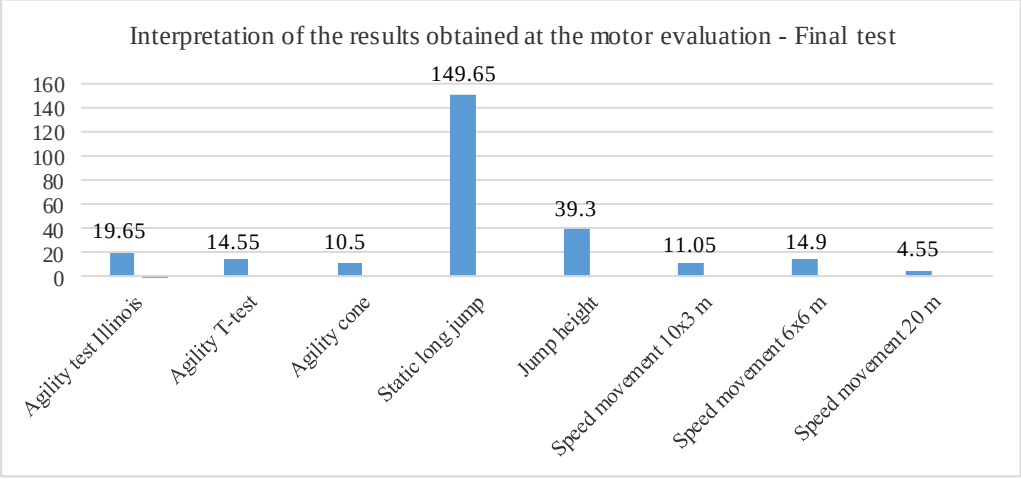

Fig. 4. *Interpretation of the results obtained at the motric evaluation – Final test*

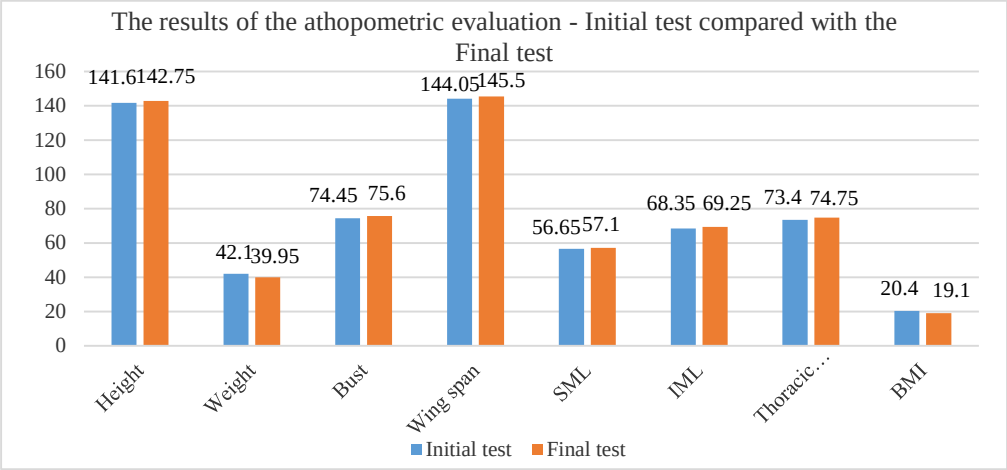

Fig. 5. *The results of the anthropometric evaluation – Initial test compared with Final test*

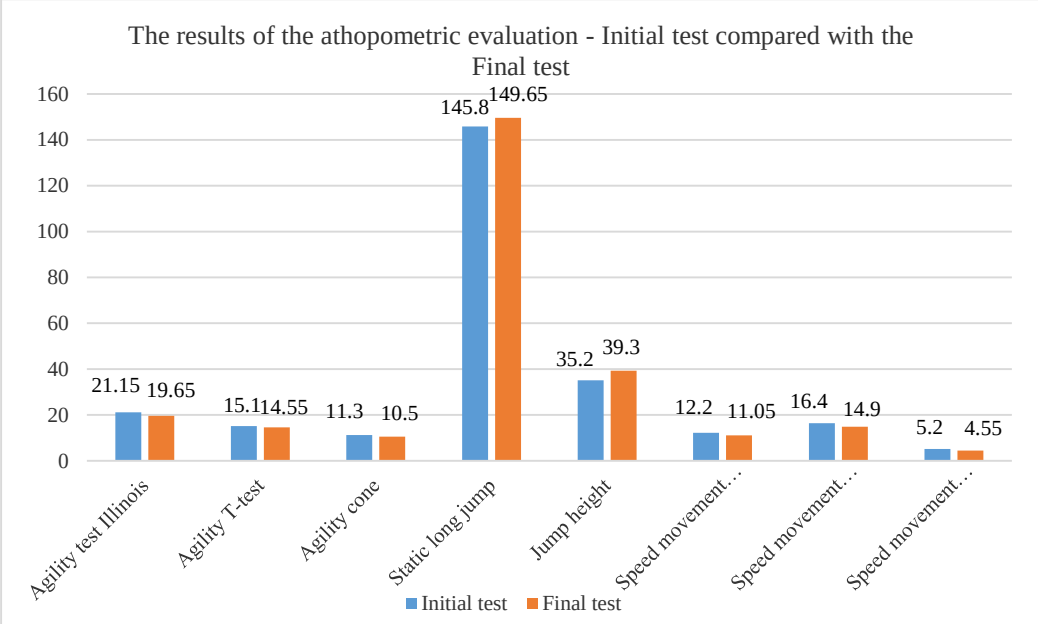

Fig. 6. *The results of the motor evaluation Initial test compared with Final test*

6. Discussions

In the next step we decided to analyze the differences between the two tests initial and final at the anthropometric and motor evaluation. In Figure No. 5 we find the graphic analyze for the anthropometric evaluation:

- at the indices “height”, we can observe a progress of 1.15 cm (141.6 cm at the initial evaluation and 142.75 cm at the final evaluation) with a growth rate of 0.80%; at the significance t-test we can see that the difference between tests was **insignificant with a t value of -1.28321 and a p value of 0.00001, p<0.05.**

- at the indices "weight", we can observe a progress of 2.15 kg (42.1 kg at the initial evaluation and 39.95 kg at the final evaluation) with a growth rate of 5.38%; at the significance t-test we can see that the difference between tests was **significant with a t value of -7.94069 and a p value of 0.00001, p<0.05.**

- at the indices "bust", we can observe a progress of 1.15 cm (74.45 cm at the initial evaluation and 75.6 cm at the final evaluation) with a growth rate of 1.52%; at the significance t-test we can see that the difference between tests was **insignificant with a t value of -8.13743 and a p value of 0.00001, p<0.05.**

- at the indices "wing span", we can observe a progress of 1.45 cm (144.05 cm at the initial evaluation and 145.5 cm at the final evaluation) with a growth rate of 0.99%; at the significance t-test we can see that the difference between tests was **significant with a t value of -3.27739 and a p value of 0.000976, p<0.05.**

- at the indices "superior member length", we can observe a progress of 0.45 cm (56.65 cm at the initial evaluation and 57.1 cm at the final evaluation) with a growth rate of 0.80%; at the significance t-test we can see that the difference between tests was **insignificant with a t value of 2.01631 and a p value of 0.00351, p<0.05.**

- at the indices "inferior member length", we can observe a progress of 0.90 cm (68.35 cm at the initial evaluation and 69.25 cm at the final evaluation) with a growth rate of 1.29%; at the significance t-test we can see that the difference between tests was **insignificant with a t value of 0.21401 and a p value of 0.00136, p<0.05.**

- at the indices "thoracic perimeter", we can observe a progress of 1.15 cm (73.4 cm at the initial evaluation and 74.75 cm at the final evaluation) with a growth rate of 0.80%; at the significance t-test we can see that the difference between tests was **significant with a t value of -1.69186 and a p value of 0.023259, p<0.05.**

- at the indices "body mass index", we can observe a progress of 1.30 points (20.4 points at the initial evaluation and 19.10 points at the final evaluation) with a growth rate of 6.81%; at the significance t-test we can see that the difference between tests was **significant with a t value of -3.24351 and a p value of 0.00001, p<0.05.** At the motor evaluation we can see in Figure No. 6 the differences between the initial and the final test at the following parameters:

At the motor evaluation we can see in Figure No. 6 the differences between the initial and the final test at the following parameters:

- at the indices "Agility Test Illinois" we can observe a progress of 1.50 seconds (21.15 seconds at the initial evaluation and 19.65 seconds at the final evaluation) with a growth rate of 7.63%; at the significance t-test we can see that the difference between tests was **significant with a t value of -1.61525 and a p value of 0.00365, p<0.05.**

- at the indices "Agility T-Test" we can observe a progress of 0.56 seconds (15.11 seconds at the initial evaluation and 14.55 seconds at the final evaluation) with a growth rate of 3.85%; at the significance t-test we can see that the difference between tests was **significant with a t value of 1.51215 and a p value of 0.037405, p<0.05.**

- at the indices "Agility Cone" we can observe a progress of 0.80 seconds (11.3 points at the initial evaluation and 10.5

points at the final evaluation) with a growth rate of 7.62%; at the significance t-test we can see that the difference between tests was **significant with a t value of 3.225706 and a p value of 0.00001, p<0.05.**

- at the indices "Static long jump" we can observe a progress of 3.85 cm (145.8 cm at the initial evaluation and 149.65 cm at the final evaluation) with a growth rate of 2.57%; at the significance t-test we can see that the difference between tests was **significant with a t value of -1.20021 and a p value of 0.03401, p<0.05.**

- at the indices "Jump height" we can observe a progress of 4.1 cm (35.2 cm at the initial evaluation and 39.3 cm at the final evaluation) with a growth rate of 10.43%; at the significance t-test we can see that the difference between tests was **significant with a t value of 3.58011 and a p value of 0.02250, p<0.05.**

- at the indices "Speed movement 10x3 m" we can observe a progress of 1.15 seconds (12.2 seconds at the initial evaluation and 11.05 seconds at the final evaluation) with a growth rate of 10.41%; at the significance t-test we can see that the difference between tests was **significant with a t value of 2.66308 and a p value of 0.02348, p<0.05.**

- at the indices "Speed movement 6x6 m" we can observe a progress of 1.50 seconds (16.4 seconds at the initial evaluation and 14.9 seconds at the final evaluation) with a growth rate of 10.07%; at the significance t-test we can see that the difference between tests was **significant with a t value of 1.20032 and a p value of 0.01156, p<0.05.**

- at the indices "Speed movement on 20 m" we can observe a progress of 0.67 seconds (5.2 seconds at the initial evaluation and 4.55 seconds at the final evaluation) with a growth rate of 4.73%; at the significance t-test we can see that the difference between tests was **insignificant with a t value of -1.348021 and a p value of 0.00001, p<0.05.**

References

1. Akilan, N., Mohd, S. S.: *Comparison of speed and agility between handball and volleyball players*. In: International Journal of Physical Education, Fitness and Sports, (2014), Vol. 3, No. 2, March. http://doi.org/10.26524/1415
2. Benetti, G., Schneider, P., Meyer, F.: *Sports benefits and the importance of muscular strength treinability in prepubertal volleyball athletes.* In: Rev Bras Cineantropom Desempenho Hum, (2005), 7: 87–93.
3. Borras, X., Balius, X., Drobnic, F., Galilea, P.: *Vertical jump assessment on volleyball: a follow-up of three seasons of a high-level volleyball team.* J Strength Cond Res, (2001), 25(6): 1686–1694.
4. Castagna, C., Dottavio, S., Granda Vera, J., Barbero Alvarez, J.C.: *Match demands of professional Futsal: A case study.* In: J Sci Med Sport, (2009), 12: 490–494.
5. Fry, A.C., Kraemer, W.J., Weseman, C.A., Conroy, B.P., Gordon, S.E., Hoffman, J.R., Maresh, C.M.: *The effects of an off-season strength and conditioning program on starters and non-starters in women's intercollgiate volleyball.* In: Journal Appl Sport Sci Res, (1991), 5: 174-181.
6. Gabbett, T., Georgieff, B., Domrow, N.: *The use of physiological, anthropometric, and skill data to predict selection in a talent-identified*

junior volleyball squad. J Sport Sci, (2007), 25 (12): 1337-44, DOI: 10.1080/02640410601188777

7. Gabbett, T. J., Sheppard, J. M., Pritchard-Peschek, K. R., Leveritt, M. D., Aldred, M. J.: *Influence of closed skill and open skill warm-ups on the performance of speed, change of direction speed, vertical jump, and reactive agility in team sport athletes.* In: J Strength Cond Res, (2008), 22: 1413–1415.
8. Gabbett, T., Georgieff, B.: *Anthropometric and physical characteristics allow differentiation of young female volleyball players according to playing position and level of expertise.* In: J Strength Cond Res, (2007), 21: 481-486.
9. González-Ravé, J.M, Arija, A., Clemente-Suarez, V.: *Season changes in jump performance and body composition in women volleyball players.* In: J Strength Cond Res, (2011), 25(6): 1492-1501.
10. Sahin, H.M.: *Relationships between acceleration, agility, and jumping ability in female volleyball players.* In: Journal of Experimental Biology, (2014), 4 (1): 303-308.
11. Sopa, I.S., Pomohaci, M.: *The importance of motor activities in promoting a healthy lifestyle with social, moral, formative and educational values.* In: "Mircea cel Bătrân" Naval Academy Scientific Bulletin, Volume XIX - Issue 2, Published by "Mircea cel Batran" Naval Academy Press, Sibiu, Romania, (2016): 522-528.
12. Sopa, I.S., Pomohaci, M.: *How important are motor activities in leaving a healthy lifestyle at students*, "Mircea cel Bătrân" Naval Academy Scientific Bulletin, Volume XIX - Issue 2, Published by "Mircea cel Bătrân" Naval Academy Press, Sibiu, Romania, (2016) : 514-521.
13. Sopa, I.S., Pomohaci, M.: *Study regarding the impact of motor activities over a healthy life of students.* In: "Mircea cel Bătrân" Naval Academy Scientific Bulletin, Volume XX - Issue 3, Published by "Mircea cel Batran" Naval Academy Press, Sibiu, Romania, (2017): 514-521;
14. Szabo, D. A., Sopa, I. S.: *Study on the Interpretation of the Results in a Volleyball Game by Using a Specific Program of Statistics*. In: Procedia Social and Behavioral Sciences, Elsevier Publication, ISSN: 1877-0428 Volume 180C, 5 May 2015, 1357-1363.