

Monitoring of School Wellness Based on the Effect of Volleyball Methodology

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Abstract: *Objective: The study aims to establish the effect of the innovative volleyball methodology and its influence on the motor development level of volleyball players actively practicing this approach. Methods: The research aims to establish the reasons for the change in the biomechanical motor indicators as a result of the applied volleyball methodology, based on benchmarking the biomechanical parameters to determine the effect of the volleyball methodology on the degree of development of the motor qualities. The study contingent consisted of 26 7th-grade girls aged 13-14, practicing volleyball at a metropolitan school. The present study was conducted during the 2023-24 school year. Results: The subject of research is the dynamics of biometric indicators in one school year. Discussion: Motor activity measurements were performed at the beginning of the study, before the implementation of the innovative volleyball methodology, and at the end after the implementation. Conclusion: The influence of active sports on the motor development of volleyball players has undoubtedly been established. Analyzing the research from the conducted diagnostics, during the study a comparative analysis of the biomechanical motor indicators in two cognitive stages of the studied period was carried out to establish the effect of the applied volleyball methodology.*

Keywords: Benchmarking analysis, biomechanical parameters, volleyball methodology

Ключови думи: анализ на бенчмаркинг, биомеханични параметри, волейболна методика



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INTRODUCTION

Biomechanics has an essential role in establishing the dynamics in the development of movements and their correct assimilation in the motor development of adolescents^{1,2,3,4}. By building motor stereotypes from an early age, biomechanics develops the motor potential of adolescents, directly influencing their motor development.^{5,6,7,8,9}

The regular practice of selected motor exercises with a volleyball orientation in the

¹Angelova & Ignatova 2024: 248-253.

²Angelova & Ignatova 2024a: 48-54.

³Dimitrova 2023: 21-25.

⁴Dimitrova 2024: 23-28.

⁵Dimitrova 2025: 92-98.

⁶Dimitrova 2025a: 24-30.

⁷Dimitrova et al. 2021:110.

⁸Ignatova 2023: 653-667.

⁹Ignatova 2023a: 17-22.

motor activity classes in the modern school aims to establish the degree of mastered knowledge and skills of motor training and to diagnose relevant dependencies between biomechanical parameters and the achieved results^{10,11,12}. In the present study, the effectiveness of the application of the volleyball methodology was established, based on tracked diagnostics in six specific volleyball motor tests^{13,14,15}.

METHODOLOGY

The Objective: The study aims to establish the effect of the applied innovative volleyball methodology and its influence on the motor development level of volleyball players actively practicing this methodology.

Specificity of the Methodology: The research on volleyball methodology includes specific motor complexes of volleyball-oriented exercises to improve the general fitness of students playing volleyball. The object of the study is to establish the effect of the applied innovative volleyball methodology and its influence on the motor development level of volleyball players actively practicing this methodology. The study contingent consisted of 26 students of a junior high school in Sofia, Bulgaria, who are girls aged 13-14 years old.

Expertise: For the study, training tests were conducted in six disciplines in physical education classes – Vertical jump from a standing position – cm; Vertical jumping after runout – cm; Shuttle running – sec; Long jump with two legs from a standing position – cm; Specific speed – sec and Sit-ups for 30 sec/pcs. The training in the subject of physical education and sports is based on the principles of diversity of sports-technical and tactical knowledge and skills, versatility, and harmony in the development of physical qualities and motor abilities. In modern conditions of urbanization, physical education and sports counteract neuro-psychological

tension and stress, providing mental relaxation and entertainment. The subject of physical education and sports has a responsible task to develop physical qualities and skills in students, strengthen health, and form a harmoniously developed personality. Physical education is an educational process that aims to form the student's motor skills, his mental and physical qualities, as well as to help him develop and shape his body.

Duration: The present study was conducted during the 2024-25 school year in the Metropolitan School during one academic year. The study started in September 2024 and ended in June 2025.

RESULTS

The following is a presentation of diagnostics of average values and variability in the results of volleyball players up to 14 years of age. From the presented empirical data, the following tables 1 and 2 present the results of the studied target group of volleyball players, providing information about the level of specific motor qualities. The first table shows the results at the beginning of the study, and the second shows the achievements at the end of the study.

The comparative analysis of biometric indicators is described as follows, using the following statistical values:

- n – number of students surveyed
- R – Range – the most basic measure of statistical dispersion. It represents the difference between the largest and smallest value of the variable. $R = X_{max} - X_{min}$
- $\bar{x}$ – Arithmetic mean – $\bar{x} = \frac{\sum x}{n}$
- S – Standard deviation – $S = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$
- V – Coefficient of variation – $v = \frac{s}{\bar{x}} \cdot 100$
- A_s – Asymmetry
- E_x – The height of the peak of the normal distribution

¹⁰ Ignatova 2023b: 583-590.

¹¹ Ignatova 2024: 15-23.

¹² Ignatova & Iliev 2023: 8-14.

¹³ Iliev 2009: 38-39.

¹⁴ Iliev 2016: 225-238.

¹⁵ Iliev et al. 2021: 01-08.

The information array of data obtained during the study was subjected to mathematical and statistical processing, performed with the SPSS 19.0 and Microsoft Excel programs.

The benchmark analysis from the conducted diagnostics is synthesized in the following two tables, respectively in the two cognitive stages of the conducted study.

Table 1. Analysis of variance – beginning.

Indicators	n	R	$X_{\min}$	$X_{\max}$	$\bar{x}$	S	V	A_s	E_x
Vertical jump from a standing position - cm	13	21	234	255	243,29	7,30	3,00	0,60	-1,27
Vertical jumping after runout - cm	13	30	245	275	257,86	9,41	3,65	0,46	-1,00
Shuttle running - sec	13	2,5	11,2	13,7	11,97	0,67	5,57	1,52	2,56
Long jump with two legs from a standing position - cm	13	55	150	205	180,07	12,48	6,93	-0,54	2,49
Specific speed - sec	13	8,6	19,2	27,8	22,14	2,13	9,61	1,37	3,01
Sit-ups for 30 sec/pcs	13	12	17	29	23,36	3,22	13,81	-0,33	-0,33

Table 2. Analysis of variance – end.

Indicators	n	R	$X_{\min}$	$X_{\max}$	$\bar{x}$	S	V	A_s	E_x
Vertical jump from a standing position - cm	13	24	234	258	244,71	7,51	3,07	0,54	-1,07
Vertical jumping after runout - cm	13	31	247	278	260,00	10,00	3,85	0,43	-1,05
Shuttle running - sec	13	2,8	10,8	13,6	11,54	0,75	6,53	1,82	3,70
Long jump with two legs from a standing position - cm	13	72	148	220	184,29	16,10	8,74	-0,09	2,48
Specific speed - sec	13	8,3	18,8	27,1	20,89	2,14	10,24	1,95	5,23
Sit-ups for 30 sec/pcs	13	10	20	30	26,14	3,28	12,54	-0,42	-1,14

The following is an interpretation of data from a benchmarking analysis of empirical values obtained during the study in the two

cognitive stages, establishing the effect of the applied volleyball methodology and its influence on the dynamics of biomechanical indicators.

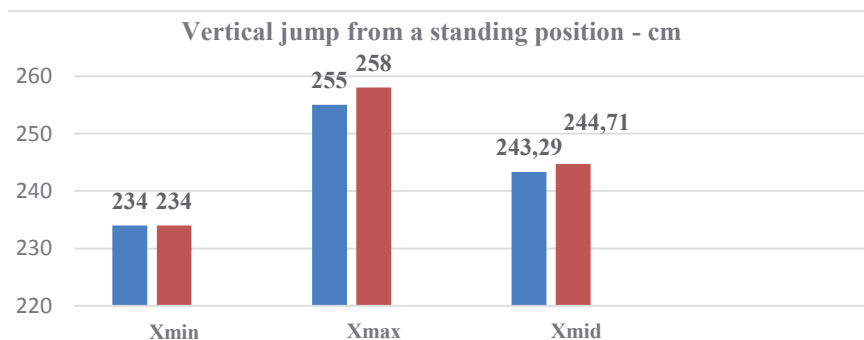


Figure 1. Vertical jump from a standing position – cm.

In the motor indicator: Vertical jump from a place it is seen that after the work is done the results are very slightly higher Figure 1. On average the target group improves its

achievements by 1.42 cm, as at the beginning $\bar{x}_1 = 243, 29$ cm, while $\bar{x}_2 = 244, 71$ cm. The maximum achievement in the first study is $X_{\max} = 255$ cm and in the second $X_{\max} = 258$ cm.

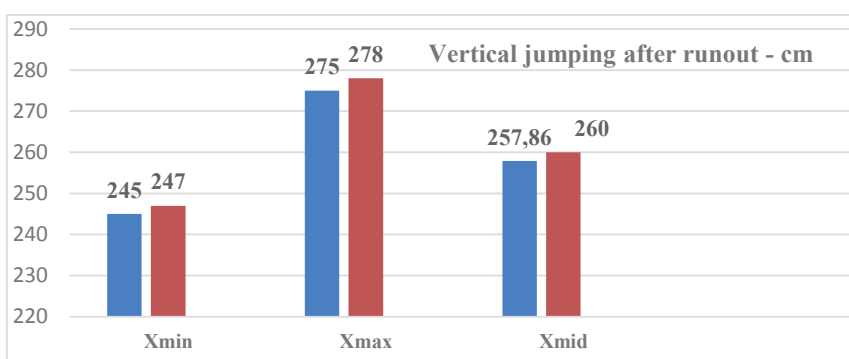


Figure 2. Vertical jumping after runout – cm.

The vertical jumping after runout has visibly increased. The results presented in Figure 2 show growth even at minimal values. The weakest achievement in the first test was 245 cm, and in the second it was 247 cm. The difference is 2 cm, which indicates a positive influence of the work done on the explosive power of the lower limbs of volleyball players. The average result at

the beginning is $\bar{x}_1 = 257,86$ cm, and at the end, it is $\bar{x}_2 = 260$ cm. The maximum measured height is $X_{\max} = 275$ cm in the first measurement and $X_{\max} = 278$ cm in the second. These two tests, specific to the game of volleyball, prove the positive effect of implementing the new volleyball methodology, which has a positive impact on the explosive strength of the lower limbs.

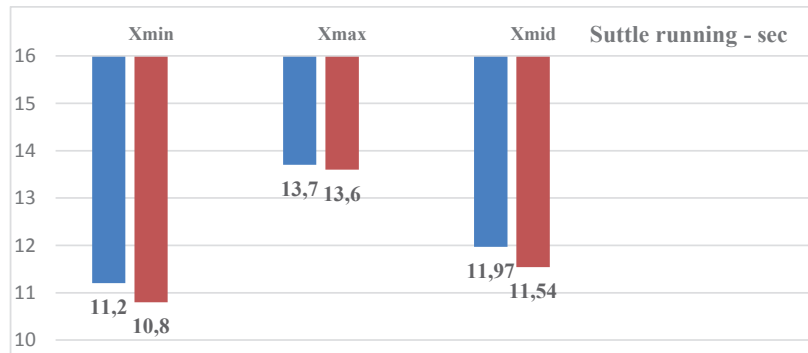


Figure 3. Shuttle running – sec.

The special speed-shuttle running of the studied athletes is also positively influenced by the training loads Figure 3. On average, the results of the special speed test show an improvement of 0.43 sec. In the first test, the

average value of the achievements is $\bar{x}_1 = 11,97$ sec., and in the second test, it is $\bar{x}_2 = 11,54$ sec. Under the influence of the volleyball methodology, a minimal increase is recorded in both the minimum and maximum results.

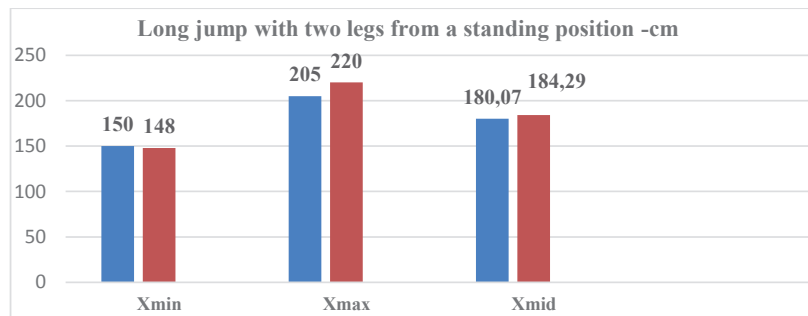


Figure 4. Long jump with two legs from a standing position – cm.

Figure 4 shows the data for the Long jump with two legs from a standing position. Positive results are observed between the mean values of the first and second tests. In the first

test, the mean value is $\bar{x}_1 = 180,07$ cm, and in the second test $\bar{x}_2 = 184,29$. The improvement is 4.24 cm, which is very good for the studied age group.

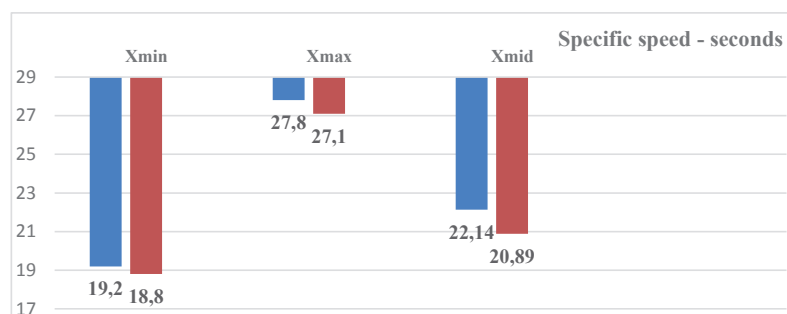


Figure 5. Specific speed – seconds.

In the study illustrated in Figure 5, it was measured using the specific speed test, calculating the sum of the three attempts of the volleyball players. It can be seen that the difference between the minimum and maximum values of the first and then the second

test is significant. The best achievement is 18.8 seconds, and the weakest is 27.1 seconds.

The targeted training process has almost no effect on this quality and at the end of the study it is seen that the minimum change in the average values is $\bar{x} = 1, 25$ sec.

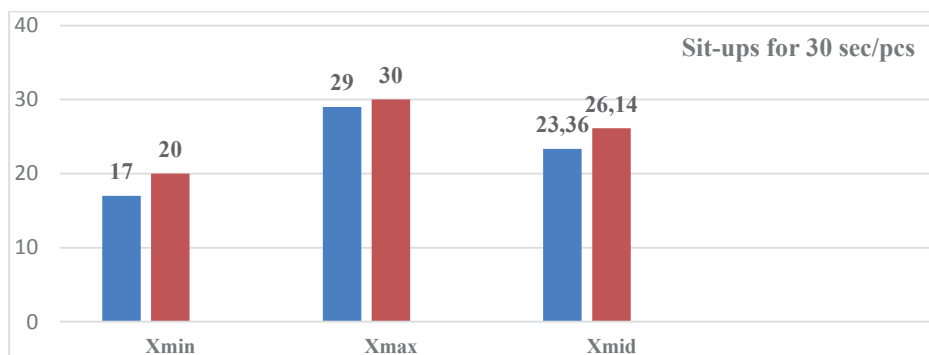


Figure 6. Sit-ups for 30 sec/pcs.

The last motor quality that is targeted in the diagnosis of motor preparation is the explosive strength of the abdominal muscles. Information about its level is provided by the motor test of the abdominal press for 30 seconds. In volleyball, it is an important factor in the performance of some of the main elements of the game, when performing a kick-off and a dunk.

In the initial study, the average value of the results in the motor test for the abdominal press for 30 seconds was 23.36 pcs. The minimum number of performed abdominal presses for the specified time was 17 pcs, and the maximum number was 29 pcs. After the end of the training cycle, the studied volleyball players showed significantly better results. The minimum number of abdominal presses was now $X_{\min} = 20$ pcs, and the maximum $X_{\max} = 30$ pcs, with the average value for the group being $\bar{x}_2 = 26, 14$ pcs. The data from the benchmarking of biomechanical parameters, conducted to establish the effect of the volleyball methodology, unequivocally show that the applied experimental new volleyball methodology has a positive impact on the development of motor skills, such as the explosive strength of the abdominal muscles.

DISCUSSION

The summarized results: The interpretation of the achieved baseline results for most of the biomechanical indicators shows improvement as a result of the applied volleyball methodology within one school year.

The results of the study and the analyses and summaries of the motor development of 7th-grade students give grounds to draw the following conclusions:

- The studied population is homogeneous in terms of physiological development and motor skills.
- The students perform the running technique very well and well.
- Difficulties are noted in the technical performance of a motor test: long jump from a place, as well as throwing a solid ball 3 kg. and 200 m. shuttle run.
- The studied contingent shows good results in the performance of the motor tests: 30 m. high-speed run and agility test T-test.
- At the beginning of the research period, girls practicing volleyball up to 14 years of age have homogeneous motor skills from the motor test standards.

The diagnostic study results:

❖ The analysis of the variance of the test battery results at the beginning of the experiment shows:

– Unsatisfactory results of volleyball players in the indicators - Vertical jump from a standing position $R = 21$ cm., Vertical jumping after runout $R = 30$ and Specific speed $R = 8.6$ sec.;

– Relatively satisfactory results in the indicators for assessing speed-strength endurance $R = 8.6$ sec., jumping endurance $R = 55$ cm, and abdominal muscle strength on test Sit-ups for 30 sec/pcs $R = 10$ pcs.

❖ The variation analysis and the volleyball players' results at the end of our study show a significant increase in the levels of the studied indicators:

– The following change in biomechanical indicators was noted at the end of the study - Vertical jump from a standing position $R = 24$ cm, Vertical jumping after runout $R = 31$ cm, and Specific speed $R = 8.3$ sec;

– The indicators for assessing speed-strength endurance $R = 8.3$ sec, jumping endurance $R = 72$ cm, and abdominal muscle strength on test Sit-ups for 30 sec/pcs $R = 12$ pcs. High results are Reported.

❖ The training activity carried out using applied volleyball methodology has a

positive effect, primarily on speed-strength and jumping endurance, special speed, and abdominal muscle strength. The impact on the explosive strength of the lower limbs, measured by jumping from a place after running, is also positive.

CONCLUSIONS

From the benchmarking diagnostic analysis of biomechanical parameters to establish the effect of volleyball methodology of the studies conducted so far, it can be concluded that despite the observed improvement in results, the athletes have not yet reached the required level of optimal motor development, which is a sufficient reason to continue the training process. The influence of active sports on the motor development of volleyball players has undoubtedly been established. Analyzing the research from the conducted diagnostics, during the study a benchmarking analysis of the biomechanical motor indicators in two cognitive stages of the studied period was carried out to establish the effect of the applied volleyball methodology. It is recommended that when working on the motor training of volleyball players up to fourteen years old, the time for developing explosive strength of the lower limbs should be gradually increased, at the expense of endurance.

BIBLIOGRAPHY

Angelova & Ignatova 2024: Angelova, Petya & Ignatova, Darinka. Applying the Borg's ratings of perceived exertion scale to assess motor development in online university learning. (2025). *Trakia Journal of Sciences*, 22(Supplement 1), 6. 248-253 <https://doi.org/10.15547/tjs.2024.s.01.036>

Angelova & Ignatova 2024a: Angelova, Petya & Ignatova, Darinka. Biomechanical sustainable trends in the dynamics of speed endurance indicators, Series on Biomechanics, Vol.38, No.3 (2024), 48-54, ISSN:1313-2458, DOI:10.7546/SB.06.03.2024 Scopus Q4 SJR 0,21 2023 http://jsb.imbm.bas.bg/page/en/details.php?article_id=791

Dimitrova 2023: Dimitrova, Bistra. The Economic Impact of Brain Drain on the

Development of Wellness and Spa Tourism in Bulgaria. *Trakia Journal of Sciences*, Vol. 21, Suppl. 3, 21-25, 2023, e-ISSN 1313-3551, <http://www.uni-sz.bg>

Dimitrova 2024: Dimitrova, Bistra. Sustainable quality of SPA programs through benchmarking the biomechanical profile of a new aqua spinning methodology. Series on Biomechanics, Vol.38, No.2, 23-28. DOI:10.7546/SB.03.02.2024

Dimitrova 2025: Dimitrova, Bistra. A Wellness lifestyle enhances emotional intelligence. International scientific conference. Expanding knowledge through interdisciplinary research. Sydney, Australia. 27-28.02.2025. Proceeding, 92-98.

Dimitrova 2025a: Dimitrova, Bistra. Niche tourism – innovations and quality culture in specialised workforce development. German International Journal of Modern Science V.100, 24-30. ISSN (Online) 2701-8377

Dimitrova et al. 2021: Dimitrova, Bistra, Izov, Nikolay, Alexandrova, Velichka, Yosifov, Rumen, Ignatova, Darinka, Trendafilov, Dimitar, Petrov, Vasil, Vassileva, Gergana. Smart kognitiven instrumentarium. Vŭnshna otsenka na profesionalni kompetentsii za kadri v Nishov turizŭm. NSA Press; 2021. p. 110. 3.

Ignatova 2023: Ignatova, Darinka. Implementation of motor complexes based on specialized application system blaze-pod trainer. Bulgarian Educational Journal, Strategies for Policy in Science and Education. 2023; 31(6): 653-667.

Ignatova 2023a: Ignatova, Darinka. Study the influence of yoga specialised practices on the Formation of correct body posture and corrections of spinal Deformities. Smart Inovattions in Recreative & Wellness Industry and Niche Tourism – Scientific Journal. 2023; 4(1-2): 17-22.

Ignatova 2023b: Ignatova, Darinka. Tracking functional dynamics in motor potential for development of Wellness Culture, *Trakia Journal of Sciences*, Vol. 21, Suppl. 1, 583-590, Available online at: <http://www.uni-sz.bg> ISSN 1313-3551 (online) doi:10.15547/tjs.2023.s.01.097

Ignatova 2024: Ignatova, Darinka. Smart Educational Models of Wellness Practices, Recreation, Wellness Industry and Niche Tourism, *International Scientific Journal for Smart Innovations*, Vol. 6, Is. 1, 15-23, 2024. ISSN: 2603-4921, Sofia. https://scjournal.globalwaterhealth.org/wp-content/uploads/2024/11/2.-IGNATOVA.D._SMART-EDUCATIONAL-MODELS-FOR-WELLNESS-CULTURE.pdf

Ignatova & Iliev 2023: Ignatova, Darinka & Iliev, Alexander. Current methods and models combining nutritional regimes with motor activity. *International Scientific Journal of Innovation "Smart Innovations in the Recreational (Wellness) Industry and Niche Tourism"*, ISSN: 2603-4921, 05 (1-2), 08-14, https://scjournal.globalwaterhealth.org/wp-content/uploads/2024/02/2.IGNATOVA_ILIEV_p.7-13_2023.pdf

Iliev 2009: Iliev, Alexander. Emotion Recognition Using Glottal and Prosodic Features (Doctoral dissertation, University of Miami).

Iliev 2016: Iliev, Alexander. Feature vectors for emotion recognition in speech. In *National Informatics Conference* (225-238).

Iliev et al. 2021: Iliev, Alexander, Dimitrova, Bistra, Ignatova, Darinka, Angelova, P. Benchmarking Analysis at Establishing a Culture of Wellness, *Forum for Education Studies* 2024, 2(3), 1418, Vol. 2 No. 3 (2024), 01-08 <https://doi.org/10.59400/fes.v2i3.1418>

Мониторинг на училищен уелнес въз основа на ефект от волейболна методика

Даринка Игнатова

Цел: Изследването има за цел, установяване на ефекта от прилагането на волейболна методика и влиянието ѝ върху нивото на училищен уелнес, проследявайки двигателното развитие на активно спортуващи волейболисти. *Методи:* Изследването има за цел да установи причините за изменението на биомеханичните двигателни показатели в резултат на прилаганата волейболна методика, на базата на бенчмаркинг на биомеханични параметри за определяне на ефекта от волейболната методика върху степента на развитие на двигателните качества. Изследователският контингент се състои от 26 момичета от 7 клас на възраст 13-14 години, трениращи волейбол в столично училище. Настоящото проучване е проведено през учебната 2023-24 г. *Резултати:* Предмет на изследване е динамиката на биометричните показатели за една учебна година. *Дискусия:* Измерванията на двигателната активност са извършени в началото на изследването, преди прилагането на иновативната волейболна методика, и в края, след внедряването. *Заключение:* Несъмнено е установено влиянието на активния спорт върху двигателното развитие на волейболистите. Анализирайки изследванията от проведената диагностика, по време на изследването е извършен сравнителен анализ на биомеханичните двигателни показатели в два когнитивни етапа от изследвания период за установяване на ефекта от приложената волейболна методика.

