

## METHODS OF IMPROVING PHYSICAL TRAINING OF FEMALE STUDENTS IN VOLLEYBALL CLASSES

**Vlasenko Anton,**

Postgraduate student at the Department of the Theories and methods of physical culture  
Sumy State Pedagogical University named after A.S. Makarenko,  
<https://orcid.org/0009-0003-0530-2956>

**Rybalko Petro Fedorovich,**

Doctor of Pedagogical Sciences,  
Professor at the Department of the Theories and methods of physical culture  
Sumy State Pedagogical University named after A.S. Makarenko  
<https://orcid.org/0000-0002-6460-4255>

*In modern volleyball, which is characterized by high intensity, speed, and athleticism, physical fitness is becoming a key factor that allows players to effectively perform technical techniques, withstand significant physical exertion, and recover quickly after games and training. For female students who are actively involved in volleyball, physical fitness is of particular importance as their bodies continue to develop, and the right approach to training contributes to harmonious physical development, health promotion, and increased resistance to disease.*

*Different techniques can have different effects on the development of physical qualities such as strength, endurance, speed, agility, and flexibility. Therefore, the article aims to compare the methods to determine the most effective approaches to improving the physical fitness of female students involved in volleyball. The leading research method is a comparative analysis, which allows us to theoretically evaluate each technique and determine which is best suited to improve specific physical indicators necessary for successful volleyball. It is shown that the development and implementation of differentiated physical training programs for female students in volleyball classes is a complex task that requires a deep understanding of the physiological and psychological characteristics of female students, as well as knowledge of the principles of training and the development of a training program.*

*The existing methods of improving the physical fitness of female students in volleyball classes are differentiated: methods of strength development, such as weight training, plyometric exercises, and isometric exercises; cardio training, interval training, and special exercises for volleyball players are used to develop endurance. Speed and agility are developed through sprint training, coordination, and reaction exercises. The differentiation of methods allows us to choose the most effective approaches for developing each physical quality, considering the individual characteristics of female students and the specifics of volleyball. Future research may focus on developing and evaluating differentiated training methods for female students of pedagogical specialties in the process of volleyball training.*

**Key words:** physical training, differentiated programs, female students, volleyball, methods of improvement, sport.

**Власенко Антон, Рибалко Петро. Методики удосконалення фізичної підготовки студенток на заняттях з волейболу**

У сучасному волейболі, який характеризується високою інтенсивністю, швидкістю та атлетизмом, фізична підготовка стає ключовим фактором, що дозволяє гравцям ефективно виконувати технічні прийоми, витримувати значні фізичні навантаження та швидко відновлюватися після ігор і тренувань. Для студенток, які активно займаються волейболом, фізична підготовка має особливе значення, оскільки їхній організм продовжує розвиватися, і правильний підхід до тренувань сприяє гармонійному фізичному розвитку, зміцненню здоров'я та підвищенню стійкості до захворювань. Різні методики можуть мати різний вплив на розвиток фізичних якостей, таких як сила, витривалість, швидкість, спритність та гнучкість.

Тому **метою** статті є порівняльний аналіз методик для визначення найбільш ефективних підходів для покращення фізичної підготовки студенток, які займаються волейболом. Провідним методом дослідження виступає порівняльний аналіз, який дозволяє теоретично оцінити кожен методик та визначити, яка з них найкраще підходить для поліпшення конкретних фізичних показників, необхідних для успішної гри у волейбол. Показано, що розробка та впровадження диференційованих програм фізичної підготовки студенток на заняттях з волейболу є складним завданням, яке вимагає глибокого розуміння фізіологічних і психологічних особливостей студенток, а також знань про принципи тренувань і розробку програм тренувань. Диференційовано наявні методики удосконалення фізичної підготовки студенток на заняттях з волейболу: методики розвитку сили, такі як тренування з обтяженнями, пліометричні вправи та ізометричні вправи; для розвитку витривалості використовуються кардіотренування, інтервальні тренування та спеціальні вправи для волейболістів. Швидкість та спритність розвиваються за допомогою спринтерських тренувань, вправ на координацію, а також ігрових вправ на реакцію.

Диференціація методик дозволяє обрати найбільш ефективні підходи для розвитку кожної фізичної якості, враховуючи індивідуальні особливості студенток та специфіку волейболу. Майбутні дослідження можуть бути зосереджені на розробці та оцінці диференційованих методик тренувань студенток педагогічних спеціальностей у процесі занять волейболом.

**Ключові слова:** фізична підготовка, диференційовані програми, студентки, волейбол, методика удосконалення, спорт.

**Problem statement.** Physical fitness plays an important role in achieving success in volleyball, especially for female students who combine their studies with intensive training and competition [1]. This aspect of training not only determines the level of sports achievements but also significantly impacts overall health, performance, and injury prevention. In modern volleyball, which is characterized by high intensity, speed, and athleticism, physical fitness is becoming a key factor that allows players to effectively perform technical techniques, withstand significant physical exertion, and recover quickly after games and training sessions. Physical fitness is of particular importance for female students who are actively involved in volleyball as their bodies continue to develop, and the right approach to training contributes to harmonious physical development, health, and increased resistance to disease.

**Analysis of current research.** Scientific research, in particular [2] and others provide information on how different types of physical exercises affect physiological processes in the human body, such as the cardiovascular system, respiratory system, muscular system, endocrine system, and others. These studies allow us to determine the optimal types, intensity, and duration of physical exercises to achieve specific goals, such as improving strength, endurance, speed, agility, and flexibility, promoting health and preventing diseases. In addition, the analysis of scientific publications allows us to identify possible risks and contraindications to certain types of exercise, which is important for ensuring the safety of the training process [3].

The study of the effectiveness of different types of training (strength, cardio, game) in volleyball is important for determining the optimal combination of training methods [1]. Strength training aims to develop the muscle strength necessary for performing jumps, hits, and other volleyball techniques. Cardio training improves endurance, allowing players to withstand long and intense games. Game training develops speed, agility, coordination, and reaction, which is important for quick decision-making and effective execution of game actions. Scientists prove that the optimal combination of strength, cardio, and game training allows you to achieve the best results in volleyball, ensuring the harmonious development of physical qualities and improving game skills. For female students who combine studying with training, it is important to have sufficient physical fitness to withstand high loads, maintain concentration, and effectively absorb the educational material. The development of physical qualities is important for improving the health and performance of female students involved in volleyball [4]. Regular exercise helps to strengthen the cardiovascular system, improve metabolism, normalize weight, and boost immunity. In addition, physical activity has a positive effect on the psycho-emotional state, reduces stress, improves mood, and boosts self-esteem. A properly organized training process to develop physical qualities helps increase efficiency, improve academic performance, and ensure harmonious personality development.

Volleyball requires players to perform a variety of movements, such as jumping, running, throwing, and hitting, which significantly strain muscles, joints, and ligaments.

Insufficient physical fitness can lead to injuries and reduced performance in volleyball [4]. If female students are not physically fit, their muscles may be weak, joints unstable, and ligaments inelastic, increasing the risk of sprains, strains, tears, and other injuries [5]. Insufficient physical fitness can lead to fatigue, decreased concentration, and poor coordination, negatively affecting the game's effectiveness. Female students who are not physically fit may be less efficient in performing techniques, lose speed and agility, and make more mistakes during the game. Therefore, ensuring a sufficient level of physical fitness is important to prevent injuries and increase the effectiveness of the volleyball game.

Thus, success in volleyball largely depends on the players' physical fitness, so choosing the best training methods is an important task for coaches and teachers in higher education institutions. Different methods of physical activity development can affect physical qualities (strength, endurance, speed, agility, flexibility). Therefore, the **article aims** to compare the methods to determine the most effective approaches to improving the physical fitness of female students engaged in volleyball.

**Methods.** The leading research method is a comparative analysis of scientific research, which allows us to theoretically evaluate each technique and determine which is best suited to improve the specific physical indicators necessary for a successful volleyball game. In general, comparing different approaches to training, taking into account their advantages and disadvantages, is an important task of scientific and pedagogical research [6]. Each training method has its characteristics that can positively or negatively affect the development of physical qualities and the general health of female students.

**Results.** A review of methods to develop certain physical qualities (strength, endurance, speed, agility) allows us to identify and characterize the most effective approaches for developing each quality. Let's take a closer look at them.

*Strength training with weights as a method of developing physical fitness.* The use of bodyweight exercises is an effective way to start strength training for female students who are just starting to play volleyball or have a low level of physical fitness [5]. Bodyweight exercises, such as push-ups, squats, lunges, planks, and others, allow you to gradually increase the load on your muscles, develop strength and endurance, and improve coordination and balance. Circuit training methods are effective for developing both strength and endurance [7]. Circuit training involves performing exercises for different muscle groups with short breaks between them. This allows you to maintain a high level of training intensity. Circuit training can include bodyweight exercises, exercises with additional weights, and cardio exercises. It is important to choose exercises that correspond to female students' physical fitness level and the specifics of volleyball.

Plyometric exercises for strength development as a method of physical fitness development. Jumping exercises are an effective way to improve jumping height and leg strength, so they are important in volleyball classes for female students [1]. Plyometric exercises, such as

box jumps, deep jumps, jumps from a standing position, etc., use rapid stretching of the muscles followed by rapid contraction to develop explosive power. These exercises improve the ability of the muscles to generate much force in a short period, which is necessary to perform jumps during the game of volleyball. Effective in the implementation of this technique is the use of plyometric platforms [8] and other special equipment that can increase training effectiveness by changing the height of jumps, increasing the muscle load, and diversifying the training process. At the same time, it is important to observe the correct technique of plyometric exercises to prevent injuries, as they strain muscles, joints, and ligaments, and improper technique can lead to sprains, strains, and tears.

*Isometric muscle strengthening exercises* as a method of developing physical fitness. Static exercises, which involve maintaining tension in the muscles without changing their length, are an effective way to strengthen muscles [9]. Isometric exercises, such as holding a plank, holding a weight on outstretched arms, and others, allow you to activate many muscle fibers and develop strength. These exercises do not require any special equipment and can be performed in various conditions. Isometric exercises are beneficial for strengthening the muscles used to maintain proper posture and stabilize joints. Isometric exercises are practical for strengthening the core muscles and organizing volleyball training. The core muscles, which include the abdominal, back, and pelvic muscles, play an important role in maintaining proper posture, stabilizing the spine, and transferring strength from the lower body to the upper body. The strength of these muscles helps students perform techniques with greater strength and efficiency and reduces the risk of back injuries.

The advantages and disadvantages of isometric exercises in volleyball must be taken into account when using them [10]. The advantages of isometric exercises include their simplicity, accessibility, ability to be performed in any environment, and effectiveness in strengthening muscles and improving joint stabilization. The disadvantages of isometric exercises include their limited ability to develop explosive strength and speed and the potential for high blood pressure during exercise. Therefore, isometric exercises should be combined with other types of training, such as weight and plyometric exercises, to achieve optimal volleyball results.

*Cardio training to increase aerobic endurance* as a method of endurance development. Long-distance running is an effective way to improve overall aerobic endurance, which is important for female volleyball players [6]. Aerobic endurance allows players to withstand long and intense games while maintaining high performance. Long-distance running helps to increase blood volume, improve cardiovascular function, and increase the efficiency of muscle oxygen utilization. Interval training is an effective way to increase anaerobic endurance [1]. Anaerobic endurance allows players to perform short, intense efforts, such as jumping, hitting, and throwing, with high speed and power. Interval training involves alternating periods of high intensity with rest or low-intensity periods. This improves the abil-

ity of muscles to utilize energy under anaerobic conditions, increases recovery from intense effort, and improves overall anaerobic endurance.

The use of exercise bikes and other cardio devices can be useful for diversifying cardio training and reducing joint stress [6]. Exercise bikes, ellipticals, rowing machines, and other cardio devices allow you to perform workouts of varying intensity and duration while reducing joint stress. In addition, using different cardio devices can make your workouts more interesting.

*Special exercises for endurance development in volleyball.* Repeated repetitions of game elements (serves, techniques, attacks) are an effective way to develop endurance specific to volleyball [1]. These exercises allow players to improve their ability to execute techniques accurately and efficiently over time. Repeated repetitions of game elements also contribute to developing muscle endurance, improved coordination, and automation of movements. It is important to perform these exercises with proper technique and with a gradual increase in intensity and duration. Simulation exercises using a volleyball can help develop endurance in volleyball-specific movements. These drills mimic real-life game situations and allow players to improve their ability to execute techniques quickly and accurately for extended periods. Simulation exercises include jumping with a simulated shot, running with a simulated ball reception, and others. It is important to perform these exercises with proper technique and with a gradual increase in intensity and duration. Training in a game format with an emphasis on endurance is one of the most effective ways to improve endurance and game skills at the same time [6]. Such training involves playing games with certain restrictions or conditions that force players to work with greater intensity and endurance.

*Sprint training for speed development as a method of developing speed and agility.* Short sprints at maximum speed are an effective way to build speed [6], which is essential for volleyball. Speed allows players to move quickly on the court, react to opponents' actions, and perform techniques effectively. Short sprints at maximum speed help improve neuromuscular coordination, increase muscle strength, and improve reaction time. Acceleration and deceleration exercises can help enhance volleyball players' speed and agility. These exercises involve rapid acceleration followed by rapid deceleration and a change of direction. They help improve neuromuscular coordination, increase muscle strength, and improve reaction time. The use of starting exercises can help improve reaction time and start speed. Starting exercises involve quick starts from different positions, such as standing, sitting, or lying down. They help to improve neuromuscular coordination, increase muscle strength, and improve reaction time. They are essential in volleyball training because they allow you to react quickly to opponents' actions and move quickly on the court.

*Agility and coordination exercises as a method of endurance development.* Shuttle running is an effective exercise for developing agility and speed of change of direction [6], what is essential for volleyball. Shuttle running involves running short distances with a quick change of direction.

It helps to improve neuromuscular coordination, increase muscle strength, and improve reaction time. Exercises using cones and other obstacles can help improve female students' agility and coordination. They help improve neuromuscular coordination, increase muscle strength, and improve reaction time. Game-based reaction and coordination exercises can be a fun and effective way to develop agility and coordination. These exercises involve various game tasks that require quick reaction and coordination of movements.

*Methods of developing reaction and decision-making speed as a method of endurance development.* Training with visual and auditory cues can help improve reaction and decision-making speed in volleyball [1]. Such training involves responding to various visual and auditory cues, such as changing light colors, the sound of a whistle, or a coach's command. They help improve neuromuscular coordination, increase reaction time, and improve the ability to make quick decisions in game situations. Game situations that require quick decision-making can help improve tactical thinking and the ability to make quick decisions. Performing various game tasks that require quick analysis of the situation, choosing the best solution, and implementing it (exercises that require quick selection of a position on the court, choosing a technique to perform, or choosing a partner to pass the ball to) allow female students to improve their game skills, tactical thinking, and ability to make quick decisions in game situations.

Thus, the presented approaches emphasize differentiated methods of improvement of physical fitness of female students in volleyball classes, among which are described strength training with weights, plyometric exercises for strength development, isometric exercises for strengthening muscles, cardio training for increasing aerobic endurance and special exercises for endurance development in volleyball, sprint training for speed development, methods of development of agility and coordination and strategies of development of reaction and speed of decision-making.

**Discussions.** We have considered various methods of improving the physical fitness of female students in volleyball classes. Various scientific studies confirm their effectiveness.

Plyometric training is widely used in volleyball to improve vertical jump height and explosive power [11]. However, the effectiveness of different plyometric exercises may differ for female athletes. The study by J. Ruffieux et al. [12] showed that counter-movement jumping (CMJ) training was significantly more effective than drop jumping (DJ) training in increasing jump height in non-professional volleyball players. Specifically, CMJ training resulted in a mean improvement in jump height of 17% compared to a 7% improvement during DJ training. The authors suggest that the slower stretch-shortening cycle during CMJ is more specific to these athletes' volleyball demands. This indicates that volleyball coaches should favor CMJ training over DJ training for non-professional volleyball players to maximize improvements in jumping performance.

Strength and conditioning programs should address common muscular imbalances and weaknesses seen in female athletes. These programs should include exer-

cises that strengthen the core, glutes, and hamstrings to improve stability and reduce the risk of lower extremity injuries. Trunk muscle training (TMT) has been shown to improve athletes' fitness and specific sports performance. A systematic review and meta-analysis by Saeterbakken et al. [13] found that TMT had a significant small to large effect on maximal muscle strength, localized muscle endurance, lower extremity muscle strength, linear sprint speed, and change of direction speed (CODS)/agility. The study also showed that TMT with a session duration of 30 minutes or less resulted in significant, large effects on linear sprint speed and CODS/agility, while longer sessions (over 30 minutes) resulted in significant, large effects on sport-specific outcomes.

Sports skill development should combine techniques and tactics to improve overall performance. This includes drills that focus on improving passing, serving, hitting, and blocking techniques and tactical training that emphasizes decision-making and game strategy. One practical approach is the use of sports-specific games (SSGs), which can improve fitness and skills specific to team sports [14].

A systematic review and meta-analysis showed that SSG greatly benefits maximal oxygen uptake (VO<sub>2</sub> max), agility, and repeated running ability. SSG can also improve specific tests and techniques compared to general training, making it an effective multicomponent training strategy.

The research also emphasizes methods of improving the physical fitness of female students in volleyball classes, which take into account sufficient sleep, which is essential for the recovery of muscles and the nervous system after endurance training [15]. During sleep, the body repairs muscle fibers damaged during exercise and restores the nervous system. Insufficient sleep can lead to fatigue, decreased performance, and increased risk of injury. Getting enough sleep (7-9 hours per night) is essential to recover from endurance training. Massage and other recovery techniques can help reduce muscle soreness and speed recovery from endurance training. Massage helps to improve circulation, reduce muscle tension, and remove waste products from the muscles. Other recovery techniques, such as contrast showers, saunas, and cryotherapy, can also help reduce muscle soreness and speed recovery. Massage and other recovery techniques can help you recover quickly from endurance training, reduce the risk of injury, and improve your overall health.

**Conclusions.** Thus, the development and implementation of differentiated programs of physical training of female students in volleyball classes is a complex task that requires a deep understanding of the physiological and psychological characteristics of female students and knowledge of the principles of training and program development. A comparative analysis of studies has made it possible to differentiate methods of improving the physical fitness of female students in volleyball classes: methods of strength development, such as weight training, plyometric exercises, and isometric exercises; cardio training, interval training, and special exercises for volleyball players are used to develop endurance. Speed and agility are developed through sprint training, agility and coordination exercises, as well as game exercises for reaction and coordination.

Differentiation of methods allows you to choose the most effective approaches for developing each physical quality, taking into account students' individual characteristics

and the specifics of volleyball. Future research can focus on developing and evaluating differentiated training for female students of pedagogical specialties in volleyball training.

### Bibliography:

1. Войтенко С., Рогаль І., Чхань А. Удосконалення основних технічних прийомів у волейболі в закладах вищої освіти. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15. Науково-педагогічні проблеми фізичної культури (фізична культура і спорт)*. 2022. № 1(145). С. 31-34. Режим доступу: [https://doi.org/10.31392/NPU-nc.series15.2022.1\(145\).08](https://doi.org/10.31392/NPU-nc.series15.2022.1(145).08).
2. Фідірко М., Мороз І., Волошина А. Вплив занять фізкультурно-оздоровчої спрямованості на стан фізичної підготовленості. *European vector of development of the modern scientific researches: collective monograph / edited by authors*. 1st ed. Riga, Latvia: "Baltija Publishing", 2021. Р. 39-54. Режим доступу: <https://doi.org/10.30525/978-9934-26-077-3-3>
3. Максимова К. В. Моніторинг стану соматичного здоров'я студенток І курсів вищих навчальних закладів м. Харкова. *International Scientific Journal «Internauka»*. 2017. № 7(29). С. 30-34.
4. Зеніна І. В., Гаврилова Н. М., Кузьменко Н. Вплив фізичних вправ на організм студентів. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15. Науково-педагогічні проблеми фізичної культури (фізична культура і спорт)*. 2022. № 1(145). С. 47-50. Режим доступу: [https://doi.org/10.31392/NPU-nc.series15.2022.1\(145\).12](https://doi.org/10.31392/NPU-nc.series15.2022.1(145).12)
5. Gamali V., Potop V., Bondar A., Salnykova S., Shynkaruk O., Shevchuk O., Ulan A. Improvement of the motor structure of the paddle technique of qualified female athletes in rowing. *Journal of Physical Education and Sport*. 2020. № 20 (4), Art 263. Р. 1944-1949. DOI:10.7752/jpes.2020.04263
6. Рогаль І., Бурбела О. Розвиток фізичних якостей у студенток непрофільних ЗВО засобами ігрових видів спорту. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15. Науково-педагогічні проблеми фізичної культури (фізична культура і спорт)*. 2020. № 6(126). С. 76-79. Режим доступу: [https://doi.org/10.31392/NPU-nc.series15.2020.6\(126\).16](https://doi.org/10.31392/NPU-nc.series15.2020.6(126).16)
7. Мадяр-Фазекаш Е., Тулайдан В. Г., Сусли В. Я., Мордвінцев Г. О. Розвиток силових здібностей студенток засобами фітнесу в системі додаткової освіти. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15. Науково-педагогічні проблеми фізичної культури (фізична культура і спорт)*. 2022. № 10(155). С. 116-119. Режим доступу: [https://doi.org/10.31392/NPU-nc.series15.2022.10\(155\).26](https://doi.org/10.31392/NPU-nc.series15.2022.10(155).26)
8. Гуцул Н., Мадяр-Фазекаш Е. О., Ворончак М. Фізичний розвиток і фізична підготовленість студентів різних функціональних груп здоров'я. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15. Науково-педагогічні проблеми фізичної культури (фізична культура і спорт)*. 2022. Випуск 6 (151). С. 55-60. Режим доступу: [https://doi.org/10.31392/NPU-nc.series15.2022.6\(151\).11](https://doi.org/10.31392/NPU-nc.series15.2022.6(151).11).
9. Druz V. A., Iermakov S. S., Nosko M. O., Shesterova L. Y., Novitskaya N. A. The problems of students physical training individualization. *Pedagogics Psychology Medical-Biological Problems of Physical Training and Sports*. 2017. № 21 (2). S. 51-59. doi: 10.15561/18189172.2017.0201
10. Батєєва Н. П. Стан фізичної підготовленості студентів Київського національного університету культури і мистецтв. *Слобожанський науково-спортивний вісник*. 2014. № 6(44). С. 11–14. Режим доступу: <https://doi.org/10.15391/sns.v.2014-6.002>
11. Silva A. F., Clemente F. M., Lima R., Nikolaidis P. T., Rosemann T., Knechtel B. (2019). The Effect of Plyometric Training in Volleyball Players: A Systematic Review. *International Journal of Environmental Research and Public Health*. 2019. No 16 (16). P. 29-60. URL: <https://doi.org/10.3390/ijerph16162960>
12. Ruffieux J., Wälchli M., Kim K.-M. and Taube W. (2020) Countermovement Jump Training Is More Effective Than Drop Jump Training in Enhancing Jump Height in Non-professional Female Volleyball Players. *Front. Physiol*. 2020. № 11:231. doi: 10.3389/fphys.2020.00231
13. Saeterbakken A. H., Stien N., Andersen V. et al. The Effects of Trunk Muscle Training on Physical Fitness and Sport-Specific Performance in Young and Adult Athletes: A Systematic Review and Meta-Analysis. *Sports Medicine*. 2022. № 52. P. 1599–1622. URL: <https://doi.org/10.1007/s40279-021-01637-0>
14. Hammami A., Gabbett T. J., Slimani M., Bouhlel E. Does small-sided games training improve physical fitness and team-sport-specific skills? A systematic review and meta-analysis. *J Sports Med Phys Fitness*. 2018. № 58. P. 1446-55. DOI: 10.23736/S0022-4707.17.07420-5
15. Москаленко Н., Кошелева О., Татарченко Л., Рузанов В., Максимов А. Особливості впливу рухової активності на психофізичний стан здобувачів вищої освіти. *Спортивний вісник Придніпров'я*. 2022. № 2. С. 45-57. Режим доступу: <https://doi.org/10.32540/2071-1476-2022-2-045>

### References:

1. Voitenko, S., Rohal, I., & Chkhan, A. (2022). Udokonalennia osnovnykh tekhnichnykh pryimov u voleiboli v zakladakh vyshchoi osvity [Improvement of basic techniques in volleyball in higher education institutions]. *Naukovyi chasopys Ukrainskoho derzhavnoho universytetu imeni Mykhaila Drahomanova. Serii 15. Naukovo-pedahohichni problemy fizychnoi kultury (fizychna kultura i sport) – Scientific journal National Pedagogical Dragomanov University. Series 15. Scientific and pedagogical problems of physical culture (physical culture and sports)*, no 1 (145), pp. 31-34. URL: [https://doi.org/10.31392/NPU-nc.series15.2022.1\(145\).08](https://doi.org/10.31392/NPU-nc.series15.2022.1(145).08) [in Ukrainian].
2. Fidirko, M., Moroz, I., Voloshyna, A. (2021). Vplyv zaniat fizkulturno-ozdorovchoi spriamovanosti na stan fizychnoi pidhotovlenosti [Influence of physical culture and health Classes on the state of physical preparedness]. *European vector*

of development of the modern scientific researches: collective monograph. Riga, Latvia: "Baltija Publishing", pp. 39-54. URL: <https://doi.org/10.30525/978-9934-26-077-3-3> [in Ukrainian].

3. Maksymova, K. V. (2017). Monitoryng stanu somatychnoho zdorovia studentok I kursiv vyshchykh navchalnykh zakladiv m. Kharkova [Monitoring first year girl students' health condition of Kharkiv higher educational establishments]. *Mizhnarodnyi naukovi zhurnal «Internauka» – International Scientific Journal "Internauka"*, no 7(29), pp. 30-34 [in Ukrainian].

4. Zenina, I. V., Havrylova, N. M., & Kuzmenko, N. (2022). Vplyv fizychnykh vprav na orhanizm studentiv [The effect of exercise on the body of students]. *Naukovyi chasopys Ukrainського derzhavnoho universytetu imeni Mykhaila Drahomanova. Seriya 15. Naukovo-pedahohichni problemy fizychnoi kultury (fizychna kultura i sport) – Scientific journal National Pedagogical Dragomanov University. Series 15. Scientific and pedagogical problems of physical culture (physical culture and sports)*, no 1(145), pp. 47-50. URL: [https://doi.org/10.31392/NPU-nc.series15.2022.1\(145\).12](https://doi.org/10.31392/NPU-nc.series15.2022.1(145).12) [in Ukrainian].

5. Gamali, V., Potop, V., Bondar, A., Salnykova, S., Shynkaruk, O., Shevchuk, O., Ulan, A. (2020). Improvement of the motor structure of the paddle technique of qualified female athletes in rowing. *Journal of Physical Education and Sport*, no 20 (4), Art 263, pp. 1944-1949. DOI:10.7752/jpes.2020.04263 [in English].

6. Rohal, I., & Burbela, O. (2020). Rozvytok fizychnykh yakosti u studentok neprofilnykh ZVO zasobamy ihrovykh vydiv sportu [Development of physical qualities in students of non-profile higher education institutions by means of game sports]. *Naukovyi chasopys Ukrainського derzhavnoho universytetu imeni Mykhaila Drahomanova. Seriya 15. Naukovo-pedahohichni problemy fizychnoi kultury (fizychna kultura i sport) – Scientific journal National Pedagogical Dragomanov University. Series 15. Scientific and pedagogical problems of physical culture (physical culture and sports)*, no 6(126), pp. 76-79. URL: [https://doi.org/10.31392/NPU-nc.series15.2020.6\(126\).16](https://doi.org/10.31392/NPU-nc.series15.2020.6(126).16) [in Ukrainian].

7. Madiar-Fazekash, E., Tulaidan, V. H., Susla, V. Ya., & Mordvintsev, H. O. (2022). Rozvytok sylovykh zdibnostei studentok zasobamy fitnesu v systemi dodatkovoi osvity [Development of strength abilities of female students by means of fitness in the system of additional education]. *Naukovyi chasopys Ukrainського derzhavnoho universytetu imeni Mykhaila Drahomanova. Seriya 15. Naukovo-pedahohichni problemy fizychnoi kultury (fizychna kultura i sport) – Scientific journal National Pedagogical Dragomanov University. Series 15. Scientific and pedagogical problems of physical culture (physical culture and sports)*, no 10(155), pp. 116-119. URL: [https://doi.org/10.31392/NPU-nc.series15.2022.10\(155\).26](https://doi.org/10.31392/NPU-nc.series15.2022.10(155).26) [in Ukrainian].

8. Hutsul N., Madiar-Fazekash E.O., Voronchak M. (2022) Fizychnyi rozvytok i fizychna pidhotovlenist studentiv riznykh funktsionalnykh hrup zdorovia [Physical development and physical preparation of students of various functional health groups]. *Naukovyi chasopys Ukrainського derzhavnoho universytetu imeni Mykhaila Drahomanova. Seriya 15. Naukovo-pedahohichni problemy fizychnoi kultury (fizychna kultura i sport) – Scientific journal National Pedagogical Dragomanov University. Series 15. Scientific and pedagogical problems of physical culture (physical culture and sports)*, no 6 (151), pp. 55-60 [in Ukrainian].

9. Druz, V. A., Iermakov, S. S., Nosko, M. O., Shesterova, L. Y., Novitskaya, N. A. (2017). The problems of students physical training individualization. *Pedagogics Psychology Medical-Biological Problems of Physical Training and Sports*, no 21 (2), pp. 51-59. URL: <https://doi.org/10.15561/18189172.2017.0201> [in English].

10. Batieieva, N. P. (2014). Stan fizychnoi pidhotovlenosti studentiv Kyivskoho natsionalnoho universytetu kultury i mystetstv [State of the level of physical preparedness of students of the Kyiv National University of Culture and Art]. *Slobozhanskyi naukovo-sportyvnyi visnyk – Slobozhanskyi Herald of Science and Sport*, no 6(44), pp. 11–14. URL: <https://doi.org/10.15391/sns.v.2014-6.002> [in Ukrainian].

11. Silva, A. F., Clemente, F. M., Lima, R., Nikolaidis, P. T., Rosemann, T., & Knechtel, B. (2019). The Effect of Plyometric Training in Volleyball Players: A Systematic Review. *International Journal of Environmental Research and Public Health*, no 16(16), pp. 29-60. <https://doi.org/10.3390/ijerph16162960> [in English].

12. Ruffieux, J., Wälchli, M., Kim, K.-M. and Taube, W. (2020). Countermovement Jump Training Is More Effective Than Drop Jump Training in Enhancing Jump Height in Non-professional Female Volleyball Players. *Front. Physiol.*, no 11, art. 231. doi: 10.3389/fphys.2020.00231 [in English].

13. Saeterbakken, A. H., Stien, N., Andersen, V. et al. (2022). The Effects of Trunk Muscle Training on Physical Fitness and Sport-Specific Performance in Young and Adult Athletes: A Systematic Review and Meta-Analysis. *Sports Medicine*, no 52, pp. 1599–1622. URL: <https://doi.org/10.1007/s40279-021-01637-0> [in English].

14. Hammami, A., Gabbett, T. J., Slimani, M., Bouhlel, E. (2018). Does small-sided games training improve physical fitness and team-sport-specific skills? A systematic review and meta-analysis. *J Sports Med Phys Fitness*, no 58, pp. 1446-55. DOI: 10.23736/S0022-4707.17.07420-5 [in English].

15. Moskalenko, N., Kosheleva, O., Tatarchenko, L., Ruzanov, V., Maksymov, A. (2022). Osoblyvosti vplyvu rukhovoi aktivnosti na psykho-fizychnyi stan zdobuvachiv vyshchoi osvity [Peculiarities of the influence of motor activity on the psychophysical state of higher education students]. *Sportyvnyi visnyk Prydniprov'ia – Sports Bulletin of the Dnieper*, no 2, pp. 45-57 <https://doi.org/10.32540/2071-1476-2022-2-045> [in Ukrainian].

Дата першого надходження рукопису до видання: 27.06.2025

Дата прийнятого до друку рукопису після рецензування: 29.07.2025

Дата публікації: 02.09.2025