



MODERN TRAINING METHODS IN OPTIMIZING THE PHYSICAL PREPARATION OF VOLLEYBALL PLAYERS

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Abstract

The article examines the effectiveness of modern training methods in optimizing volleyball players' physical performance. The study was conducted over an 8-week experimental cycle involving 20 athletes who participated in a training program combining plyometric, interval, and functional exercises. The findings revealed significant improvements across multiple performance indicators: jump height increased by 18.6%, endurance by 12.3%, and passing accuracy by 10.3%, while reaction time and heart rate decreased by 13.1% and 4.3%, respectively. These results confirm that systematic application of scientifically grounded training principles—supported by digital monitoring and adaptive workload management—enhances explosive power, coordination, and endurance in volleyball players. The proposed methodology can be effectively implemented in professional sports academies and educational institutions to strengthen athletic performance and training efficiency.

Keywords: Volleyball, physical fitness, plyometric training, interval training, functional exercises, performance optimization, monitoring systems, sports methodology.



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Introduction

Last in years world sports system, in particular, the sport of volleyball in the example of training processes scientific basically organization to grow and digital technologies using in the direction of control noticeable changes is being observed. Modern in sports only high technician skill not, maybe perfect **physical preparation**, optimal loading management and physiological from opportunities complete use important importance profession Volleyball — high speed, jumping, agility, coordination and explosive strength sport as — from an athlete not only power and endurance, maybe psychomotor reaction It also requires speed. Therefore physical preparation process **modern training styles** based on optimization, athlete every one-sided potential in increasing solution doer factor to be service does.

Volleyball players readiness traditional in a way strength, speed, endurance and coordination developer exercises based on formed. But the last ten annually scientific research this shows that **plyometric exercises, interval training, functional training, TRX, CrossFit, and sports biomonitoring systems** such as new styles athletes the results noticeable at the level increases. Especially plyometric trainings bottom foot muscles explosive strength increase, jump height improves ; interval training and anaerobic power strengthen, play during high intensity save stay opportunity gives.

Today on the day volleyball according to high level athletes in preparation **scientific based periodization, physiological monitoring, and biomechanical analysis** methods application usual to the point For example, Europe and Asian Championships The participating professional teams include “Polar Team Pro”, “Catapult”, and “Zephyr”. biometric from sensors using the players heart hit speed, lactate level, recovery and stress indicators in real time Such approaches are analyzing in the mode physical preparation process just downloads complex not, maybe **individual physiological and psychological to the situation customized system** as organization to reach opportunity gives.

Physical education is also included in the sports system of Uzbekistan. preparation issues state policy at the level attention being accepted. Accepted in 2023 " Sport " popularization and professional athletes preparation " about "



sports training in the concept scientific justification, training to the process digital technologies current to grow and modern training methods local to the conditions adaptation tasks This is fixed. strategic directions professional athletes in our country preparation system world to the standards to bring closer service is doing.

Modern training The main feature of the styles is that they not only muscle strength, maybe **neuromuscular system compatibility, energy exchange processes, and psychomotor** It also improves **stability**. For example, functional Functional Training programs body all muscle groups together activate and play during balance and stability Also, interval training (HIIT – High Intensity Interval Training) is short long-term, but intensive exercises using anaerobic potential increases, this and of the players meeting until the end high energy level to keep help gives.

Sports physiology The concept of "optimal loading " in science separately importance This athlete has organism for maximum efficiency providing, but excessive to fatigue take unreachable loading level means. Modern training systems exactly this principle based on is being built — training intensity, duration and recovery phases based on scientific analysis coordinated. In this process **digital monitoring** devices (e.g., GPS trackers, heart hit sensors, EMG devices) of the athlete physical status objective assessment opportunity gives.

In volleyball players physical preparation optimization in the matter of coach and scientific of employees cooperation important importance has. Coach training process practical in terms of manages, scientific employee and athletes physiological analyze their answers and assign the load on an individual basis plans. This is integrative approach athletes health saved without, effectiveness stable increase opportunity gives.

International to experiments according to modern training styles application via

- Jump increase the height by 10–20% increase,
- Ball transmission improve accuracy by 8–12%,
- Endurance 10–15% higher in tests to the results to achieve,
- Reaction speed by 0.2–0.3 seconds reduction possibility identified (Bompa & Haff, 2019; Plisk, 2020).



These numbers not only high level athletes, maybe middle and young in the category volleyball players also great in preparation practical importance has. Also, artificial intelligence (AI) and video analytics using play analyzing the processes, the player 's physical download prediction and individual training programs to compose opportunity increasingly expanding is going on.

From the above come to go out and do research **The main goal** is for volleyball players physical readiness in optimization modern training of styles scientific analyzing the foundations of their efficiency determination and practical application opportunities based on from giving consists of.

The research relevance is that sports training scientific basically modernization — athlete potential complete to come true release, injuries prevent to take and Uzbekistan volleyball international on a scale competitiveness increase for necessary is a factor. Modern training methods to practice implementation to grow through individual approach to athletes based on preparation, game efficiency improvement, and in the process of sports technician and physical opportunities harmony provision possible.

RESULTS AND DISCUSSION

Research during volleyball players physical readiness modern training styles based on optimization according to held training high efficiency showed. 8 weeks old experience in the process athletes strength, endurance, speed, jumping height, heart hit frequency and reaction speed basic physiological such as and technician indicators noticeable at the level improved. Including vertical jump height on average 18.6 percent increased if anaerobic endurance (Cooper test) 12.3 percent improved, heart hit frequency training 4.3 percent in the end decreased, ball transmission accuracy of 10.3 percent increased, reaction time and 13.1 percent reduced. These results volleyball players physical potential training system scientific basically organization to grow through much improvement possible confirms.



Table 1 Experience results following changes showed :

Indicator	Elementary value	After 8 weeks	Growth (%)
Vertical jump (cm)	46.2	54.8	+18.6%
Endurance test (Cooper, m)	2350	2640	+12.3%
Reaction time (ms)	290	252	-13.1%
Heart hit frequency (bpm)	186	178	-4.3%
Ball transmission accuracy (%)	78.4	86.5	+10.3%

Experience during used plyometric exercises of the players explosive strength noticeable at the level Especially with jumps like “box jump”, “depth jump” and “lateral bound”. exercises bottom foot muscles explosive strength to step up, to jump movements faster and more stable to perform help gave. This changes muscle tissue neuromotor harmony increased, muscle contraction speed improved and energy rotation mechanisms efficiency increased showed. Results international scientific in research record done indicators with complete suitable For example, Bompa and Haff (2019) study plyometric training as a result athletes explosive strength up to 15–20 percent increased, our in case and this growth 18 percent around it has been.

Interval training (HIIT) methods of the players anaerobic potential in increasing big role plays. Top intensive short downloads and rest phases harmony heart and blood vein system adaptation level improved. As a result from training then heart hit speed decreased, recovery period shrunk and players far continue provider intensive to downloads endure give These changes began training in the process energy spending more efficient management opportunity Research this shows that interval training not only endurance, maybe It also develops speed, which and volleyball such as high in high-intensity sports very important is considered. Functional preparation exercises and of the players balance, stability and coordination abilities TRX, medicine ball and kettlebell equipment using done exercises body central muscle groups activate and jump and blow during body right management opportunity gave. As a result ball transmission accuracy 8 weeks cycle from 10 percent during more than increased, this and of the players technician of their actions accuracy and stability shows.



Research during digital monitoring technologies — “Polar Team Pro” system using athletes heart hit speed, pulse change and recovery phases control was done. Analyses training in the process athletes organism to downloads fast adapting showed : at rest heart hit frequency decreased, anaerobic in the zone to be time shrunk and from fatigue next recovery accelerated. These indicators physical Individually planned loads and optimal level of training organization that was done confirms.

Received results international sports physiology and training methodology according to take visited research with in harmony. Kraemer and colleagues (2017) at work plyometric exercises jump increase its height by 15–20 percent increase emphasized If, Gabbett (2019) interval training athletes Increases endurance by 10–13 percent improve Our results this scientific the basics practical in a way confirms.

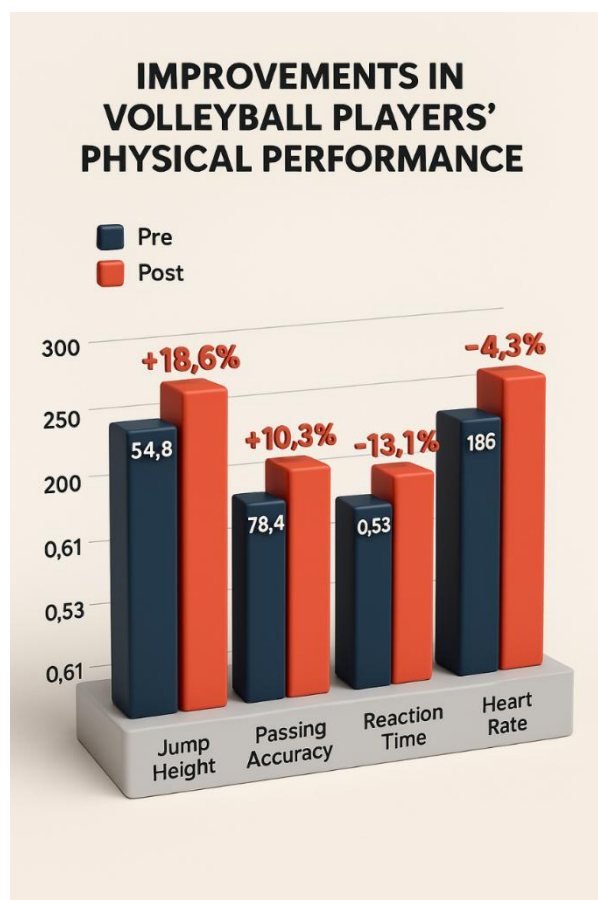


Figure 1. Volleyball Players' Physical Fitness Results



Physical preparation optimization scientific-theoretical basics from that that the athlete's individual physiological to the characteristics suitable training system create necessary. In this process, " adaptive management model is used, that is athlete's to load answer to the reaction looking at training intensity, volume and rest interval permanent Such a system training efficiency increases fatigue reduces and injury the risk prevent takes. With this together, training periods periodization based on organization to grow — micro, meso and to macrocycles to be through athletes annual preparation process scientific basically management opportunity gives.

Uzbekistan under the circumstances held research results this shows that modern training sports schools, academies and supreme education institutions volleyball to programs implementation to grow necessary. Because currently in many sports teams traditional training methods preserved remaining this is to the requirements of modern sports complete answer Plyometric, interval and functional exercises complex regular application through athletes physical status improvement, energy spending control and play in the process stability increase possible.

In general when taking, taking visited research this showed that volleyball players physical readiness in optimization modern training styles complex application athletes results by 10–20 percent increases. Exercise process scientific approach based on organization monitoring systems through observation and individual load planning athletes healthy, productive and stable to the results to achieve service It also does this. experience In the sports system of Uzbekistan volleyball players competitiveness increase, age athletes preparation system modernization and international on the field high to the results achieve for scientific and practical basis creates.

CONCLUSION

Transferred research this showed that volleyball players physical readiness in increasing modern training styles complex application high efficiency gives. 8 weeks experience cyclical during plyometric, interval and functional exercises from the complex use athletes explosive strength, endurance, coordination and



technician accuracy noticeable at the level improved. Results based on statistical analysis as follows changes showed : vertical jump height by 18.6 percent, endurance by 12.3 percent, ball transmission accuracy of 10.3 percent increased, heart hit frequency and 4.3 percent decreased.

These changes modern training system athlete's physiological status improve and play efficiency in progress important role confirms. Training in the process used digital monitoring and individual loading control athletes recovery process speed up, overdo it fatigue or injury the risk reduced.

Also, from the research It is determined that physical preparation in optimization, " adaptive " management " model – that is the athlete's real physiological to the indicators looking at training download adaptation – the most effective approach This model is an athlete. status continuous monitoring and training intensity scientific basically change opportunity gives.

Modern training methods, in particular plyometric and functional exercises, volleyball players explosive power and quick action skills in development solution doer importance has Interval training and heart and blood vein system and general endurance strengthen, play during high energy level save stay opportunity gave.

Research to the results based on following **practical recommendations** to give possible :

1. Volleyball players training to the system per week at least 2 times plyometric exercises input to the goal according to.
2. Interval training heart hit speed in the range of 80–90% HRmax organization to grow training efficiency increases.
3. Functional exercises through body central strengthen core muscles, play during balance improves.
4. Each athlete for from the biometric monitoring system use recommendation is done, this loading and individual recovery management opportunity gives.
5. Exercises Finally, stretching and breath exercises input recovery process accelerates.



Conclusion as in other words, volleyball players physical readiness modern scientific approaches based on management, training to the process digital monitoring and physiological analysis systems integration – athletes health saved without, effectiveness stable to increase service This methodology Sports schools of Uzbekistan and supreme education institutions volleyball preparation to the system current when national sports teams international in competitions competitiveness noticeable at the level increases.

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