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Parameters of Physical Performance of Qualified Football Players in the Preparatory Period of Training

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Abstract

The purpose of the work: to determine the level of physical fitness of qualified football players in the preparatory period of the annual macrocycle based on test indicators for the formation of rational programs for their preparation for competitive activities.

Material and methods. Contingent: 25 qualified football players of MFC “Metalurg” (Zaporizhzhya): 15 athletes – application form “A” and 10 athletes – application form “B” of the second stage of the “Champion” group VBET UA 2022-2023 season of Professional Football League of Ukraine. Methods: Analysis and systematization of data from scientific and methodical literature and the electronic resource of global information network “Internet”; pedagogical observations; pedagogical testing: PWC₁₇₀ (Physical Working Capacity); Harvard Step-Test; pedagogical experiment of controlling orientation; methods of mathematical statistics.

Results. During the educational and training meetings, the test indicators had statistically significant differences in the direction of decreasing values of special physical capacity, from retractable microcycle to percussive microcycle ($p < 0.05$): aPWC₁₇₀ – 1469.33 ± 50.11 and 1377.67 ± 49.11 ($\text{kg} \cdot \text{m} \cdot \text{min}^{-1}$), rPWC₁₇₀ – 20.87 ± 0.69 and 20.71 ± 0.71 ($\text{kgm} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$), aVO₂ max – 4002.23 ± 115.23 and 3857.54 ± 117.34 ($\text{ml} \cdot \text{min}^{-1}$), rVO₂ max – 61.57 ± 1.51 and 54.37 ± 1.67 ($\text{ml} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$), in accordance. Also, during the educational and training meetings, the test indicators had statistically significant differences in the direction of increment values of special physical capacity: from percussive microcycle to submersible microcycle ($p < 0.05$): aPWC₁₇₀ – 1377.67 ± 49.11 and 1494.34 ± 51.78 ($\text{kg} \cdot \text{m} \cdot \text{min}^{-1}$), rPWC₁₇₀ – 20.71 ± 0.71 and 21.37 ± 0.85 ($\text{kgm} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$), aVO₂ max – 3857.54 ± 117.34 and 3997.09 ± 114.89 ($\text{ml} \cdot \text{min}^{-1}$), rVO₂ max – 54.37 ± 1.67 and 63.67 ± 1.71 ($\text{ml} \cdot \text{min}^{-1} \cdot \text{kg}^{-1}$), in accordance.

Conclusion. The way to solve this problem is the proposed methodical approach, which allows, on the one hand, to comprehensively approach the solution of the issue of the complex orientation of the training process of qualified football players in the preparatory period of training, on the other hand, it provides for the differentiation of the team composition into typological groups of athletes, which allows to have a targeted influence on indicators of special physical capacity and technical and tactical potential of qualified football players.

Keywords: football, qualification, training, special physical capacity, functional readiness.

Introduction

The modern system of training qualified football players in the annual macrocycle assumes the main focus on the formation of basic mechanisms that ensure the manifestation of functional readiness and physical capacity. The construction of the training process for qualified football players is

considered classic, when, in the preparatory period (Kokareva, Kokarev & Doroshenko, 2018), the foundations for the development and improvement of special motor skills are formed, the basis of functional readiness and physical capacity is formed (Lisenchuk, Zhigadlo, Tyshchenko, 2019). This is a necessary prerequisite for the effective implementation of the technical and tactical skills of football players in variable competitive activities (Mitova, 2020). It is also important to determine the current level of physical performance of

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qualified football players. Thus, issues of physical fitness in sports remain relevant while maintaining high competition between athletes and teams (Lisenchuk et al., 2023; Nurimov, 2021; Pertsukhov & Shalenko, 2021).

Individual issues of this issue have repeatedly been in the focus of researchers' attention. In particular, (Balsom, Hawkins, & Strudwick, 2022) emphasized the importance of rationalizing the physical training of modern elite football players for national and international competitions with an emphasis on avoiding physical overload according to the parameters of the intensity of special game exercises. At the same time, the issue of using models of maximum power exercises with dynamic external resistance is significant (Bergstrom et al., 2021). The researchers note (Permadi, 2019) that the development of models of physical and psychological training has an applied orientation – to increase the effectiveness of competitive activities in football and for modeling and analysis of specific physical capabilities of soccer players based on the training evaluation index (Li & Zeng, 2021). This situation creates the basis for a comparative analysis of the physical and anthropometric qualities of football players, which systematizes the search for sports talents in elite junior football (Woods et al., 2017) and regarding the physiological aspects of identifying sports talents in football (Dodd & Newans, 2018). Similar trends were recorded in the study, on the material of testing football players of other qualifications (Kaczorowska, Tota, & Pałka, 2022)

The issue of the relationship between indicators of physical performance and bioenergetic mechanisms of ensuring the playing activity of qualified football players is significant, they note (Lyzohub et al, 2020). This situation is reinforced by the variability of indicators of cumulative load and anaerobic power in youth elite football in the context of taking into account indicators of biological maturation of their organism (Nobari, Gorouhi & Mallo, 2023).

A significant group of researchers emphasizes the need to use the most rational approaches to planning significant physical exertion. Failure to comply with the methodological requirements for the ratio of volume and intensity of training loads can significantly increase the rates of injuries of the musculoskeletal system of qualified football players and the risks of the development of accompanying pathologies (Dambroz, Clemente & Teoldo, 2022; Doroshenko, 2015; Doroshenko et al., 2019; Garrett et al., 2019; Griffin et al., 2020; Sirenko et al., 2022).

This problem is actualized in the context of the age-related development of athletes' bodies, psychophysiological features, gender differences, etc. (Chau, 2021; Hanapiah et al., 2020; Kalinowski et al., 2021). The accounting of this complex of issues allows us to state that the scientific problems related to the physical performance of qualified football players remain relevant and timely, and the implementation of the results of experimental studies will allow to increase the effectiveness of competitive activities (Hoff, 2005; Kapelman, Kizilet & Bozdogan, 2022).

The above allows us to assert the presence of a problematic situation, which contains a contradiction between the classical system of sports training of qualified football players in the annual macrocycle and the need to modify existing approaches to improving physical performance (Kostiukevych, Shchepotina & Vozniuk, 2020; Kostiukevich et al., 2017; Shchepotina et al., 2021).

Hypothesis. The study of indicators of the dynamics of the physical working capacity of qualified football players will contribute to the development of new approaches to improving their physical and functional fitness in the preparatory period of the annual training macrocycle.

The purpose of the work: to determine the level of physical fitness of qualified football players in the preparatory period of the annual macrocycle based on test indicators for the formation of rational programs for their preparation for competitive activities.

Material and methods

Participants

25 qualified football players of MFC "Metalurg" (Zaporizhzhya): 15 athletes – application form "A" and 10 athletes – application form "B" of the second stage of the "Champion" group VBET UA 2022-2023 season of Professional Football League of Ukraine. Age range: 18-36. Term of preparatory training period: 09.03.2023 – 08.04.2023 (Morshyn of the Lviv region).

Methods of research

Analysis and systematization of data from scientific and methodical literature and the electronic resource of global information network "Internet"; pedagogical observations; pedagogical testing: PWC₁₇₀ (Physical Working Capacity); Harvard Step-Test; pedagogical experiment of controlling orientation; methods of mathematical statistics.

Organization of research

Experimental studies were carried out during the preparatory period to the second stage of the "Champion" group VBET UA 2022-2023 season of Professional Football League of Ukraine. The educational and training meetings of MFC "Metalurg" (Zaporizhzhya) contained 5 training microcycles: retractable microcycle (4 days); basic microcycle (7 days); percussive microcycle (7 days); restorative microcycle (7 days); submersible microcycle (6 days).

PWC₁₇₀ (Physical Working Capacity). Athletes perform three consecutive workloads on a cycle ergometer. Begin by setting up subject on bike to ensure correct seat height (knee slightly bent at bottom of cycle). Place heart rate monitor on the subject. Check their exercise history to determine the starting workload (estimated to achieve a heart rate between 100-115). Start the test and measure heart rate each minute and continue for 3-4 minutes (until a steady heart rate is achieved). Continue the test for 2nd and 3rd workloads, set to achieve a HR between 115-130 and 130-145 beats per minute respectively. Each steady-state heart rate and workload are graphed, with the line of best fit for the three points extrapolated to estimate the workload that would elicit a heart rate of 170 beats per minute. This workload value then be compared to norms.

Harvard Step-Test. The football players steps up and down on the platform at a rate of 30 steps per minute (every two seconds) for 5 minutes or until exhaustion. Exhaustion is defined as when the athlete cannot maintain the stepping rate for 15 seconds. The football players immediately sits down on

Table 1. The scale of qualitative assessment of the level of indicators of PWC₁₇₀ and VO₂ max of male athletes 18-35 years old (Malikov, Bogdanovs'ka, & Svatiev, 2006)

Level	PWC ₁₇₀		VO ₂ max	
	aPWC ₁₇₀ (kg•m•min ⁻¹)	rPWC ₁₇₀ (kgm•min ⁻¹ •kg ⁻¹)	aVO ₂ max (ml•min ⁻¹)	rVO ₂ max (ml•min ⁻¹ •kg ⁻¹)
Low	≤ 1067.50	≤15.25	≤ 3.50	≤ 50.00
Below average	1067.51 – 1294.50	15.26 – 18.49	3.51 – 3.85	50.01 – 54.99
Average	1294.51 – 1750.00	18.50 – 25.00	3.86 – 4.55	55.00 – 65.00
Above average	1750.01 – 1995.00	25.01-28.25	4.56 – 4.90	65.01 – 70.00
High	> 1995.00	> 28.25	> 4.90	> 70.00

completion of the test, and the total number of heart beats are counted between 1 to 1,5 minutes after finishing. This is the only measure required if using the short form of the test. If the long form of the test is being conducted, there is an additional heart rate measures at between 2 to 2,5 minutes, and between 3 to 3,5 minutes.

The results of testing the level of physical performance of qualified football players are differentiated into 5 levels in accordance with the data in the table 1.

During the experimental studies, the participants gave informed consent to the processing of personal data in accordance with the requirements of the Declaration of Helsinki of the World Medical Association "Ethical principles of medical research with the participation of a person as an object of research".

Statistical analysis

The obtained experimental materials were processed by the package of application programs "IBM SPSS Statistics" with the calculation of the following indicators: arithmetic mean (X); arithmetic mean error (S); σ – mean square deviation; Student's t-test, which is a test of the reliability of the normal distribution for equal and unequal samples with (n-1) degrees of freedom. Statistically reliable differences are accepted as significant at a 5% significance level of $p < 0,05$.

Results

Experimental studies were carried out during the educational and training gathering of qualified football players

of MFC "Metalurg" (Zaporizhzhya) taking into account the direction of training loads, which is presented in table 2.

The predominant focus of the training process is the comprehensive development of technical and tactical preparedness and physical capacity of qualified football players. The main task of the educational and training camp of qualified football players MFC "Metalurg" (Zaporizhzhya) is integral preparation for official competitions – to the second stage of the "Champion" group VBET UA 2022-2023 season of Professional Football League of Ukraine.

Table 3 shows the indicators of the physical performance of qualified football players, which were recorded by control tests at the end of the retracting, impact and subduction microcycles in the preparatory period of training

Analysis of the dynamics of indicators of special physical performance of qualified footballers according to tests PWC₁₇₀ and VO₂ max allows us to state that the proposed methodical approach is sufficiently effective. During the educational and training meetings, the test indicators (PWC₁₇₀ and VO₂ max) had statistically significant differences in the direction of decreasing values of special physical capacity, from retractable microcycle to percussive microcycle ($p < 0,05$): aPWC₁₇₀ – $1469,33 \pm 50,11$ and $1377,67 \pm 49,11$ (kg•m•min⁻¹), rPWC₁₇₀ – $20,87 \pm 0,69$ and $20,71 \pm 0,71$ (kgm•min⁻¹•kg⁻¹), aVO₂ max – $4002,23 \pm 115,23$ and $3857,54 \pm 117,34$ (ml•min⁻¹), rVO₂ max – $61,57 \pm 1,51$ and $54,37 \pm 1,67$ (ml•min⁻¹•kg⁻¹), in accordance.

Also, during the educational and training meetings, the test indicators had statistically significant differences in the direction of increment values of special physical capacity: from percussive microcycle to submersible microcycle

Table 2. Orientation of training loads of qualified football players of MFC "Metalurg" (Zaporizhzhya) in microcycles of the preparatory period, %

Types of sports training	Types of microcycles				
	retractable	basic	percussive	restorative	submersible
general physical training	15	15	10	0	0
special physical training	0	10	15	5	10
technical and tactical training	20	20	20	30	30
integrated training	0	0	0	30	35
psychological preparation	5	5	5	5	5
control game	40	30	30	0	0
MFR and stretching	5	5	5	10	5
restorative measures	5	5	5	10	5
theoretical training	5	5	5	5	5
testing	5	5	5	5	5
total	100	100	100	100	100

Table 3. Dynamics of indicators of physical performance of qualified football players MFC “Metalurg” (Zaporizhzhya), n=25

Tests & Indicators	Types of microcycles & Levels		
	retractable	percussive	submersible
aPWC ₁₇₀ (kg•m•min ⁻¹)	1469.33 ± 50.11 average	1377.67 ± 49.11* average	1494.34 ± 51.78** average
rPWC ₁₇₀ (kgm•min ⁻¹ •kg ⁻¹)	20.87 ± 0.69 average	20.71 ± 0.71* average	21.37 ± 0.85** average
aVO ₂ max (ml•min ⁻¹)	4002.23 ± 115.23 average	3857.54 ± 117.34* average	3997.09 ± 114.89** average
rVO ₂ max (ml•min ⁻¹ •kg ⁻¹)	61.57 ± 1.51 average	54.37 ± 1.67* average	63.67 ± 1.71** average

Notes: * – statistically significant differences between indicators at retractable and percussive microcycles (p<0,05); ** – statistically significant differences between indicators at percussive and submersible microcycles (p<0,05);

(p<0,05): aPWC₁₇₀ – 1377,67 ± 49,11 and 1494,34 ± 51,78 (kg•m•min⁻¹), rPWC₁₇₀ – 20,71 ± 0,71 and 21,37 ± 0,85 (kgm•min⁻¹•kg⁻¹), aVO₂ max – 3857,54 ± 117,34 and 3997,09 ± 114,89 (ml•min⁻¹), rVO₂ max – 54,37 ± 1,67 and 63,67 ± 1,71 (ml•min⁻¹•kg⁻¹), in accordance.

In addition, during the retractable, basic and percussive microcycles, six control games were held:

- 11.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “Scala-1911” (Morshyn) – 1:0;
- 12.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “Mykolaiv” (Mykolaiv) – 0:2;
- 18.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “LNZ” (Chercasy) – 1:1;
- 22.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “Bukovina” (Chernivtsi) – 1:1;
- 24.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “Ruh” (Lviv) – 1:0;
- 25.03.2023. MFC “Metalurg” (Zaporizhzhya) – FC “Prykarpattya” (Ivano-Frankivsk) – 0:3.

As a result of the control games, the quantitative and qualitative indicators of the competitive practice of qualified footballers were taken into account: the level of the rival team (Premier League, I, II league, amateur team) and the main typological groups of athletes were determined (the main composition of the team; protocol lineup for the game; entry list for the competition).

As a result of the complex application of methods of developing technical and tactical preparedness and special working capacity of qualified footballers MFC “Metalurg” (Zaporizhzhya) in the preparatory period of training, a methodical approach has been determined that allows to effectively combine these areas during the training camp.

Thus, the methodical approach to the complex development of technical and tactical preparation and physical capacity of qualified football players MFC “Metalurg” (Zaporizhzhya), which is applied in the preparatory period of training qualified football players for official competitions to the second stage of the “Champion” group VBET UA 2022-2023 season of Professional Football League of Ukraine, contains the following components:

- determination of a promising group of professional footballers to be included in the main team, taking into account game specialization;
- comparative analysis of quantitative and qualitative indicators of the level of competitive practice

(national or international competitions; friendly or official; starting lineup or substitution; indicators of time played; chronological development of the game, etc.);

- differentiation of the team composition into typological groups with appropriate individualization of their training: main team (11 footballers); protocol squad for the game (18 footballers); application squad for the competition (25 footballers);
- special analysis, assessment and interpretation of indicators of competitive activity of footballers (performance, efficiency of technical and tactical actions in different zones of the playground, chronological segments of time, etc.);
- differentiated analysis, assessment and interpretation of indicators of competitive activity of footballers according to certain typological groups: the main composition of the team; protocol lineup for the game; entry list for the competition (efficiency, effectiveness of technical and tactical actions).

Discussion

In the experimental researchers, a scientific problem with elements of scientific novelty was raised: added data on the training of qualified football players (Hoff, 2005; Kaczorowska, et al., 2022), testing of their special physical performance indicators using instrumental methods: PWC₁₇₀ and VO₂ max (Kokareva et al., 2018; Lisenchuk et al., 2019). Problematic issues concerning the adequacy of determining the indicators of special preparedness among young football players based on taking into account the age-related features of the development of their bodies have gained further development (Chau, 2021; Hanapih et al., 2020; Kalinowski et al., 2021).

Modern scientific concepts regarding testing of functional readiness, development and improvement of special physical capacity of qualified football players have been expanded (Kostiukevych et al., 2020; Kostiukevich et al., 2017; Shchepotina et al., 2021).

In the course of experimental studies, it has been shown that long-term maximum physical exertion, including high-intensity test exercises, can provoke increased traumatism of the musculoskeletal system of athletes (Dambroz et al., 2022; Doroshenko, 2015; Doroshenko et al., 2019).

The researchers note that, in this context, the problems of interrelationship of the mechanisms of energy supply for the muscular activity of qualified football players and the functional diagnosis of their current physical condition are significant (Lyzohub et al., 2020; Malikov et al., 2006).

This creates the necessary prerequisites for effective implementation of the existing technical and tactical potential of qualified football players in competitive activities, management of long-term training of athletes and control of the main parameters of their preparation: special physical capacity and integral playing qualities (Lisenchuk et al., 2023; Mitova, 2020; Nobari et al., 2023).

In further generalization, this indicates the need to differentiate the composition of the team into typological groups for effective sports training for official competitions at the national or international levels (Hoff, 2005; Kaczorowska et al., 2022; Kokareva et al., 2018; Lisenchuk et al., 2019).

Prospects for further research in this direction relate to the improvement of instrumental testing technologies for the special physical performance of qualified football players (testing protocols, evaluation and interpretation of the obtained indicators). Also promising are the issues related to the improvement of modern methodological approaches to determining the effectiveness of the complex application of training directions: to the development and improvement of special physical capacity and the maximum realization of the available technical and tactical potential of a football player in competitive activities.

Conclusions

Analysis and systematization of data from scientific and methodical literature and the electronic resource of global information network "Internet" indicates the final non-completion of this problem.

The way to solve this problem is the proposed methodical approach, which allows, on the one hand, to comprehensively approach the solution of the issue of the complex orientation of the training process of qualified football players in the preparatory period of training, on the other hand, it provides for the differentiation of the team composition into typological groups of athletes, which allows to have a targeted influence on indicators of special physical capacity and technical and tactical potential of qualified football players.

Analysis of the dynamics of indicators of special physical performance of qualified footballers according to tests PWC₁₇₀ and VO₂ max allows us to state that the proposed methodical approach is sufficiently effective. During the educational and training meetings, the test indicators (PWC₁₇₀ and VO₂ max) had statistically significant differences in the direction of decreasing values of special physical capacity: from retractable microcycle to percussive microcycle ($p < 0,05$). In accordance, during the educational and training meetings, the test indicators had statistically significant differences in the direction of increment values of special physical capacity: from percussive microcycle to submersible microcycle ($p < 0,05$).

Conflict of interest

The authors state no conflict of interest.

References

- Kokareva, S., Kokarev, B., & Doroshenko, E. (2018). Analysis of the State of Highly Skilled Football Players' Musculoskeletal System at the Beginning of the 2nd Preparatory Period of the Annual Macrocycle. *Physical Education, Sports and Health Culture in Modern Society*, 4, 64-68. <https://doi.org/10.29038/2220-7481-2018-04-05-64-68>.
- Lisenchuk, G., Zhigadlo, G., Tyshchenko, V., & et al. (2019). Assess Psychomotor, Sensory-Perceptual Functions in Team-Sport Games. *Journal of Physical Education and Sport*, 19(2), 1205-1212. <https://doi.org/10.7752/jpes.2019.02175>
- Lisenchuk, G., Leleka, V., Bogatyrev, K. & et al. (2023). Fitness Training in Functional Preparedness of Highly Qualified Football Players. *Journal of Physical Education and Sport*, 23(2), 502-509. <https://doi.org/10.7752/jpes.2023.02062>
- Mitova, O. (2020). Formation of a Test System for Controlling the Preparedness of Players in Team Sports Games. *Sport Science and Human Health*, 4(2), 88-101. <https://doi.org/10.28925/2664-2069.2020.2.8>
- Lisenchuk, G., Leleka, V., Bogatyrev, K. & et al. (2023). Fitness Training in Functional Preparedness of Highly Qualified Football Players. *Journal of Physical Education and Sport*, 23(2), 502-509. <https://doi.org/10.7752/jpes.2023.02062>
- Nurimov, E.R. (2021). Assessment of the Situation During the Training Qualified of Football Players. *European Scholar Journal*, 2(3), 211-213. <https://www.scholarzest.com/index.php/esj/article/view/395>
- Pertsukhov, A., & Shalenko, V. (2021). Model Characteristics of Leading Football Players of Different Positions. *Slobozhanskyi Herald of Science and Sport*, 1(81), 47-58. <https://doi.org/10.15391/snsv.2021-1.007>
- Balsom, P., Hawkins, R., & Strudwick, T. (2022). Physical Preparation of the Modern Elite Football Player for Domestic and International Competitions with Special Reference to Congested Fixture Periods. *Aspetar: Sports Medicine Journal*, 11(25), 28-35. <https://www.aspetar.com/journal/viewarticle.aspx?id=560#.ZDMFPPXZBxPY>
- Bergstrom, H.C., Dinyer, T.K., Succi, P.J., & et al. (2021). Applications of the Critical Power Model to Dynamic Constant External Resistance Exercise: A Brief Review of the Critical Load Test. *Sports*, 9(2), 15. <https://doi.org/10.3390/sports9020015>
- Permadi, A.A. (2019). The Development of Physical and Psychological Training Models to Improve Football Performance. *Advances in Social Science, Education and Humanities Research*, 407, 1-7. <https://doi.org/10.2991/assehr.k.200219.002>
- Li Y., & Zeng S. (2021). Modeling and Analysis of Football Players' Specific Physical Ability Based on Training Evaluation Index. *Security and Communication Networks*. Article ID 1446971. <https://doi.org/10.1155/2021/1446971>
- Woods, C.T., Cripps, A., Hopper, L., & Joyce, C. (2017). A Comparison of the Physical and Anthropometric Qualities Explanatory of Talent in the Elite Junior Australian Football Development Pathway. *Journal of Science and Medicine in Sport*, 20(7), 684-688. <https://doi.org/10.1016/j.jsams.2016.11.002>
- Dodd, K.D., & Newans, T.J. (2018). Talent Identification for Soccer: Physiological Aspects. *Journal of Science and*

- Medicine in Sport, 21(10), 1073-1078.
<https://doi.org/10.1016/j.jsams.2018.01.009>
- Kaczorowska, I., Tota, L., & Pałka, T. (2022). Assessment of the Level of Somatic Indicators and Aerobic Physical Capacity in First League Footballers. *Journal of Physical Education and Sport*, 22(5), 1311-1318.
<https://doi.org/10.7752/jpes.2022.05164>
- Lyzohub, V., Shpaniuk, V., Pustovalov, V., & Kozhemiako T. (2020). Relationship Between Physical Performance and Bioenergetic Mechanisms of Ensuring the Game Activity of Football Players. *Cherkasy University Bulletin: Biological Sciences Series*, 2, 66-75.
<https://doi.org/10.31651/2076-5835-2018-1-2020-2-66-75>
- Nobari, H., Gorouhi, A., & Mallo, J. (2023). Variations in Cumulative Workload and Anaerobic Power in Adolescent Elite Male Football Players: Associations with Biological Maturation. *BMC Sports Science, Medicine and Rehabilitation*, 15(11).
<https://doi.org/10.1186/s13102-023-00623-5>
- Dambroz, F., Clemente, F.M., & Teoldo I. (2022). The Effect of Physical Fatigue on the Performance of Soccer Players: A Systematic Review. *PLoS ONE*, 17(7), e0270099.
<https://doi.org/10.1371/journal.pone.0270099>
- Doroshenko, E. (2015). Application of Stretching Techniques in Physical Rehabilitation of Football Players with Traumas of Upper and Lower Limbs. *Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports*, 19(7), 11-16.
<https://doi.org/10.15561/18189172.2015.0702>
- Doroshenko, E., Malakhova, S., Chernenko, O., & et al. (2019). Therapeutic Exercises in the Process of Physical Rehabilitation of Athletes with Traumatic Injuries of the Musculoskeletal System (Based on Futsal). *Current Issues in Pharmacy and Medicine: Science and Practice*, 3, 357-364. <https://doi.org/10.14739/2409-2932.2019.3.184252>
- Garrett, J., Graham, S.R., Eston, R.G., & et al. (2019). A Novel Method of Assessment for Monitoring Neuromuscular Fatigue in Australian Rules Football Players. *International Journal of Sports Physiology and Performance*, 14(5), 598-605. <https://doi.org/10.1123/ijspp.2018-0253>
- Griffin, A., Kenny, I.C., Comyns, T.M., & Lyons M. (2020). The Association between the Acute: Chronic Workload Ratio and Injury and its Application in Team Sports: A Systematic Review. *Sports Medicine*, 50(3), 561-580. <https://www.researchgate.net/publication/350357284>
- Sirenko, P., Istomin, A., Sirenko, R., & et al. (2022). Special and Preventive Exercises for Hamstring Muscles in the Training Process of Experienced Football Players. *Pedagogy of Physical Culture and Sports*, 26(5), 344-352.
<https://doi.org/10.15561/26649837.2022.0509>
- Chau, V.H. (2021). Research on Physical Fitness Development for U10 five-a-side Football Teams. *The Open Sports Sciences Journal*, 14, 92-97.
<https://doi.org/10.2174/1875399X02114010092>
- Hanapiyah, K. S. B., Hashim, A. Bin., & Abd Karim, Z. Bin. (2020). Influencing Effect of Physical Fitness Components on Football Playing Ability Among Male Players Under 14 Years. *International Journal of Academic Research in Progressive Education & Development*, 9(3), 12-25.
<http://dx.doi.org/10.6007/IJARPEd/v9-i3/8086>
- Kalinowski, P., Jerszyński, D., & Nowakowska, M. (2021). Level of Speed Abilities of Young Football Players in Various Training Periods. *Health, Sport, Rehabilitation*, 7(2), 57-64.
<https://doi.org/10.34142/HSR.2021.07.02.05>
- Hoff, J. (2005). Training and Testing Physical Capacities for Elite Soccer Players. *Journal of Sports Sciences*, 23(6), 573-582. <https://doi.org/10.1080/02640410400021252>
- Kapelman, A.E., Kızılet, A., & Bozdogan. T. (2022). The Effect of Game Strategies on the Physiological, Physical, and Technical Loads of Soccer Players. *Annals of Applied Sport Science*, 10(1), 1-13.
<https://doi.org/10.52547/aassjournal.1014>
- Kostiukevych, V., Shchepotina, N., & Vozniuk, T. (2020). Monitoring and Analyzing of the Attacks of the Football Team. *Physical Education Theory and Methodology*, 20(2), 68-76. <https://doi.org/10.17309/tmfv.2020.2.02>
- Kostiukevich, V., Stasiuk, V., Shchepotina, N., & Dyachenko, A. (2017). Programming of Skilled Football Players Training Process in the Second Cycle of Specially Created Training During the Year. *Physical Education of Students*, 21(6), 262-269. <https://doi.org/10.15561/20755279.2017.0602>
- Shchepotina, N., Kostiukevych, V., Asauliuk, I., & et al. (2021). Management of Training Process of Team Sports Athletes During the Competition Period on the Basis of Programming (Football-Based). *Physical Education Theory and Methodology*, 21(2), 142-151.
<https://doi.org/10.17309/tmfv.2021.2.07>
- Malikov, M., Bogdanovs'ka, N., & Svatiev, A. (2006). Functional diagnostics in physical education and sports. Zaporizhzhya: ZNU, 246. https://scholar.google.com.ua/citations?view_op=view_citation&hl=ru&user=o_SFBiWAAAAJ&scstart=20&pagesize=80&citation_for_view=o_SFBiWAAAAJ:Y5dfb0dijaUC
- Declaration of Helsinki of the World Medical Association "Ethical principles of medical research with the participation of a person as an object of research": Electronic resource. <https://ips.ligazakon.net/document/MU64021>

Параметри фізичної роботоздатності кваліфікованих футболістів у підготовчий період підготовки

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 7 с., 3 табл., 32 джерела.

Мета роботи: визначити рівень фізичної підготовленості кваліфікованих футболістів у підготовчий період річного макроциклу за тестовими показниками для формування раціональних програм їх підготовки до змагальної діяльності.

Матеріал і методи. Контингент: 25 кваліфікованих футболістів МФК «Металург» (Запоріжжя): 15 спортсменів – заявковий лист «А» і 10 спортсменів заявковий лист «В» до II етапу групи «Чемпіон» VBET UA 2022-2023 сезону Професіональної Футбольної Ліги України. Методи: аналіз та систематизація даних науково-методичної літератури та електронних ресурсів глобальної інформаційної мережі «Інтернет»; педагогічні спостереження; педагогічне тестування: PWC₁₇₀ (Physical Working Capacity); Гарвардський степ-тест; педагогічний експеримент контролюючої спрямованості; методи математичної статистики.

Результати. Під час навчально-тренувальних зборів показники тестів мали статистично значущі відмінності у бік зменшення значень спеціальної фізичної працездатності з втягувального до ударного мікроциклу ($p < 0,05$): aPWC₁₇₀ – $1469,33 \pm 50,11$ та $1377,67 \pm 49,11$ (кг•м•хв⁻¹), rPWC₁₇₀ – $20,87 \pm 0,69$ і $20,71 \pm 0,71$ (кг•м•хв⁻¹•кг⁻¹), aVO₂ max – $4002,23 \pm 115,23$ і $3857,54 \pm 117,34$ (мл•хв⁻¹), rVO₂ max – $61,57 \pm 1,51$ і $54,37 \pm 1,67$ (мл•хв⁻¹•кг⁻¹), відповідно. Також під час навчально-тренувальних зборів показники тестів мали статистично значущі відмінності за напрямом приросту значень спеціальної фізичної працездатності: від ударного до підвідного мікроциклу ($p < 0,05$): aPWC₁₇₀ – $1377,67 \pm 49,11$ і $1494,34 \pm 51,78$ (кг•м•хв⁻¹), rPWC₁₇₀ – $20,71 \pm 0,71$ і $21,37 \pm 0,85$ (кг•м•хв⁻¹•кг⁻¹), aVO₂ max – $3857,54 \pm 117,34$ і $3997,09 \pm 114,89$ (мл•хв⁻¹), rVO₂ max – $54,37 \pm 1,67$ і $63,67 \pm 1,71$ (мл•хв⁻¹•кг⁻¹), відповідно.

Висновок. Шляхом реалізації мети дослідження є запропонований методичний підхід, який дозволяє, з одного боку, комплексно підійти до вирішення питання комплексної спрямованості тренувального процесу кваліфікованих футболістів у підготовчий період підготовки, з іншого боку, передбачається диференціація складу команди на типологічні групи спортсменів, що дозволяє цілеспрямовано впливати на показники спеціальної фізичної працездатності та техніко-тактичного потенціалу кваліфікованих футболістів.

Ключові слова: футбол, кваліфікація, підготовленість, спеціальна фізична працездатність, функціональна підготовленість.

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