ORIGINAL ARTICLE

The efficacy and safety of the training process in sumo through autogenic training for professional wrestlers

Yuliya Holenkova[1ABCDE], Leonid Vostroknutov[1ABCDE], Pavol Bartik[2CDE]

[1] *H.S. Skovoroda Kharkiv National Pedagogical University; Ukraine.*
[2] *Matej Bel University in Banska Bystrica, Slovakia*

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Abstract

Background and Study Aim Considering the high demands for physical and psychological preparedness in sumo, the implementation of comprehensive approaches to training becomes relevant. Such an approach ensures the improvement of sports results and the health maintenance of athletes. The study is aimed at analyzing the effectiveness of autogenic training in the educational and training process among experienced sumo wrestlers.

Material and Methods The analysis is based on the observation of 10 experienced sumo wrestlers from the "Adrenaline" sports club in Kharkiv, Ukraine. Methods used to assess the psycho-emotional and physical state of athletes included the SAN test, heart rate measurement, the Stange and Genchi tests, reaction time measurement, and the Romberg test. Mastery of autogenic training techniques took place in a group over 5 weeks at the end of each training session. After the first week, a visualization technique was added to the autogenic training. For the analysis and visualization of the obtained data it was used the integrated development environment PyCharm Community Edition. The programming code was written in Python. The experiment was conducted in Kharkiv (Ukraine), which has been located in a war zone since February 2022. The requirements of the military administration for ensuring the safety of the experiment participants were observed.

Results Significant improvements were observed in the psycho-emotional state of athletes, including a reduction in anxiety levels by 6.5 points ($p<0.01$) and an improvement in reactionmetry indicators by 3.4 cm ($p < 0.05$). Improvements were also noted in the well-being, mood, and activity of athletes. At the end of the experiment, no significant changes were observed in heart rate and the Stange and Genchi tests. A noticeable improvement was shown in the Genchi test, although these changes did not reach statistical significance. The results of the reactionmetry significantly improved, confirming the effectiveness of the training in enhancing the athletes' reaction speed.

Conclusions The study confirmed that autogenic training is an effective means of improving not only the psycho-emotional state but also the physical readiness of sumo wrestlers. The implementation of such methods can contribute to increasing the safety and effectiveness of the educational and training process, as well as achieving higher sports results while maintaining the health of athletes.

Keywords: autogenous training, visualization, sumo wrestling, athletes, training process.

Introduction

Modern high-performance sports, especially in disciplines with unique physical and psychological demands such as sumo face a complex challenge. It is necessary not only to achieve high sports results but also to ensure the health preservation of athletes. In this context, researching effective training methods that can contribute to simultaneously improving performance and maintaining the physical health of athletes becomes particularly relevant.

Autogenic training is a method of relaxation and self-regulation that was developed to improve the physical and psychological preparation of athletes. Various studies have identified its potential in increasing the level of sports effectiveness and stress management [1, 2, 3]. The study by Ugurlu et al. [4] examining the impact of autogenic training on the visual and auditory reaction time of national badminton athletes. The findings of the study indicate that autogenic training does not have a statistically significant effect on the studied reaction parameters among badminton players. Lope Fernandez et al. [5] measured the stress level before and after psychological intervention among semi-professional footballers. The results showed a significant reduction in stress levels, highlighting the effectiveness of the methods used.

Ortigosa-Márquez et al. [6] analyzed the impact of regular practice of autogenic training on lung volume, subjective vitality, and competitive anxiety. The study revealed significant improvements in subjective vitality and a reduction in competitive anxiety. The results of other studies also indicate the positive effect of autogenic training on sports outcomes [7, 8, 9, 10].

doi:10.15561/health.2024.0102

The analysis of research on sumo training highlights several key aspects. The work by Ochiai and Takeda [11] emphasizes the uniqueness of sumo among sports, particularly in the context of the short duration of matches and the need to maintain a high level of muscular strength. Ogawa et al. [12] focus on the morphological characteristics of sumo wrestlers, noting their differences from athletes in other sports and underlining the importance of adapting training methods.

Contemporary research, such as the work by Ota and Kimura [13], addresses the issue of injuries. The authors propose statistical models for predicting and preventing injuries. This underscores the need for a comprehensive approach to the training process, including technical and tactical preparation [14, 15]. Special attention is also given to training methods aimed at developing the physical qualities of athletes [16, 17, 18]. These and other studies [19, 20] represent a significant contribution to the development of effective training programs that enhance sports results and prevent injuries.

Thus, the studies presented highlight the importance of an integrated approach to the preparation of sumo wrestlers, including physical, technical-tactical, and psychological training. The introduction of autogenic training and statistical prediction of injuries are just parts of the efforts to achieve these goals. This approach promises not only to enhance the sports performance of wrestlers but also to contribute to their overall well-being and health. It reinforces the foundation for achieving high results without compromising the physical and emotional state of athletes. The research is aimed at analyzing the effectiveness of autogenic training in the educational and training process among experienced sumo wrestlers.

Materials and Methods

Participants

The analysis is based on observations of 10 experienced sumo wrestlers from the "Adrenaline" sports club in Kharkiv, Ukraine. This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University.

Special Conditions of the Experiment

The experiment was conducted in Kharkiv (Ukraine), which is located in a war zone since February 2022. The requirements of the military administration for ensuring the safety of the experiment participants were observed. Participants were informed about specific actions during the announcement of alarm signals in the city (loud siren sounds and a message on the mobile phone) and had already acquired practical skills for such actions.

Study Design

Methods for assessing the psycho-emotional and physical state were used, including the SAN test and a series of physiological tests, to evaluate the impact of autogenic training and visualization on the overall readiness of athletes. The mastery of autogenic training techniques occurred in a group over 5 weeks at the end of each training session. After the first week, a visualization technique was added to the autogenic training. In the first week, autogenic training was conducted with an audio recording to learn the text of formulations and instructions, and then the athletes performed it independently. Surveys of the athletes' state were conducted before and after each session of autogenic training.

At the beginning of the experiment, an assessment of the athletes was conducted after the completion of training to identify their functional state following the training load. At the end of the training, athletes used breathing exercises for recovery.

During the study, sumo wrestlers mastered the technique of autogenic training at the end of their training sessions, learning the technique of relaxation. After the first week, they independently performed autogenic training and used a series of phrases or affirmations that helped them relax and affect their physical and emotional state. Common phrases that can be used in autogenic training were divided into 6 stages:

1. Concentration on the sensation of heaviness in the arms and legs (starting with the leading leg and arm);
2. Concentration on the sensation of warmth in the arms and legs (starting with the leading arm and leg);
3. Concentration on the sensation of warmth in the heart area;
4. Concentration on breathing;
5. Concentration on the sensation of warmth in the abdominal area;
6. Concentration on the sensation of coolness in the forehead area.

The phrases of each stage are aimed at creating a sense of relaxation and calmness in different parts of the body. After this, a visualization method was applied, invoking pleasant memories or successful performances and victories in competitions. At the end of the experiment, a study was conducted on the impact of the learned technique on the wrestlers' recovery after training load.

Statistical Analysis

For the analysis and visualization of the obtained data, the integrated development environment PyCharm Community Edition was used. The programming code was written in Python, with a primary emphasis on using the Matplotlib library for creating graphs and diagrams. The NumPy library

was used for processing statistical data, including calculating mean values, standard deviations, and determining the statistical significance of results. Differences were considered significant at a significance level of $p<0.05$.

Results

Changes in heart rate indicators, the Stange and Genchi tests, reactionmetry, as well as in the Romberg test, allow evaluating the effectiveness of the training process before and after training at the beginning of the experiment (fig. 1).

The data analysis of Figure 1 (at the beginning of the experiment - before and after training) shows a significant increase in heart rate (HR) after training. This indicates the high intensity of the training process and its impact on the cardiovascular system of the athletes. Statistically significant changes in the Stange and Genchi tests, reactionmetry, and the Romberg test were not observed. This may indicate the stability of respiratory and nervous system functional indicators in athletes at this stage of the training process. Thus, the current training regime has a substantial impact on the level of physical fitness, especially affecting the cardiovascular system.

At the final stage of the experiment, an analysis of the athletes' physical condition before and after training was conducted. The results of this analysis are presented in Figure 1 (end of the experiment - before and after training).

From the data in Figure 1 (end of the experiment - before and after training), it follows that no significant changes in HR and the Stange and Genchi tests were observed. This indicates the stabilization of the athletes' physical condition under the influence of the training process. A noticeable improvement was shown in the Genchi test, indicating increased endurance, although these changes did not reach statistical significance. However, the results of the reactionmetry significantly improved, confirming the effectiveness of the training in improving the reaction speed of athletes. The indicators of the Romberg test also improved but without statistically significant changes. This could indicate an improvement in coordination abilities. Overall, the results underscore the importance of a comprehensive approach in the training process for developing various aspects of physical fitness.

The results obtained at the end of the training session at the initial stage of the experiment and after its completion allow for the assessment of the dynamics of changes in physical indicators under the influence of the training process (Fig. 2).

The data in Figure 2 demonstrate significant improvements in the physical condition indicators of athletes by the end of the experiment. Particularly noticeable is the reduction in heart rate after training, indicating an improvement in the cardiovascular system and overall endurance of the athletes. Progress is also observed in the Genchi test, indicating an increase in respiratory endurance. The improvement in reactionmetry reflects an increase in the athletes' reaction speed. Despite the lack of statistical significance in the changes in the Stange test and the Romberg test, the overall trend

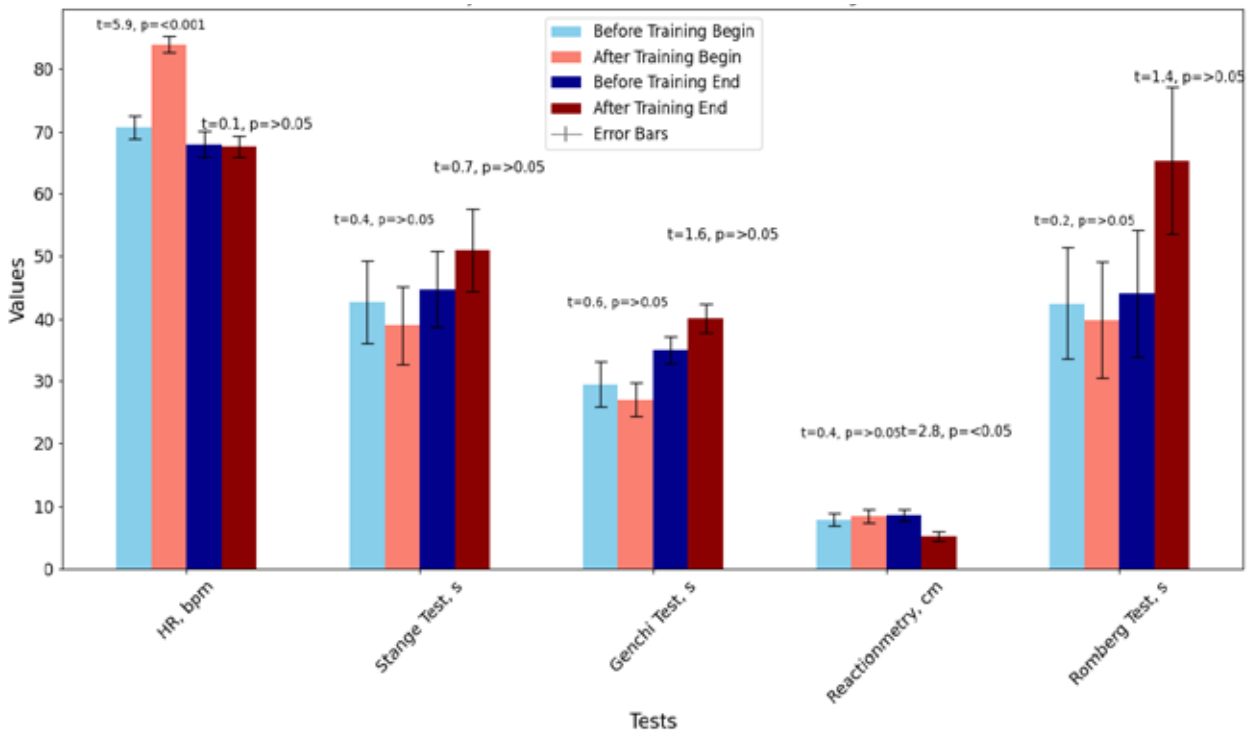

Figure 1. Physical state indicators of athletes before and after training at the beginning of the experiment and at the end of the experiment (n=10)

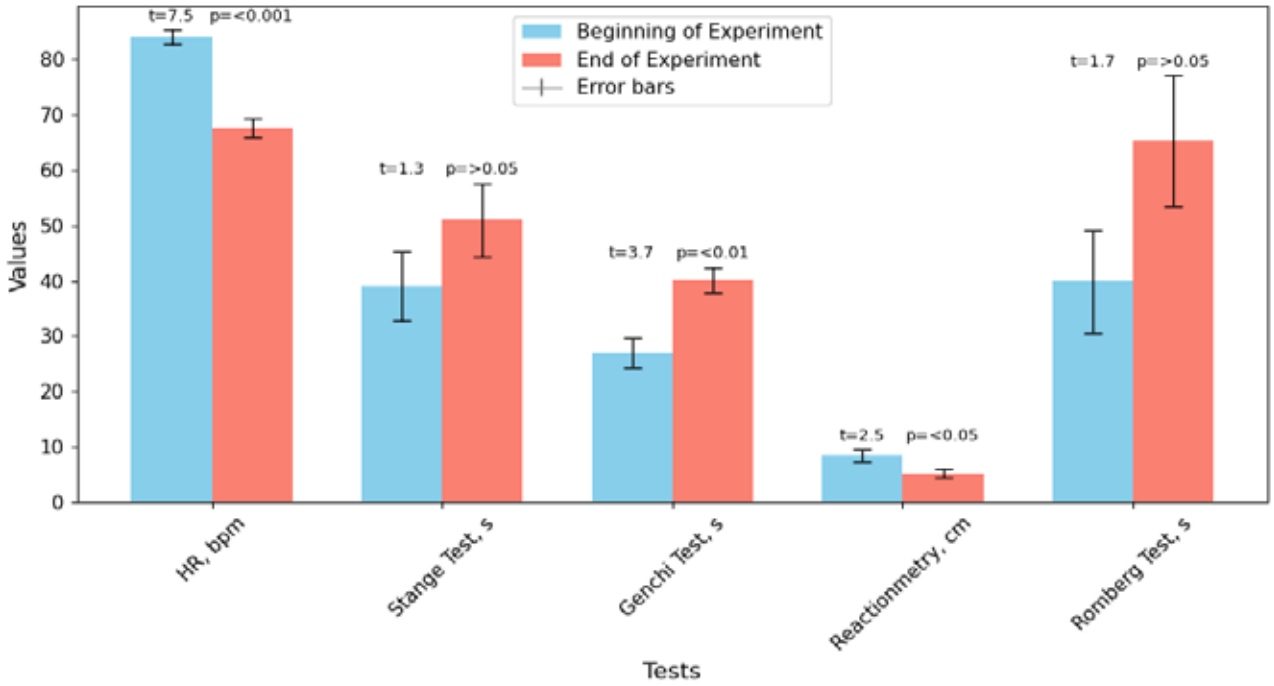

Figure 2. Physical condition indicators of athletes (n=10) after training at the beginning and at the end of the experiment

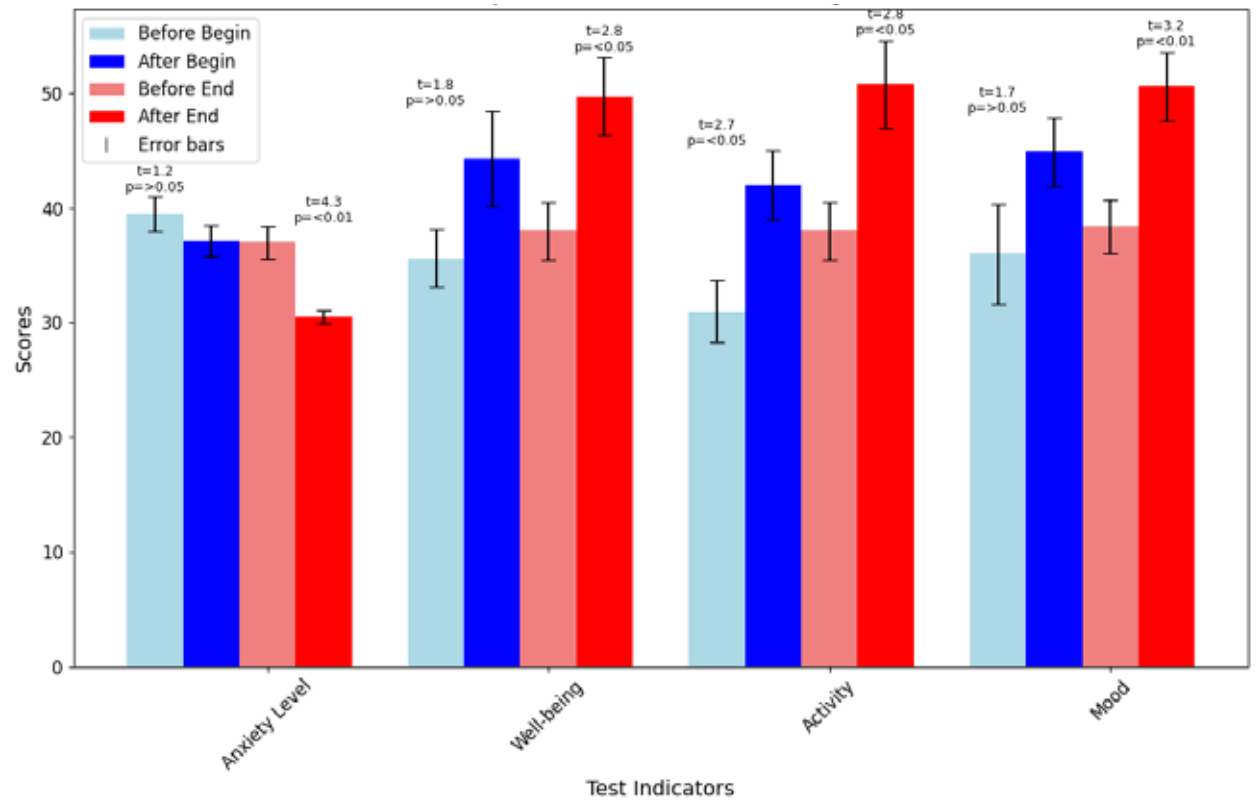

Figure 3. Indicators of situational anxiety level and SAN test of athletes (n=10) before and after autogenic training at the beginning and end of the experiment.

indicates a positive impact of the training process on the physical condition of the athletes.

As part of the experiment, an analysis was conducted on the impact of autogenic training on the level of situational anxiety and indicators of well-being, activity, and mood of athletes. The evaluation was carried out before and after sessions at the beginning and at the end of the experimental period. The results of the study are reflected in Figure 3.

The analysis of the results in Figure 3 demonstrates a significant reduction in the level

of situational anxiety among athletes by the end of the experiment, indicating the effectiveness of autogenic training. Furthermore, there is an improvement in the indicators of well-being, activity, and mood, especially noticeable in the final period of the study. These data highlight the positive impact of autogenic training on the psycho-emotional state of athletes, enhancing their physical and psychological adaptation to stress.

Discussion

The aim of the study was to assess the impact of autogenic training on sumo wrestlers. By the end of the experiment, an improvement in reaction speed indicated a positive effect of autogenic training. There was also a decrease in situational anxiety and an improvement in well-being, highlighting the importance of such training for the psychological well-being of athletes. Collectively, the results confirm the significance of autogenic training as an element of comprehensive preparation for sumo wrestlers.

During the analysis of the obtained results, their consistency and, in some cases, divergence with the conclusions of other studies in a similar field [11, 13, 14, 15] become evident. The increase in heart rate after training sessions noted in our study is confirmed by the works of other authors. For instance, the study by Ugurlu et al. [4] also highlights the intensity of the training process and its impact on the cardiovascular system, although they focused on badminton players.

However, regarding the impact of autogenic training on functional indicators, our results are less consistent with the findings of Ortigosa-Márquez et al. [6]. While those authors did find significant improvements in subjective vitality and a reduction in competitive anxiety among athletes, this discrepancy may indicate the specificity of the effects of autogenic training depending on the sport and individual characteristics of the athletes.

It is also interesting to compare our results with the study by Lope Fernandez et al. [5], which showed a significant reduction in stress levels following psychological intervention, including autogenic training, among footballers. This aligns with our observations of decreased situational anxiety among sumo wrestlers, confirming the effectiveness of autogenic training in managing the psycho-emotional state of athletes.

It is important to note that, despite the lack of statistical significance in some parameters in our study, the overall trend indicates a positive effect of autogenic training. This is corroborated by studies in other sports [5, 6, 8], including martial arts [9]. This highlights the potential of autogenic training as a tool for enhancing athletes' physical and psychological adaptation to training loads.

Thus, comparing our results with data from other studies confirms the significance of autogenic training in sports preparation. However, such confirmation points to the need for further investigation of its impact on various aspects of functional state and psycho-emotional well-being of athletes in different sports.

Conclusions

Our study has affirmed the importance of autogenic training in the comprehensive preparation of sumo wrestlers, showcasing its positive impact on both the physical and psychological adaptation of athletes. The discovered ability of autogenic training to enhance cardiovascular endurance and reduce the level of situational anxiety underscores its value in the educational and training process. Comparisons with other studies have shown agreement regarding the effectiveness of autogenic training, also highlighting the need to consider individual and sport-specific nuances in training approaches.

Overall, the results of our study can contribute to the development of more effective training programs that integrate autogenic training as a means to enhance sports achievements and ensure the psycho-emotional well-being of athletes. This paves the way for a deeper investigation into the impact of various relaxation techniques on professional sports, including the optimization and adaptation to specific sports and the individual needs of athletes.

References

1. Keilani M, Hasenöhrl T, Gartner I, Krall C, Fürnhammer J, Cenik F, et al. Use of mental techniques for competition and recovery in professional athletes. *Wiener klinische Wochenschrift*, 2016;128(9–10): 315–319. https://doi.org/10.1007/s00508-016-0969-x
2. Kozina Z, Shepelenko T, Cretu M, Safronov D, Bugayets N, Polianskyi A, Protsevskiy V. The effectiveness of autogenic training in the preparation of elite athletes in rhythmic gymnastics. *International Journal of Applied Exercise Physiology*, 2019; 8(2.1):868–878.
3. Pashkov I, Tropin Y, Romanenko V, Goloha V, Kovalenko J. Analysis of Competi- tive Activity of Highly Qualified Wrestlers. *Slobozhanskyi Herald of Science and Sport*, (5(85), 20–25. https://doi.org/10.15391/snsv.2021-5.003
4. Ugurlu D, Ilbak I, Akarsu M. Examination of the Effects of Autogenic Training on the Reaction Time Performance of the National Badminton Athletes. *Pakistan Journal of Medical and Health Sciences*, 2021;15(11): 3181–3184. https://doi.org/10.53350/pjmhs2115113181
5. Lope Fernandez DE, Solis Briceno OB. Coping strategies as stress intervention in soccer players. *Retos-Nuevas Tendencias en Educacion Fisica Deporte y Recreacion*, 2020;(38): 613–619.
6. Ortigosa-Márquez JM, Carranque-Cháves GA, Hernández Mendo A. Effects of autogenic training on lung capacity, competitive anxiety and subjective vitality. *Biomedical Research*, 2015; 26 (1): 71-76.
7. Litwic-Kaminska K, Kotysko M, Pracki T, Wilkosc-Debczynska M, Stankiewicz B. The Effect of Autogenic Training in a Form of Audio Recording on Sleep Quality and Physiological Stress Reactions of University Athletes-Pilot Study. *International Journal of Environmental Research and Public Health*, 2022;19(23): 16043. https://doi.org/10.3390/ijerph192316043
8. Anwar S, D J Asath. *Effect of autogenic training on selected psychological variable of handball players*. 2018; https://doi.org/10.13140/RG.2.2.26809.99689
9. Vesković A, Koropanovski N, Dopsaj M, Jovanović S. Effects of a psychological skill training program on anxiety levels in top karate athletes. *Revista Brasileira de Medicina do Esporte*, 2019;25(5): 418–422. https://doi.org/10.1590/1517-869220192505173969
10. Turki A, Haffani Fakhreddine. *Application of a relaxation technique, Autogenic Training of Schultz, to the federal men's basketball team*. 2004; https://doi.org/10.13140/RG.2.2.30898.96968
11. Ochiai R, Takeda J. Introduction to sumo wrestlers, the world's largest athletes. *Current Anaesthesia & Critical Care*, 2001;12(5): 267–272. https://doi.org/10.1054/cacc.2001.0345
12. Ogawa S, Furuta Y, Yamamoto K, Nagai N. Studies on the physical fitness of sumo wrestlers (report ii) (physical fitness and development of the sekitori). *Japanese Journal of Physical Fitness and Sports Medicine*, 1973;22(2): 45–55. https://doi.org/10.7600/jspfsm1949.22.45
13. Ota S, Kimura M. Statistical injury prediction for professional sumo wrestlers: Modeling and perspectives. Kovtun V (ed.) *Plos One*, 2023;18(3): e0283242. https://doi.org/10.1371/journal.pone.0283242
14. Rynkiewicz M, Żurek P, Kos H, Stronczyński W, Rynkiewicz T. Body composition of male and female elite Polish sumo wrestlers in different weight category. *Journal of Combat Sports and Martial Arts*, 2013;4(2): 153–157. https://doi.org/10.5604/20815735.1090661
15. Tropin Y, Holokha V, Ahmedov F. Technical and tactical arsenal of professional sumo wrestlers. *Martial Arts*, 2023;(1(27)): 78–90. https://doi.org/10.15391/ed.2023-1.07
16. Bairamov RKO, Bondar A, Wojnowska I. Sumo Coaches Training. *Polonia University Scientific Journal*, 2020;39(2): 153–157. https://doi.org/10.23856/3920
17. Bezkorovainy S. Dynamics of development of physical abilities of students using sumo. *Theory and Practice of Physical Culture and Sports*, 2023;(3): 10–15. https://doi.org/10.31470/2786-6424-1/2023-10-15
18. Bezkorovainy SB. The dynamics of the development of speed and strength abilities of students engaged in sumo in the conditions of optional classes. *Naukovo-pedagogichni problemi fizichnoi kul'turi,* 2019; 5(113): 9–12. (In Ukrainian).
19. Ananchenko KV, Chuev AIu, Zantaraia GM. The main areas of improvement of the competitive activity of sumo wrestlers. *Martial Arts*, 2019; (1): 4–14. (In Ukrainian).
20. Buravcov VV. Study of posture stability in sumo wrestling. *Naukovo-pedagogichni problemi fizichnoi kul'turi,* 2012; 24: 23–27. (In Ukrainian).

Information about the authors:

Yuliya Holenkova; (Corresponding Author); PhD, Associate Professor; https://orcid.org/0000-0003-1553-8893; yuliia.golenkova@hnpu.edu.ua; Department of Sports and Pedagogical Disciplines and Fitness, H.S. Skovoroda Kharkiv National Pedagogical University; Kharkiv, Ukraine.

Leonid Vostroknutov; PhD, Associate Professor; https://orcid.org/0000-0003-0896-1466; vld160464@gmail.com; Department of Sports and Pedagogical Disciplines and Fitness, H.S. Skovoroda Kharkiv National Pedagogical University; Kharkiv, Ukraine.

Pavol Bartik; https://orcid.org/0000-0002-2087-7876; pavol.bartik@umb.sk; Faculty of Physical Education, Sport and Health. Matej Bel University in Banska Bystrica; Banska Bystrica, Slovakia.

Cite this article as:
Holenkova Y, Vostroknutov L, Bartik P. The efficacy and safety of the training process in sumo through autogenic training for professional wrestlers. *Pedagogy of Health*, 2024;3(1):11–17. https://doi.org/10.15561/health.2024.0102

Received: 18.01.2024
Accepted: 22.02.2024; Published: 30.06.2024