



Coordination and development of aerobic direction: Prognostication

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Abstract

Purpose: The purpose of the study was to experimentally verify the level of influence of aerobic classes (cross training and basic aerobics) on the coordination of students' movements and to investigate the need to include these classes in the physical education curriculum. To test the results, we used the exercise "Somersaults Forward", which consisted of three somersaults over a period. The data obtained were analyzed using the Hurst method.

Material: 106 first-year students took part in the experiment (53 - the control group and 53 - the experimental). All participants received written consent to participate in this experiment. To process the experimental data, the R / S method was proposed.

Results: at the end of the experiment (May), the results of students in the experimental group differed qualitatively from the results of students in the control group. The results of the experiment indicate the need to include aerobic classes in the curriculum on physical education of students in groups with a sports orientation, in particular (sectional lessons) table tennis. The experimental program combines a curriculum with a sports orientation (sectional lessons) in table tennis - 75% of the total and aerobic classes (cross-training and basic aerobics) - 25%.

Conclusions: in this experiment, it was proved that the development and inclusion of table tennis, aerobic classes (cross training and basic aerobics) in the curriculum with a sports orientation (sectional lessons), and better coordinated the students' movements. And the method of exponential smoothing makes it possible to predict results for the future.

Keywords: aerobic classes; coordination; somersaults forward; hurst method; fractal analysis

1. Introduction

The problem of improving the process of physical education of students has for many years been the subject of attention of specialists. Analysis of the literature shows that the level of physical training, mental and moral strength of the majority of students remains quite low World Health Organization (2010). This testifies to the deterioration of the physical, mental and moral development of the young generation (Куделко В. Е, 2004) [13] the progress of impaired motor activity Whelton SP, (2002) [5], Бикмухаметов Р. К. (2003) [9] and Куделко В. Е. (2003) [15], which leads to the deterioration of student health. All this requires finding new ways to improve the physical, mental and moral status of student youth. According to previous studies, students evaluated the importance of developing physical qualities as follows: 1) endurance – 41,8%, 2) strength - 14,9%, 3) agility - 13,7%, 4) flexibility - 12,2%, 5) coordination – 9,8%, 6) speed – 7,6%. And their own level of physical fitness was evaluated as follows: 1) strength - 22,3%, 2) coordination - 19,5%, 3) speed - 16,1%, 4) flexibility - 15,3%, 5) agility - 14, 9%, 6) endurance - 11,9% Grinko VM (2018) [1], Grinko VM (2019) [2] and Гринько В.М. (2015). Issues of improvement of physical training of students have recently been considered in the works of a significant number of researchers: V. Grinko studied the impact of aerobic exercise; S. Isaac monitored physical activity. There is a great deal of work that studies such physical quality as coordination Бойченко С.Д. (2003) [10], Тихомиров А.К. (2006) [18]. However, there is not enough work to improve this quality, in particular in the groups with sports orientation (sectional classes) in table tennis. Based on this, the authors conducted a study aimed

at investigating the impact of aerobic exercise on student coordination in groups with sports orientation (sectional classes) table tennis. This hypothesis was experimentally tested and analyzed the state of coordination of student movements on the basis of the exercise "Somersaults Forwards" Grinko VM (2019) [4]. Aim of the study: To determine experimentally whether the coordination of students of aerobic character (cross training and basic aerobics), which are included in the program of groups with sports orientation (sectional classes) from table tennis of higher education, have influence on the coordination Положення про організацію фізичного виховання і масового спорту у вищих навчальних закладах. Міністерство освіти і науки України (10 березня 2006 р. N 249/12123) [17] and to investigate the necessity of their inclusion. Into the physical education curriculum.

2. Relationship with the work of scientific programs plans, topics

The study was conducted according to the thematic plan of the Kharkiv State Academy of Physical Culture of the scientific theme "Improvement of the process of physical education in educational institutions of different profile for 2016-2020" (state registration number 0115U006754).

3. Aim of the study

To find out the impact of aerobic classes on student coordination (cross training and basic aerobics), which are included in the program of groups of sports orientations (sectional classes) in table tennis at a higher educational institution and to investigate the need to include these classes in the curriculum of physical education. Material and

methods of research. The study involved 98 first-year students (49 - control group and 49 - experimental group). Informed consent to participate in this experiment was obtained from all participants. Methods of pedagogical observation, pedagogical experiment, and methods of mathematical statistics were applied in the study. For the processing of experimental data, the R / S method was proposed - a set of statistical techniques and methods of time series analysis, allowing determining some important characteristics of them, such as the presence of the non-frequency of cycles, memory, etc. A formative pedagogical experiment was conducted with the purpose of revealing the impact of aerobic training on the coordination of students in groups with sports orientation (sectional classes) ping-pong. For the pedagogical experiment, participants were divided into control and experimental groups.

4. Materials and methods. Participants

106 first-year students (53 - control group and 53 - experimental) participated in the experiment. Informed consent to participate in this experiment was obtained from all participants. The R / S method was proposed to process the experimental data. Procedure (study organization): A formative pedagogical experiment was conducted to identify the effect of aerobic training on student coordination in sports groups (sectional classes) ping-pong. For the pedagogical experiment, participants were divided into control and experimental groups. Given that the results of the exercise are nothing but time series, the Hurst algorithm was used for fractal analysis. The application of fractal analysis has been studied in the works of foreign and domestic scholars, such as M. Afanarov (2009), N. Novikov (2011) and others. Despite the large amount of research, the question of predicting the time series of physical education, taking into account their fractal properties, is not well understood, remains debatable and needs further research. Control and experimental groups were used to analyze the dynamics of the “Somersaults Forwards” exercise. The system of calculations was used and shown in publications 2017, # 2 and 2018 # 1 on the example of determination of special and general endurance Grinko VM, Kudelko VE and Hlotov YO (2017, 2018).

For fractal analysis, the Hurst algorithm was used, which is given in R / S analysis algorithm: according to the Hurst finding algorithm, the statistical parameters for the time series Y1 were initially found, which are given and needed to find the Hurst score.

5. Research results

For comparative analysis of control and experimental groups, a graphical comparative analysis is made, the results of which are shown in Fig. 1, 2, 3 and fig. 4.



Fig 1: The results of the dynamics of the exercise “Somersaults

Forwards” of the control group.

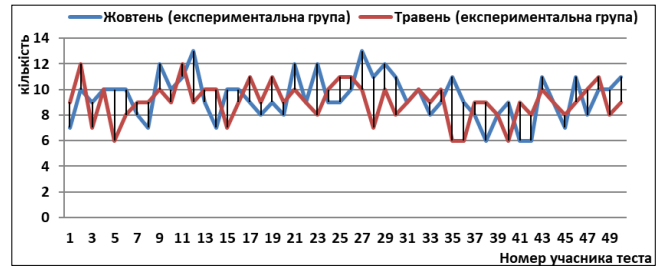


Fig 2: The results of the dynamics of the “Somersaults Forwards” exercise of the experimental group



Fig 3: Results of the dynamics of the “Somersaults Forwards” exercise in October months of the experimental and control groups



Fig 4: The results of the dynamics of the “Somersaults Forwards” exercise in May months of the experimental and control groups

As can be seen from the data of Fig. 1 - fig. 4, the average in October was 9.32 seconds for the experimental group and 9.3 for the control group, which was 0.02 seconds. More for May 9.0 and 9.19 which is 0.19 sec. less. This proves that the program we have developed to integrate aerobic training (cross training and basic aerobics) into the section-training program (ping-pong) to improve overall and special endurance has a positive effect on such physical quality as coordination Grinko VM, Kudelko VE and Hlotov YO. (2019).

It is advisable to use exponential smoothing to predict such time series. The exponential smoothing method is most effective in developing medium-term forecasts. To predict the results of the dynamics of the “Somersaults Forwards” exercise by the method of exponential smoothing, we use Professor Brown's formula (1): $U_{t+1} = \alpha * Y_t + (1 - \alpha) * U_t$, (1).

Using the formula 1, we calculate the predicted dynamics of the exercise “Somersaults Forwards”. The data are summarized in Table. 1

Table 1: Predicted values of the dynamics of the “Somersaults Forwards” exercise for the control and experimental groups (sec.)

For the control group (May)	For the experimental group (May)
8,961	8,901

The average relative error of the theoretical and actual values for the control and experimental groups does not exceed 10%.

6. Discussion (Discussion of results)

After the statistical processing and comparison of the obtained data with the data of previous studies Тодоров А.С. (1991), such physical quality as coordination, in students has become at a higher quality level. The authors of Бойченко С.Д. (2003)^[10] in their studies are limited only by the influence of aerobic exercise on the overall health. Others Барчукова Г.В. (2002) apply aerobic exercise only at the beginning of the session and at the end, during general physical training. Our proposed method is fundamentally different from those developed earlier. The obtained results complement the scientific data on aerobic exercise and their influence on coordination Grinko VM, Kudelko VE and Hlotov YO. (2017, 2018). *For the first time*: the effectiveness of the methodological approach to the development of a program of physical education for students of groups with sports orientation, which combines the conventional means of development of physical qualities and the latest techniques for their improvement, has been experimentally proven. The program of physical education for students of groups with sports orientation (sectional classes) ping-pong with the inclusion of aerobic classes (cross training and basic aerobics) is substantiated Grinko VM, Kudelko VE and Hlotov YO. (2019).

7. Conclusions

After statistical processing and comparison of the obtained data with the data of previous researches Куделко В. Е (2006), such physical quality as coordination, at students became at a higher quality level. The authors of works in their studies are limited only by the influence of aerobic exercise on the overall health. Others apply aerobic exercise only at the beginning of training and at the end, during general physical training. Our proposed method is fundamentally different from the previously developed ones. The results obtained complement the scientific data on aerobic exercise and their effect on coordination. The methodological approach to the development of a program of physical education for students of groups with sports orientation has been experimentally proved, combining the conventional means of development of physical qualities and the newest methods for their improvement. The program of physical education for students of groups with sports orientation (sectional classes) ping-pong with the inclusion of aerobic exercises (cross training and basic aerobics) is substantiated. It is proved that the development and inclusion in the curriculum with sports orientation (sectional classes), aerobic classes (cross training and elements of basic aerobics), will greatly improve the students such physical quality - coordination. In addition, the exponential smoothing method makes it possible to predict the results for the future.

8. Prospects for further research

On this basis, further research is planned to be conducted in order to increase the level of development of students' physical qualities. Improvement and introduction of aerobic exercises (cross training and basic aerobics) for groups with sports orientation (sectional classes) ping-pong in the educational process of higher education institutions.

9. References

1. Grinko VM, Kudelko VE, Hlotov YO. Training of students' special endurance in ping-pong sport circles. *Physical education of students*. 2017; 2:52-60. doi: 10.15561 / 20755279.2017.0201.
2. Grinko VM, Kudelko VE, Hlotov YO. Prediction and increasing general student endurance levels by aerobic direction exercises. *Physical education of students*. Edited prof. Yermakova SS – Kharkov. 2018; 1:23-30.
3. Grimko VM. Attitudes of students to physical culture and a healthy life. *Motivation. International Journal of Physiology, Health and Physical Education. India*. 2019; 1(1):24-26.
4. Grinko VM, Kudelko VE, Hlotov YO. The Effect of Aerobic Engagement on Coordination. Its Dynamics and Prognosis. *The Journal of Physical Education and Sport (JPES)*. Romania, December 31, 2018, pp. 2350-2357. DOI: 10.7752/jpes.2018.04354
5. Whelton SP, Chin A, Xin X, He J. The effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. *Ann Intern Med*. 2002; 136:493-503.
6. World Health Organization. *Global recommendations on physical activity for health*. Geneva, Switzerland, WHO, 2010, 1-60.
7. Афонасова МА. Управление формированием наукоемких интегрированных структур в инновационноактивных регионах. *Фундаментальные исследования*, 2009, №3. С. 111-112.
8. Барчукова ГВ. *Настольный теннис в вузе: учебное пособие для студентов нефизкультурных вузов*. Г.В. Барчукова, А.Н. Мизин. М.: СпортАкадемПресс, 2002, 132 с.
9. Бикмухаметов РК. Содержание процесса физического воспитания в системе педагогического образования. *Теория и практика физической культуры*, 2003; (3):45-50.
10. Бойченко СД. некоторых аспектах концепции координации и координационных способностях в физическом воспитании и спортивной тренировке. С.Д. Бойченко, Е.Н. Карсеко, В.В. Леонов, А.Л. Смотрицкий: *Теория и практика физической культуры*. 2003; (8):15-18.
11. Гринько ВМ. Ставлення студентів до фізичного виховання і здорового способу життя та їх самооцінка рівня фізичної підготовленості. *Слобожанський науково – спортивний вісник*. Харків: ХДАФК. 2015; 1(45):55-59.
12. Гринько ВМ. Заняття аеробного характеру та їх можливий вплив на рівень загальної та спеціальної витривалості студентів. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ. 2015; 12(67):42-45.
13. Куделко ВЕ. Эффективность организационной деятельности в системе спортивных клубов. *Физическое воспитание студентов творческих специальностей: сб. науч. тр. под ред. Ермакова С.С. Х.: ХДАДМ (ХХП)*. 2004; (3):79-85.
14. Куделко ВЕ, Королінська СВ. Аналіз соціально-педагогічних основ формування потреб в самостійних заняттях фізичною культурою у студентів НФаУ. *Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту: Наук. моногр. За ред. проф. Єрмакова С.С. Х.:*

- ХДАДМ (ХХП). 2006; (12):93-96.
15. Куделко ВЕ, Щербіна ЗИ, Павленко ЕЕ. Оценка физического состояния и физической подготовленности студентов. Харьков: НфаУ, 2003, 44 с.
 16. Новикова НБ. Фрактальные методы и концепция экономически минимальных производственных систем в управлении инновациями. Н. Б. Новикова. Вестник ЮРГТУ (НПИ), 2011; (2):162-166.
 17. Положення про організацію фізичного виховання і масового спорту у вищих навчальних закладах. Міністерство освіти і науки України. 10 березня 2006 р. N 249/12123.
 18. Тихомиров АК. Развитие координационных способностей. А.К. Тихомиров: Физическая культура в школе. 2006; (4):29-31.
 19. Тодоров А.С. Контроль координации движений борцов вольного стиля. Дис. канд. пед. наук 13.00.04, А.С. Тодоров. М.: ГДОЛИФК, 1991, 240 с