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Original Article

Enhancing the physical education system for students with hypokinesia using power fitness technology

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Abstract
Background and Study Aim.: Hypokinesia poses a significant challenge in modern physical education systems because prolonged lack of motor activity can lead to physiological maladaptation. This condition decreases adaptive reserves and functional capabilities, thereby negatively impacting educational results. This study aims to develop a technology for improving the physical education of students with hypokinesia through power fitness and to assess its practical effectiveness. *Material and Methods.*: The research comprised two stages. First, a survey was conducted among university professors of physical education and specialists in kinesiology and power fitness, totaling 60 respondents. The practical part of the research involved 84 students (young men) with hypokinesia aged 19±0.3. Students were divided into three groups of 28 people according to the results of body fat mass indicators (BF, %). Participants of group A (BF=13.7%) used a model of recreational classes in physical education which is common for higher education institutions. Group B (BF=8.2%) took up the 1st experimental model of classes developed on the basis of power fitness. Group C (BF=27.8%) used the 2nd experimental model of classes with power fitness elements. Control testing of muscular strength development and results of bioimpedancemetry were used to determine the nature of adaptation processes. *Results*. Mechanisms for increasing the adaptive reserves of students with hypokinesia were developed based on the survey results. Only group C participants decreased the BF indicator significantly (by 7.7%) during the research. The FFM and ACM indicators in group B exceeded the results of other groups by 4-5 times. The initial level of muscular strength development was identical in all groups (4 RM). However, using the 1st and 2nd models significantly increased the strength growth rate. The dynamics of muscular strength development in group B participants was 3.5 times higher than in group A. The difference between the results of groups C and A was 2 times. *Conclusions*. This study confirms the need to find new ways to improve the system of physical education for students with hypokinesia. The results indicated the effective use of power fitness elements in the adaptation of young men with hypokinesia. The proposed mechanism of training model correction allows for determining the optimal load parameters for the level of body resistance to physical stimulus.
Keywords: students with hypokinesia, adaptation processes, power fitness, training models, physical education

Introduction

One of the pressing problems of the modern physical education system is reducing the body's ability to resist stressful stimuli. The ability to counteract an external stimulus without the manifestation of compensatory reactions due to adaptation reserves is also an acute issue. The prolonged absence of physical activity required by the body leads to pronounced maladaptation processes associated with adaptive reserves decrease. These physiological processes in the student's body lead to the appearance of hypokinesia (Chernozub et al., 2023; Wang & Li, 2023; Zhang H, & Xu Z, 2023).

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The rate of spreading hypokinesia manifestations among students in recent years is of great concern to a large number of scientists in various fields (Abassi et al., 2023; Casimiro-Andújar et al., 2023; El-Ashker & Al-Hariri, 2023). The imperfection of the physical education system is one of the main reasons for the complication of this problem. The implementation of outdated approaches to load correction does not take into account the individual functional potential of the students' organism (Edelmann et al., 2022; Taylor, 2024). A narrow range of modern control methods complicates assessing the body's adaptation and compensatory reactions during exercise. The absence of scientific substantiation of physiological regularities of a combination of principles, methods, and means using different load modes, often leads to disruption of adaptation (Coyle et al., 2022). Developing models of physical education classes for students is mostly chaotic. In most cases, the relationship between the magnitude of the external stimulus and the ability of the body systems to counteract it is not considered (Mayorga-Vega et al., 2022; Xu et al., 2023).

Studying the peculiarities of changes in the physical education system in the world, rather contradictory data were found (Babaeer et al., 2022; Vilardell-Dávila et al., 2023; Arena et al., 2024). The main changes are associated with a significant decrease in the volume and intensity of loads during classes. The priority of using physical exercises involving many agonist, synergist, and stabilizer muscle groups is changing (Leite et al., 2023). The models of classes with selective involvement of certain modes of energy supply are used, which are different in structure and content (Choi & Choi et al., 2022; Lu et al., 2023). The validity of such actions is related to the rapid increase in the number of overweight or low-body-weight people in universities (Bourdier et al., 2023; Holmes et al., 2023; Jaremków et al., 2023). Similar changes also apply to students of special medical groups with certain pathologies. However, the problem is that students with hypokinesia do not belong to special medical groups. Hypokinesia is a state of the body with a low level of resistance to a stressful stimulus in maladaptation due to insufficient physical activity or its absence (Chernozub et al., 2024). An important issue is to determine an informative set of markers for selecting students with hypokinesia for further readaptation. A set of markers can help develop control methods and a mechanism for correcting loads for long-term adaptation.

Scholars and physical education teachers use different recreational models of classes for students with hypokinesia (Koh et al., 2022; Zanaboni et al., 2022). Their common characteristic is a variety of combinations between loads and physical exercises (Carvalho et al., 2022; Korobeinikova et al., 2024). However, in recent years, attention has been paid to a wide range of fitness elements in modeling classes (Chernozub et al., 2018; Rosvoglou et al., 2023). This choice is justified by the ability to selectively increase the energy reserves necessary for the body of students with hypokinesia (Fermino & Guerra, 2023). Priority load is given to isolated exercises of separate muscle groups in neuromuscular system adaptation. They also use various mechanisms of load mode correction taking into account the nature of adaptation and compensatory reactions of an organism to an external stimulus (Wilke et al., 2020; Heidel et al., 2022). However, there have been no research on using power fitness for increasing adaptation body reserves in students with hypokinesia.

The aim of the work. To develop technology for improving the physical education system for students with hypokinesia through power fitness and to check its effectiveness in practice.

Material & methods

Participants

The study involved 84 students (young men) aged 19±0.3 with hypokinesia from Uzhhorod National University, in Uzhhorod (Ukraine). The research also involved 20 physical education teachers, 20 physical rehabilitation specialists, and 20 power fitness specialists. Participants gave written informed consent to the study following the ethical standards of the Declaration of Helsinki.

Measurements

Body composition

Determination of the body composition in study group participants was carried out by the bioelectrical impedance (BIA) method with subsequent computer processing of the results. This method was used to determine the indicators of body fat mass (BF, % and BF, kg), fat-free mass (FF, kg), and active cell mass (ACM, kg). KM-AR-01 KM-AR-01 Diamond-AST diagnostic computerized hardware and software complex (VYUSK. 941118.001 RE) was used. The studied indicators were recorded 5 times during 12 weeks with an interval of 21 days.

Muscle strength (4 RM)

The muscular strength development (4 RM, kg) was monitored in students with hypokinesia 5 times at intervals of 21 days. The generally accepted practice technique of exercises for power fitness was used. The effective attempt was counted under the conditions of performing 4 repetitions in a set to complete muscle fatigue (4 RM, kg). The dynamics of leg muscle development were determined during the machine leg press exercise. The development of back muscle strength was controlled during the seated lat pulldown exercise. Assessments of controlled strength capabilities of pectoral muscles were determined by performing the seated crossovers exercise.

Experimental design

The research was conducted in two stages during 2023.

At the first stage, a survey was conducted among physical education teachers, kinesiology and power fitness specialists from the universities participating in the study. The survey was conducted to identify the main problems of the physical education system for students with hypokinesia and to find effective mechanisms for solving them. Based on the study, a mechanism for improving the physical education system for students with hypokinesia using power fitness was developed. In the second stage, the dynamics of morphofunctional indicators of students with hypokinesia using different models of physical education classes were investigated. The effectiveness of power fitness models and recreational physical culture classes was compared. The study lasted for 12 weeks. Based on initial body fat mass (BF, %), students were divided into 3 groups of 28 people.

Participants of group A (BF=13.7%) used a model of recreational physical education common to higher education institutions. They mainly used exercises for developing certain muscle groups. Physical activity was aimed at developing endurance, flexibility and improving cardiorespiratory system performance. A low-volume and low-intensity load mode was used in a sequence. The loads were performed under aerobic power supply conditions. The students of group B (BF=8.2%) used the 1st experimental model of classes developed based on power fitness. Basic strength exercises on simulators were the priority, and isolated exercises were applied with free weight with changes in kinematic characteristics. The interval method was used together with the methodological technique of premature fatigue. A prerequisite was the pyramid principle and eccentric repetitions. High-intensity load mode (R_a=0.71) was used during the study (Chernozub et al., 2020).

Representatives of group C (BF=27.8%) used the 2nd experimental model of classes with power fitness elements. Isolated strength exercises were performed on simulators and with free weights. Basic exercises were performed with body weight with a change in the kinematic characteristics of the equipment. The principle of "pyramid" and "eccentric repetitions" was used in most basic exercises. The medium (R_a=0.62) and low (R_a=0.54) intensity load modes (Chernozub et al., 2023) were combined in PT classes. However, the load volume was constantly high. Loads took place in conditions of aerobic and anaerobic-glycolytic energy supply regimes.

Statistical Analysis

The IBM *SPSS*Statistics 26 software package (StatSoftInc., USA) was used to carry out the study result statistical analysis. The program G-Power 3.1.96 (Germany) allowed for determining the smallest sample size for the study (calculation of statistical power). Nonparametric statistical analysis methods were used for determining the median (Me) and interquartile range (IQR). The H-Kruskal-Wallis test was used to compare the baseline parameters between the three groups of students. Friedman's two-factor ranked analysis of variance was applied to compare the differences in the dynamics of the studied indicators. Kendall's W (Kendall's concordance coefficient) was used to determine the effect level.

Results

Fig. 1 shows a diagram of the mechanism for improving the physical education system for students with hypokinesia using power fitness. The scheme was developed based on the survey of physical education teachers, specialists in kinesiology and power fitness.

The study identified the main problem areas in physical education of students with hypokinesia. More than 73.5% of the respondents believe that the modern physical education system does not solve the issue of readaptation of students in this category. 76.2% of respondents claim that the classic models of physical education classes for universities are outdated. 82.1% of participants believe that the existing mechanisms for monitoring the state of students' bodies with hypokinesia and managing loads do not solve the problem. The main problem, according to 79.3% of respondents, is the low level of resistance of the students' bodies to classical physical activity. The lack of an effective mechanism for combining methods, principles, means, and load indicators while modeling classes. There is also an insufficient implementation of medical and biological control in assessing adaptation and compensatory reactions to a physical stimulus.

Based on the analysis of the survey results, one of the ways to improve the physical education system for students with hypokinesia using power fitness was developed. This system consists of two main structural parts.

The first part aims at the correction of control of adaptative and compensatory body reactions to power loads. Priority physiological, biochemical, and morphofunctional methods for assessing the resistance level in students with hypokinesia to loads are determined. A set of informative markers clearly showing the increase of adaptive body reserves under conditions of power loads is proposed.

The second part is related to the management of external stimuli, which students with hypokinesia counteract at the expense of adaptation body reserves. The effectiveness of this management depends on the peculiarities of the developed models of classes and the mechanism of their correction. We can get the result only in case of a reasonable combination of load modes, principles, and complexes of strength exercises in developing models of classes. One of the main conditions is the compliance of the proposed training model with the initial functional body capabilities. The next step is to develop a mechanism for correcting models of power fitness classes for students with hypokinesia during their adaptation. The offered correction mechanism consists of several successive stages, which completely change the value of an external stimulus. Adaptive body changes were checked during 5-7 weeks of using the developed training model. The obtained result dynamics allow us to determine the direction of change in the main components of the load mode. The control over the morphofunctional indicator dynamics influences the priority of performing certain power exercises. Selective correction of the model key structural components changes indicators of volume and intensity of load modes. Accordingly, the change of load parameters is a stressful stimulus and requires students with hypokinesia to activate additional adaptation body reserves.

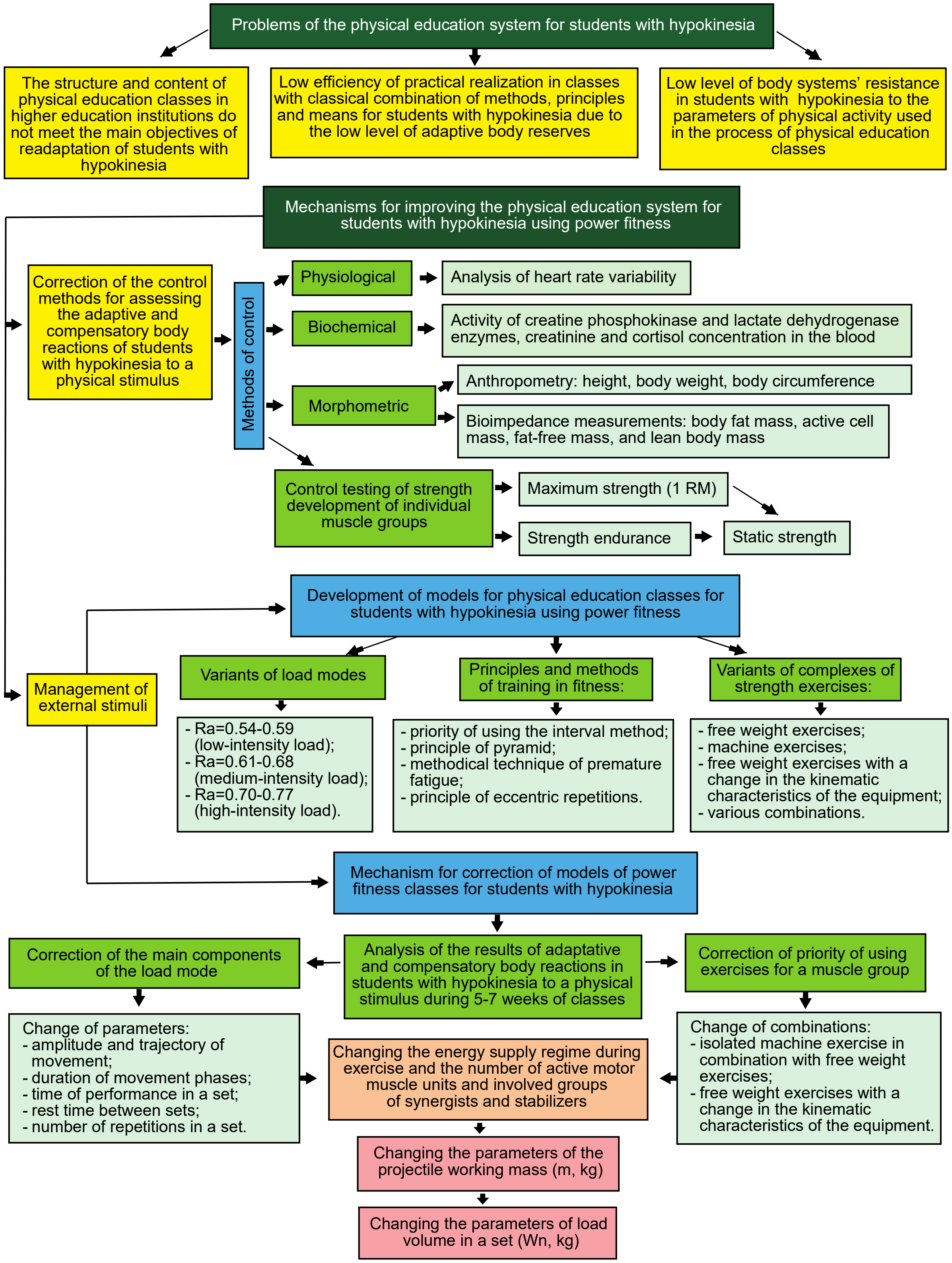

Fig 1. Mechanism for improvement of physical education system of students with hypokinesia using power fitness

Table 1 presents the results of bioelectrical impedance (BIA) indices in the study participants with hypokinesia during 12 weeks of the research.

The study showed that only group C representatives lowered BIA indices by 7.7% ($p<0.05$). This indicator did not change in the students of the other two groups. The BF indicator, kg, recorded in group C decreased significantly by 34.8% ($p<0.05$) compared to the initial parameters. However, this indicator increased in other participants, especially in group B by 15.3% ($p<0.05$). The most pronounced increase in the indicators of FFM by 8.9% ($p<0.05$) and ACM by 10.2% ($p<0.05$) were shown by the students of group B. The other two representatives did not change these body parameters significantly during the 12 weeks of research.

Table 1

Results of bioelectrical impedance (BIA) in students with hypokinesia during 12 weeks of the study (median, IQR), n=84

Groups of students with hypokinesia	Term of observation, weeks					χ^2, p df=4
	at the beginning of the study	after 3 weeks of exercise	after 6 weeks of exercise	after 9 weeks of exercise	after 12 weeks of exercise	
body fat mass (BF, %)						
A	13.71 (5.02) H=18.56; p=0.03	13.92 (4.28) 0.2%^{1}	13.81 (3.31) -0.1%^{1}	14.02 (5.12) 0.2%^{1}	13.81 (4.62) -0.2%^{1};0.1%^{2}	χ^2=4.42 W=0.08
B	8.22 (3.25) H=18.56; p=0.03	9.21 (2.37) 1.0%^{1*}	9.41 (3.01) 0.2%^{1}	9.33 (2.91) -0.1%^{1}	9.33 (3.04) 0.0%^{1};1.1%^{2}	χ^2=3.53 W=0.05
C	27.81 (4.55) H=18.56; p=0.03	26.30 (5.07) -1.5%^{1*}	24.81 (3.61) -1.5%^{1*}	22.11 (3.81) -2.7%^{1*}	20.08 (3.66) -2.0%^{1*};-7.7%^{2*}	χ^2=35.14*** W=0.61***
body fat mass (BF, kg)						
A	8.92 (2.12) H=16.49; p=0.04	9.03 (3.14) 1.2%^{1}	9.11 (2.51) 0.9%^{1}	9.38 (3.07) 2.9%^{1*}	9.17 (2.77) -2.2%^{1*};2.8%^{2*}	χ^2=13.62* W=0.29*
B	5.02 (1.51) H=16.49; p=0.04	5.33 (2.34) 6.2%^{1*}	5.64 (2.28) 5.8%^{1*}	5.71 (3.01) 1.2%^{1}	5.79 (2.07) 1.4%^{1};15.3%^{2*}	χ^2=34.67*** W=0.63***
C	23.82 (5.52) H=16.49; p=0.04	22.67 (6.45) -4.8%^{1*}	20.33 (5.29) -10.3%^{1*}	17.56 (4.08) -13.6%^{1*}	15.53 (4.77) -11.5%^{1};-34.8%^{2*}	χ^2=51.32*** W=0.93***
fat-free mass (FFM, kg)						
A	56.09 (4.07) H=17.52; p=0.04	55.97 (3.67) -0.2%^{1}	56.89 (2.99) 1.6%^{1}	57.62 (3.21) 1.3%^{1}	57.33 (2.82) -0.5%^{1}; 2.2%^{2*}	χ^2=13.56* W=0.24*
B	51.98 (3.76) H=17.52; p=0.04	53.29 (3.22) 2.5%^{1*}	54.36 (2.59) 2.0%^{1*}	55.69 (3.14) 2.4%^{1*}	56.61 (3.02) 1.6%^{1}; 8.9%^{2*}	χ^2=38.73*** W=0.68***
C	62.11 (2.98) H=17.52; p=0.04	61.63 (4.01) -0.8%^{1}	61.67 (2.89) 0.1%^{1}	61.94 (2.74) 0.4%^{1}	61.47 (3.32) -0.7%^{1}; 1.0%^{2}	χ^2=2.96 W=0.06
active cell mass (ACM, kg)						
A	36.79 (3.51) H=13.38; p=0,05	37.01 (4,01) 0.6%^{1}	37.39 (2.93) 1.0%^{1}	37.79 (3.07) 1.1%^{1}	37.83 (2.95) 0.1%^{1}; 2.8%^{2*}	χ^2=13.72* W=0.32*
B	34.09 (3.11) H=13.38; p=0,05	35.17 (2,81) 3.2%^{1*}	35.98 (2.53) 2.3%^{1*}	36.92 (3,22) 2.6%^{1*}	37.57 (3.05) 1.8%^{1*}; 10.2%^{2*}	χ^2=37.55*** W=0.65***
C	40.73 (2.71) H=13.38; p=0,05	40.24 (2,96) -1.2%^{1}	40.22 (3.26) -0.04%^{1}	40.50 (2,94) 0.7%^{1}	40.32 (3.54) -0.4%^{1}; -1.0%^{2}	χ^2=2.35 W=0.06

Notes: 1 is difference (%) in comparison with the previous results; 2 is difference (%) in comparison with the initial values; df is number of degrees of freedom; H is Wallis' Kruskal Wallis' criterion; χ^2 is Friedman's criterion; W is Kendall's coefficient; * p< .05; *** p< .001

The dynamics of muscular strength (4 RM, kg) development in students with hypokinesia performing control exercises on simulators is shown in Table 2.

The obtained data demonstrated positive dynamics of strength development in the back, leg, and pectoral muscles in students of all groups during control exercises. The most pronounced increase in muscle strength by 29.8% ($p<0.05$) was recorded in group B participants.

These changes were caused by high-intensity loads ($R_a=0.71$) with the methodical technique of premature fatigue and the principle of eccentric repetitions. The lowest increase in strength development by 8.5% ($p<0.05$) in control exercises was observed in group A students. Small volume and low-intensity load modes used in a sequence decreased strength development by 3.5 times.

Table 2

Results of muscle strength development (4 RM, kg) in students of the examined groups in control exercises during 12 weeks of the study, (median, IQR), n=84

Groups of students with hypokinesia	Term of observation, weeks					χ^2, p df=4
	at the beginning of the study	after 3 weeks of exercise	after 6 weeks of exercise	after 9 weeks of exercise	after 12 weeks of exercise	
seated lat pulldown (4 RM, kg)						
A	31.22 (3.04) H=0.30; p=0.83	32.14 (2.63) 2.9%^{1*}	33.01 (2.99) 2.7%^{1*}	33.68 (3.33) 2.0%^{1*}	34.03 (2.77) 1.0%^{1};9.0%^{2*}	χ^2=25.43*** W=0.46***
B	32.13 (2.44) H=0.30; p=0.83	34.01 (3.08) 5.8%^{1*}	36.95 (3.44) 8.6%^{1*}	39.69 (2.72) 7.4%^{1*}	41.33 (3.61) 4.1%^{1*};28.6%^{2*}	χ^2=42.49*** W=0.78***
C	31.68 (3.22) H=0.30; p=0.83	33.01 (2.88) 4.2%^{1*}	34.99 (3.16) 5.9%^{1*}	36.79 (3.44) 5.1%^{1*}	37.83 (2.83) 2.8%^{1*};19.4%^{2*}	χ^2=40.12*** W=0.72***
machine leg press (4 RM, kg)						
A	34.65 (4.12) H=2.82; p=0.41	36.71 (3.98) 5.9%^{1*}	37.58 (2.79) 2.3%^{1*}	37.94 (3.13) 0.9%^{1}	38.02 (2.96) 0.2%^{1};9.7%^{2*}	χ^2=24.96*** W=0.45***
B	33.89 (3.26) H=2.82; p=0.41	37.11 (4.23) 9.5%^{1*}	40.88 (3.22) 10.1%^{1*}	43.79 (4.09) 7.1%^{1*}	45.95 (3.78) 4.9%^{1*};35.5%^{2*}	χ^2=51.01*** W=0.83***
C	34.81 (4.06) H=2.82; p=0.41	37.08 (4.12) 6.5%^{1*}	39.12 (3.16) 5.5%^{1*}	40.89 (3.73) 4.4%^{1*}	41.23 (2.94) 0.8%^{1};18.4%^{2*}	χ^2=39.31*** W=0.69***
seated crossovers (4 RM, kg)						
A	23.62 (2.41) H=2.72; p=0.27	24.26 (3.27) 2.7%^{1*}	25.01 (2.84) 3.1%^{1*}	25.24 (3.42) 0.9%^{1}	25.23 (2.78) -0.03%^{1};6.8%^{2*}	χ^2=7.59* W=0.14*
B	24.01 (3.11) H=2.72; p=0.27	25.93 (2.79) 7.9%^{1*}	27.69 (3.09) 6.8%^{1*}	29.44 (3.22) 6.3%^{1*}	30.12 (3.31) 2.3%^{1*};25.4%^{2*}	χ^2=41.41*** W=0.76***
C	24.32 (2.76) H=2.72; p=0.27	25.36 (3.14) 4.3%^{1*}	26.73 (3.16) 5.4%^{1*}	27.42 (3.73) 2.6%^{1*}	27.99 (2.94) 2.1%^{1*};15.1%^{2*}	χ^2=39.87*** W=0.71***

Notes: 1 is difference (%) in comparison with the previous results; 2 is difference (%) in comparison with the initial values; df is the number of degrees of freedom; H is Kruskal Wallis test; χ^2 is Friedman test; W is Kendall's coefficient; * p< .05; *** p< .001

Discussion

This study describes the mechanism for developing experimental models of physical education classes for students with hypokinesia using power fitness. The peculiarities of classical physical education classes and the developed models were studied from the viewpoint of their influence on adaptive body changes. The study showed that the mechanism for improving the physical education system for students with hypokinesia using power fitness, developed on the basis of the survey results, was really effective. The research indicated the effectiveness of prior usage of developed training models in the readaptation of students with different body fat levels. These results will contribute to the development of new correction mechanisms for the physical activity of students with hypokinesia, taking into account their physiological processes of adaptation. The obtained data will help to predict the patterns of adaptative and compensatory body reactions depending on the parameters of the external stimulus.

Imperfection of control and lack of implementing informative markers of body resistance to loads are unresolved problems for students with hypokinesia. The expediency of using appropriate variations of methods, principles, and means in the neuromuscular system adaptation is one of the controversial issues. The study of new mechanisms of modeling classes to increase the adaptive body reserves is one of the priority tasks of a wide range of scientists (Chong et al., 2022; Zhao et al., 2022; Arigo et al., 2024). In most studies, the problem of hypokinesia is associated only with insufficient physical activity, or its absence and a decrease in functional capacity (Holmes et al., 2023; Lu et al., 2023; Kocjan et al., 2024). Attention is paid to the study of the effective use of recreational physical education systems with minimal load parameters (Abassi et al., 2023; Casimiro-Andújar et al., 2023). However, the peculiarities of compensatory body mechanisms of these students in maladaptation are insufficiently studied. This is mainly due to the absence of a set of physiological, biochemical, and morphofunctional methods for assessing the state of hypokinesia.

The obtained data showed that in conditions of overweight (group C), the priority use of combined load modes (R_a=0.54 and 0.62) reduced BF, %, the fastest. Compensatory mechanisms are activated in response to a load with a large amount of work, which leads to a pronounced deficit of energy resources (Chernozub et al., 2020; Holmes et al., 2023; Leite et al., 2023). High-intensity load mode (R_a=0.71) used by students with very low BF contributed to the growth of FFM and ACM. Such changes indicate pronounced hypertrophy of predominantly fast contractile muscle fibers (Carvalho et al., 2022; Rosvoglou et al., 2023). Using high-intensity load mode in conditions of anaerobic-alactate energy supply regime leads to the greatest development of muscle strength (4

RM) in students with hypokinesia. Such rates of muscular strength growth are caused by the increasing number of active fast motor muscle units of type A and B [29, 30]. At the same time, under these conditions of muscle activity, the adaptation effect is associated with the economy of the energy supply system and the optimization of ATP resynthesis processes (Chernozub et al., 2020).

The nature of adaptive body changes in students with hypokinesia revealed during the study confirms the expediency of using strength fitness in the process of developing models of classes. It was proved that the compensatory reactions manifestation in overweight people were connected with high energy expenditures, which increased adaptive body reserves simultaneously (Carvalho et al., 2022). Thus, high-volume power loads lead to a decrease in body fat mass and at the same time can contribute to an increase in strength capabilities (Chernozub et al., 2018; Heidel et al., 2022). Despite the initial low body resistance to the physical stimulus, the optimal load model usage accelerates adaptation significantly (Abassi et al., 2023; El-Ashker et al., 2023). The developed mechanism for improving the physical education system for students with hypokinesia through power fitness allows for estimating, predicting, and correcting the process of modeling classes.

Conclusions

This study confirms the need to find new ways to improve the physical education system for students with hypokinesia. The survey results on the problems with control and correction of load modes for people with low adaptive body reserves highlight the necessity of developing combined models of classes. The use of power fitness in creating models of classes for students with hypokinesia affects the individualization and optimization of load modes during readaptation. The proposed complex of informative markers for assessing adaptative and compensatory body reactions to physical stimuli increases the effectiveness of controlling changes in functional capabilities. The elaborated mechanism for correction of training models permits to determine the optimal parameters of load taking into account the level of body resistance to the stimulus.

The results indicated the effective use of power fitness in the adaptation of students with hypokinesia. Using a recreational physical education model common to universities only partially affects hypokinesia body adaptation to stress. High-intensity strength training in combination with basic machine exercises increased the body resistance of the students with low body fat. An effective model for people with excessive body fat, % included combined loads of medium and low intensity with changes in the kinematic characteristics of the exercise technique. Research result implementation into the physical education system for students with hypokinesia will help to maximize functional body capabilities during readaptation in a short time.

Conflicts of interest - There is no conflict of interest.

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