



ORIGINAL SCIENTIFIC ARTICLE

EFFECTS OF WAI KRU MUAY THAI TRAINING ON WELL-BEING AND PHYSICAL FITNESS OF PEOPLE OF ALL AGES

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

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Abstract

Study purpose. The study aimed to investigate the social, physical, and mental well-being of people of all ages in Buriram province and developed physical activities that apply to local people of all ages.

Materials and methods. To develop social cohesion in Sai To 5 Tai, Chanthopphet district, Buriram province, the study recruited 120 participants of all ages divided into 2 groups of 60 people each: 1) an experimental group was given a training program for training in Wai Kru Muay Thai 12 positions, 15 sequences 3 days/week, 30 minutes/day for 10 weeks; and 2) a control group performed their normal routine. The participants were assessed for their well-being in all ages using a questionnaire and for their physical fitness using field tests in pre-training and after training for 5 and 10 weeks. Research data were analyzed using mean, standard deviation, normal distribution test, parametric and non-parametric statistic test.

Results. The results showed that after 10 weeks, the experimental group had social, physical, and mental well-being in all ages as well as physical fitness that developed in cardiovascular endurance, flexibility, muscle strength and endurance better than in the control group at a significance level of 0.05.

Conclusions. The training program for training in Wai Kru Muay Thai 12 positions, 15 sequences can improve the well-being and physical fitness of people of all ages.

Keywords: physical well-being, mental well-being, social well-being, physical fitness, Wai Kru Muay Thai.

Introduction

As a result of the COVID-19 situation, people were quarantined in residential areas, physical activities, social activities were reduced, and worsening mental state (Burns et al., 2020; Rider et al., 2021). After the COVID-19 pandemic rate decreases, the development of physical, social, and mental well-being, is critical for people in the community to achieve recovery of physical condition to be strong, have good mental health, and have happy coexistence in society (Morrow-Howell et al., 2020; Vigo et al., 2020; Maugeri & Musumeci. 2021).

Activities used to improve well-being should be activities that can improve physical fitness. As well as being able to practice together at all ages to achieve interaction between people in the community in the form of aerobic exercise,

which affects mental development (Penedo & Dahn, 2005; Zelko et al., 2019; Van den Berg et al., 2017). In addition, many physical activities can improve well-being, such as Tai Chi, Qigong, and Yoga, which are widely found (Nontakhod et al., 2022).

However, the activity used to train the uniqueness of Thailand and still lacks research about well-being is Wai Kru Muay Thai training, which moves the body in multi-directions with large muscles in the form of aerobic exercise. As a result, the elderly can practice together safely (Phanpheng et al., 2020). Moreover, this activity also increases alternative activities for physical, social, and mental health development in people.

Materials and methods

Study participants

120 participants lived in Ban Sai Tho 5 Tai, Chanthopphet Subdistrict, Ban Kruat District, Buriram Province, di-

vided into 2 groups using a table to determine the sample size of Cohen (Cohen, 2013). Determine alpha values at the statistical significance level of .05, the effect size at .50, and the Power of the test at .75, with 57 people per group, two groups totaling 114 people. Furthermore, to prevent the mortality in participants, 6 participants were added, a total of 120 people, 60 people per group as follows: The experimental group consisted of 3 age ranges: 1) Aged 7-18 years 2) Aged 19-59 years and 3) Aged 60 years and over, 20 people per age range, was trained by Wai Kru Muay Thai. The control group was divided into the age range, and the number of people was the same as the experimental group, which was doing the routine. Criteria for inclusion of research participants 1) Have at least 6-8 hours of rest per day 2) No symptoms of heart disease 3) No relatives with heart disease 4) Blood pressure is not higher than 140/90. Criteria for exclusion of research participants 1) Involuntary participation in research 2) Participate in research less than 80% of the total training period 3) Force majeure causing not to participate, such as sickness or accidents. All participants signed the consent document to participate in the research.

Human research ethics

The research had been approved by the committee for the research ethics of Buriram Rajabhat University. The certificate issued was BRU: -rdi 002 (002/2565).

Study organization

All participants were assessed for physical, social, and mental well-being assessments with the Health Questionnaire (Ratanavilaisakul, 2015) and physical fitness test by the DPE test, consisting of body composition, flexibility, muscle strength and endurance, cardiovascular endurance, as well as agility and balance test for older people (Department of Physical Education, 2019). The experimental group conducts Wai Kru Muay Thai 12 positions, 15 sequences of training, repeating 5 rounds (Table 1) for 3 days/week, 30 minutes/day each time, including all 10 weeks in the form of group activities. While the control group is not trained. Data were collected in pre-training, after training for 5 weeks, and post-training for 10 weeks.

Statistical analysis

Quantitative data were tested for normal distribution of social, physical, and mental well-being by Kolmogorov-Smirnov's method and physical fitness by Shapiro-Wilk method. When found that 1) Normal distribution data, Analyze the difference between 2 groups by independent t-test and within the group between before, after 5, and 10 weeks of training by One-way ANOVA with Repeated Measured test. 2) Non-normal distribution data, Analyze the difference between 2 groups by Mann-Whitney U Test method and within the group between before, after 5, and 10 weeks of training with Friedman test method at the significant level .05 by SPSS17.0 (SPSS Inc. Released 2008. SPSS Statistics for Windows, Version 17.0 Chicago: SPSS Inc.).

Table 1. Wai Kru Muay Thai 12 positions, 15 sequences of training program

Day	Type of Activities	Type of Movements	Duration
	Warm up	Dynamic stretching in major muscle groups	5 minutes
Monday Wednesday Friday	Work out	1. Jarod muay 2. Tawai bangkom 3. Muan mud 5 times 4. Yang sam khum 1st 5. Hong hern 6. Yang sam khum 2nd 7. Phra mae thorani beeb muay phom 8. Yang sam khum 3rd 9. Lub hok mokasak 10. Berg fah 11. Khun phaen phan marn 12. Yang sam khum 4th 13. Phra ram plang sorn 14. Tud mai khom narm 15. Yang suk kasem	20 minutes (12 positions, 15 sequences of training) Repeat 5 rounds.
	Cool down	Static Stretching in major muscle groups	5 minutes

Results

The results of the study of Wai Kru Muay Thai training on well-being for all ages can be divided into 2 parts as follows:

1) The results of physical, social, and mental well-being conduct overall analysis of all ages by testing differences between groups by Mann-Whitney U Test and testing differences within each group by Friedman test method.

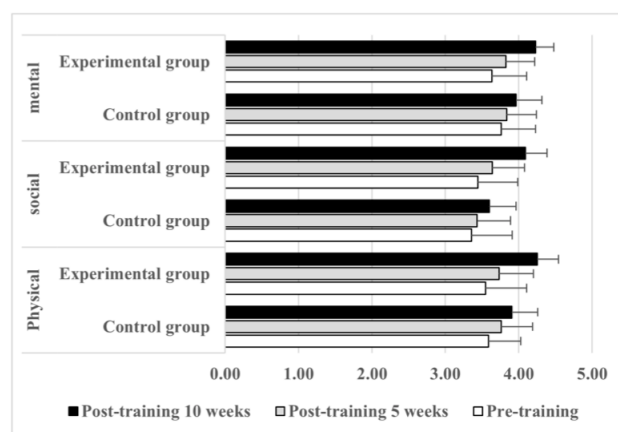


Fig. 1. The mean of physical, social, and mental well-being in the experimental group was different from the control group after 10 weeks of training. The mean was different within each group ($p < 0.05^*$)

2) Physical fitness results, which were analyzed by age by testing the difference between groups with One-way ANOVA with Repeated Measured test and tested differences within each group with independent t-test as follows:

2.1) Age over 60 years old.

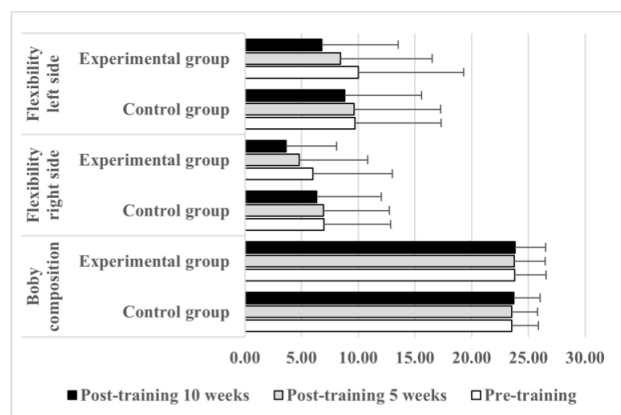


Fig. 2. The mean of body composition ($p=0.88$), flexibility right ($p=0.10$) and left side ($p=0.36$), after 10 weeks of training in the experimental group, there was no difference from the control group, while the mean of flexibility right and left side within the experimental group ($p<0.05^*$)

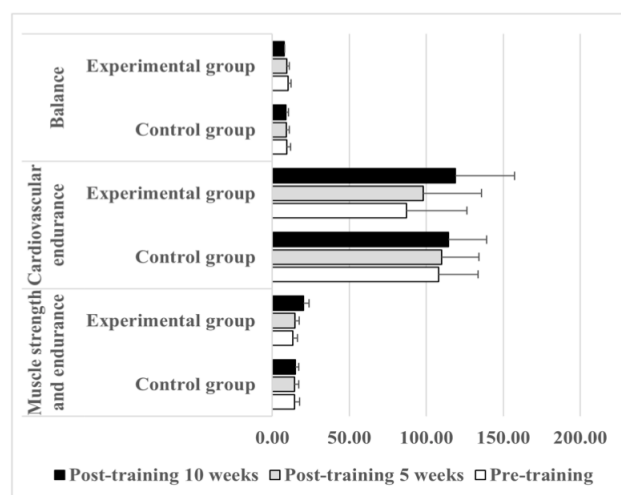


Fig. 3. The mean of muscle strength and endurance, and balance after 10 weeks of training in the experimental group was different from the control group and within the experimental group, as well as cardiovascular endurance ($p<0.05^*$)

2.2) Between 15-59 years old

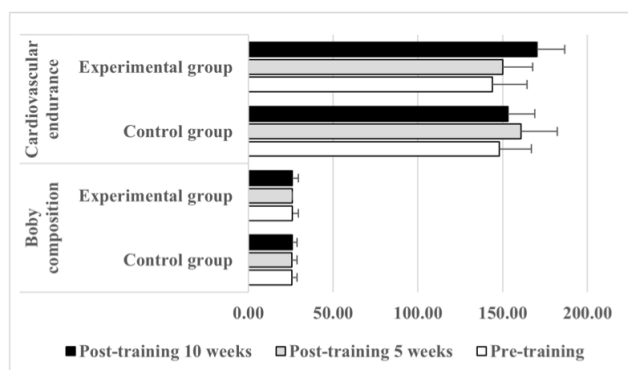


Fig. 4. The mean of body composition after 10 weeks of training in the experimental group had no difference from the control group ($p=0.91$), while the mean of cardiovascular endurance after 10 weeks of training in the experimental group was different from the control group ($p<0.05^*$)

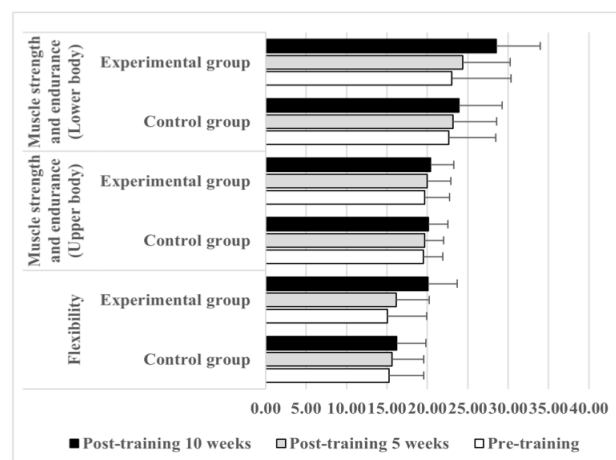


Fig. 5. The mean of flexibility, and muscle strength and endurance on lower body after 10 weeks of training in the experimental group was different from the control group and within the experimental group ($p<0.05^*$)

2.3) Between 7-18 years old

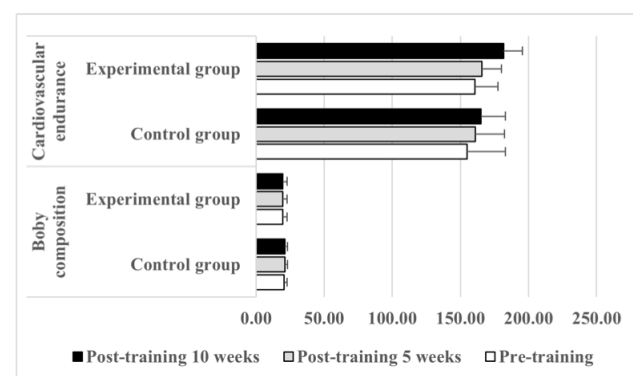


Fig. 6. The mean of body composition after 10 weeks of training in the experimental group had no difference from the control group ($p = 0.07$), while the mean of cardiovascular endurance after 10 weeks of training in the experimental group was different from the control group ($p<0.05^*$)

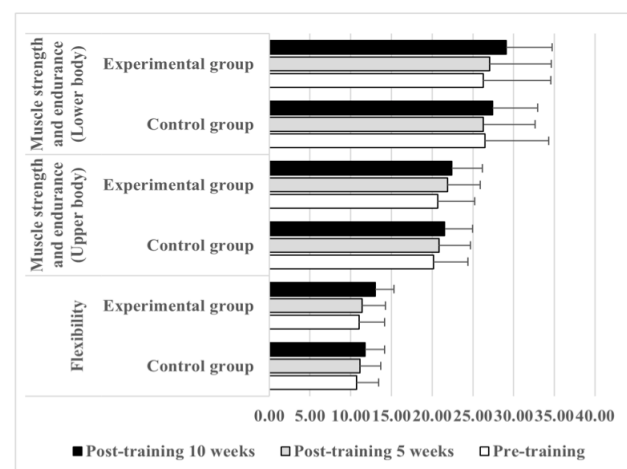


Fig. 7. The mean of flexibility ($p=0.10$), muscle strength and endurance on upper body ($p=0.46$) and lower body ($p=0.34$), after 10 weeks of training in the experimental group, there was no difference from the control group. However, there was also a difference within the experimental group in each variable ($p<0.05^*$)

Discussion

The difference within the group of the average of physical, social, and mental health data in Pre-training, after Training 5 Weeks, and after Training 10 Weeks in the experimental group found that participants with Wai Kru Muay Thai. An average of variables increased from before training, after 5 weeks and 10 weeks, respectively, because the Wai Kru Muay Thai program was an activity that required the body to move on the beauty of the unique posture and perform activities together between ages in public as well. In addition, the appearance of specific gestures made participants talk and taught each other to make the right gestures. As a result, people in the community develop physical well-being. The part of the improved sense of the body used to carry out each person's daily routine along with the development of social well-being in terms of helping and caring for family members and people in the community together. Including mental well-being that made participants feel confident in themselves, control their emotions, and be happier in life (Murphy et al., 2010; Kimiecik & Horn, 2012).

The difference between the experimental group and the control group in health information consists of 1) physical well-being in terms of self-guided travel, 2) social well-being, participation in community activities, religious activities with family members, equal health insurance services, a sense of safety in life and property in the living community. After training for 5 weeks, the experimental group had an average of physical and social well-being more than the control group because the experimental group had activities that must come to exercise Wai Kru Muay Thai together, which caused more to leave their own home. Moreover, there was visit to the area around the community, and having activities together will affect social well-being, causing people in the community to persuade each other to do (Melnik and Neale., 2018). After training for 10 weeks, the experimental group had a better average than the control group because there were easy activities to follow, suitable for all ages, and the appointment time together was evident, causing people to exercise, talk within the family, and more community (Kimiecik & Horn, 2012).

Analysis of differences within the experimental group of the average of pre-training physical fitness data, after training for 5 weeks and 10 weeks in 3 age ranges, found that 1) 7-18 years old had flexibility, strength and endurance of muscles. Cardiovascular endurance increased, respectively. 2) 19-59 years old, body composition, flexibility, strength and endurance of muscles, and cardiovascular endurance. 3) 60 years old and over, there was flexibility, strength and endurance of muscles and balance. All participants developed higher from before training, after 5 weeks and 10 weeks, respectively. Wai Kru Muay Thai was an activity that requires the body to move at a moderate speed with rhythm and stretch the knee joint, and continue for about 30 minutes, which affects on the body of all ages to develop strength and endurance of muscles, flexibility, balance from shortening and stretching with body weight in Wai Kru Muay Thai and cardiovascular endurance (Widjaja et al., 2012).

Conclusions

Wai Kru Muay Thai 12 postures, 15 sequences of training program are activities that can be done together in the com-

munity and are safe for all ages. Wai Kru Muay Thai training sets can also develop physical, social, and mental well-being. Therefore, it is an alternative for community leaders or exercise leaders to be used as an engaging activity for people in the community to improve their well-being. Furthermore, practicing until proficient will affect the development of physical fitness as cardiovascular endurance, flexibility, muscle strength and endurance for all ages, and balance for the elderly.

Acknowledgment

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Conflict of interest

The author declares that there have no of interest.

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ВПЛИВ ТРЕНУВАНЬ ІЗ ВИКОНАННЯ РИТУАЛЬНОГО ТАНЦЯ «ВАЙ КРУ МУАЙ ТАЙ» НА САМОПОЧУТТЯ ТА ФІЗИЧНУ ФОРМУ ЛЮДЕЙ УСІХ ВІКОВИХ ГРУП

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

Реферат. Стаття: 5 с., 1 табл., 7 рис., 17 джерел.

Мета дослідження. Метою цього дослідження було вивчення соціального, фізичного та психічного самопочуття людей усіх вікових груп у провінції Бурірам (Таїланд), і в його рамках було розроблено фізичні навантаження, які застосовуються до місцевого населення усіх вікових категорій.

Матеріали та методи. З метою розвитку соціальної згуртованості в населеному пункті Сай То 5 Тай, округ Чантопхет, провінція Бурірам, для участі в дослідженні було набрано 120 учасників різного віку, розділених на 2 групи по 60 осіб у кожній: 1) експериментальна група отримувала тренувальну програму для тренувань із виконання ритуального танця «вай кру муай тай» із 12 позицій, 15 послідовностей 3 дні/тиждень, 30 хвилин/день протягом 10 тижнів; і 2) контрольна група виконувала свої звичайні повсякденні справи. Самопочуття учасників усіх вікових категорій оцінювали за допомогою опитувальника, а їхню фізичну форму оцінювали за допомогою польових тестів у період до початку тренувань і після проходження тренувань протягом 5 і 10 тижнів. Аналіз даних дослідження здійснювали за допомогою середнього, стандартного відхилення, перевірки нормальності розподілу, параметричних і непараметричних статистичних критеріїв.

Результати. Результати показали, що через 10 тижнів експериментальна група в усіх вікових групах мала кращі показники соціального, фізичного та психічного самопочуття, а також фізичної форми, яка розкрилась у витривалості серцево-судинної системи, гнучкості, м'язовій силі та витривалості, ніж у контрольній групі, за рівня значущості 0,05.

Висновки. Тренувальна програма для тренувань із виконання ритуального танця «вай кру муай тай» із 12 позицій, 15 послідовностей може покращувати самопочуття та фізичну форму людей усіх вікових категорій.

Ключові слова: фізичне самопочуття, психічне самопочуття, соціальне самопочуття, фізична форма, ритуальний танець «вай кру муай тай».

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COMPLEX PHYSICAL REHABILITATION OF WOMEN REPRODUCTIVE AGE WITH STAGE I HYPERTENSIVE HEART DISEASE

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

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Abstract

Background. Hypertensive heart disease (HD) is a chronic abnormality that affects various systems of the body and is especially unfavorable for women of reproductive age.

The purpose of the study was to develop a comprehensive program of physical rehabilitation for young women suffering with stage I hypertensive heart disease at the outpatient stage of rehabilitation and evaluate its effectiveness.

Materials and methods. 42 young women with a diagnosis of HD were randomly divided into two groups: one performing traditional physical rehabilitation (control group) and the other following a method based on the Pilates system. Questionnaire, Martinet-Kushelevsky test, modified Romberg test, and Deshin test were performed.

Results. Questionnaire and examination for determination of therapeutic tasks in the application of physical rehabilitation show improvement due to the use of the suggested methodology. Indicators of Martinet-Kushelevsky test improved from 2.46 points to 5.48 points ($p < 0.01$) which is better ($p < 0.05$) than in the case of the traditional methodology where they changed from 2.44 to 4.61 ($p < 0.01$). Kotov-Deshein test results show improvement in both groups evenly but the test results of the women of the main group improved from “unsatisfactory” to “good”, and those of the women of the control group improved from “unsatisfactory” to “satisfactory” with significantly better results in the main group ($p < 0.05$). Distribution of the Romberg test results show improvement of vestibular stability in all participants of the main group.

Conclusions. The proposed program of complex physical rehabilitation of patients with stage I hypertensive heart disease using the Pilates method proved to be effective. Due to this program, there was a significant decrease in heart rate, systolic and diastolic pressure, an improvement in the response of the cardiovascular system to the Martinet-Kushelevsky functional test as well as in the state of the respiratory and nervous systems, as evidenced primarily by the indicators of hypoxic tests, spirometry, clino- and orthostatic tests, with the Romberg and Deshein methods.

Keywords: hypertensive heart disease, Pilates, women, blood pressure.

Introduction

Hypertensive heart disease (HD) is a chronic abnormality that affects various systems of the body, characterized by an increase in blood pressure above normal (Shalimova et al., 2020; Shepherd et al., 2016). The disease is underlain by arterial hypertension, which is one of the main risk factors for the development of coronary heart disease, cerebral stroke and other disorders (Shalimova et al., 2019; Rzymiski et al., 2021). All available means and forms of exercise therapy should be used in the system of motor activity of a patient with stage I hypertension, taking into account the use of certain methodological guidelines and rules (Shalimova,

2022; Krivenko et al., 2021). An important problem is the development of a comprehensive program of physical rehabilitation for this category of patients (Maksymenko et al., 2020; Schenström, Rönnerberg, Bodlund, 2006), the need for a deeper study of the pedagogical basis for the use of physical exercises in rehabilitation treatment in stressful conditions in Ukraine especially (Awuah et al., 2022).

Hypertensive heart disease is showing a steady upward trend and this is primarily due to the fact that hypertensive heart disease is a disease of civilization (Polyvianna, Chumachenko, Chumachenko, 2019) its negative aspects (in particular, the information boom, the increased pace of life, hypokinesia, etc.).

The analysis of literary sources showed that hypertensive heart disease occupies one of the leading places among the abnormalities of the cardiovascular system (Yakovlev et

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al., 2020). The prevalence of hypertension in women, the chronic course of the disease, the lack of effectiveness of the generally accepted complex therapies determine the relevance of the chosen topic and the need to search for new and effective combinations of physical rehabilitation means that would improve the rehabilitation treatment, would not cause adverse reactions and be well tolerated by women (Podrihalo et al., 2022; Gargin et al., 2019). That is very important for women of reproductive age due to common combination with other disease of genital system (Mączka, Sass, 2017; Lazko et al., 2021; Lytvynenko et al., 2022) that could be realized in later period.

The purpose of the study was to develop a comprehensive program of physical rehabilitation for young women suffering from stage I hypertensive heart disease at the outpatient stage of rehabilitation and evaluate its effectiveness.

Materials and methods

Study participants

We performed primary examination of women suffering from hypertensive heart disease. Under our supervision there were 42 young women (21-30 years old) with a diagnosis of stage I hypertensive heart disease. They were randomly divided into two groups: control (20 patients) and main (22 women). According to the diagnosis, the nature of the disease, age, gender and previous examination, both groups of patients were homogeneous. At the same stage, a program of physical rehabilitation was applied for this contingent of patients. The control group of patients was trained according to the generally accepted method, and the main group according to the method developed by us. Anthropometric data of participants are presented in table 1.

Table 1. Anthropometric data of participants.

Anthropometric data of investigated groups	Control group (N=20)		Main group (N=22)		P
	Mean	SD	Mean	SD	
Age (years)	28.47	3.48	28.13	4.02	p>0.05
Weight (kg)	67.44	5.31	69.04	5.88	p>0.05
Height (m)	1.63	0.11	1.64	0.10	p>0.05

Study organization

The complex of rehabilitation measures in the control and main groups lasted 26-28 days. After that, a second examination was carried out, which made it possible to assess the time course of the indicators of the cardiovascular and respiratory, central and autonomic nervous function, occurring under the impact of the rehabilitation means we used. The results of the re-examination were studied and the effectiveness of the proposed rehabilitation program was evaluated. Evidence-based conclusions were made and practical recommendations were given for participants.

The examined patients of the main and control groups were prescribed a complex of therapeutic exercises and massage according to the generally accepted scheme on a sparing and sparing-training motor regimen (Podrihalo et al., 2021). In the training motor mode, the patients of

the control group were engaged according to the generally accepted methodology, and patients of the main group using the Pilates methods. Classes were held once a day, every day (excluding Sundays) in the hall of therapeutic physical education department. All participants were questioned before and after rehabilitation. Martinet-Kushelevsky test, modified Romberg test, and Deshin test had been performed.

Martinet-Kushelevsky test had been performed measuring blood pressure with a tonometer, determining carpal dynamometry, lung capacity, body length and weight. During its implementation, the subject performed 20 squats in 30 seconds at a pace set from the screen. After the end of the exercise, the program measures the heart rate for 3 minutes and displays the recovery time (in seconds) on the graph. According to the recovery time, the level of physical abilities was assessed: from 1 to 30 s (16-18 points) – high; from 31 to 60 s (13-15 points) – above average; from 61 to 120 s (7-12 points) – medium; from 121 to 150 s (4-6 points) – below average; from 151 to 180 s (1-3 points) – low.

The Kotov-Deshein test was carried out as follows. At rest, the pulse was determined (according to 10-second segments) and blood pressure was measured. Then the subject performed a load in the form of a 2-minute run in place at a pace of 180 steps per minute with a high hip lift. After performing the exercise, the subject sat down and during each of the 5 minutes of the recovery period, his pulse rates were recorded for the first and last 10 seconds, and in the interval between 11 and 49 seconds, blood pressure was measured.

Statistical analysis

Statistical processing of data obtained during the study was carried out using Microsoft Office Excel 2016 spreadsheets (Microsoft, USA) and Statistica 10.0 software (StatSoft, USA). The compliance of the obtained data with the normal distribution law was assessed with the Shapiro-Wilk's W-test. Student's t-test was employed to assess the significance of the difference between independent groups of parametric indicators. The assessment of the significance of differences in the signs of dependent groups with signs of normal distribution was carried out according to the even Student's test (t-test of dependent samples). Differences were determined by the significance level p<0.05.

Results

Results of questionnaire for participants of control and main groups are presented in table 2.

The results of Kotov-Deshein test were evaluated by the increase in pulse and pulse pressure, as well as by the nature and time of recovery and it is presented in Table 4.

Follow-up study of the vestibular stability using the Romberg test is presented in table 5.

Discussion

The initial stage of our work was devoted for the analysis and processing of literary sources on the problem of hypertensive heart disease. The presentation, etiology and pathogenesis of this disease were studied. We have reviewed the available programs of physical rehabilitation

Table 2. Questionnaire of participants about their feeling

Initial parameters		Control group (N=20)		Main group (N=22)		Comparison of groups after the course of rehabilitation
		After the course of rehabilitation	Initial parameters	After the course of rehabilitation		
psycho-emotional state	unsatisfactory	3(15.0%)	1(5.0%)	4(18.2%)	-	p<0.05
	satisfactory	14(70.0%)	8(40.0%)	14(63.6%)	3(13.6%)	
	good	3(15.0%)	11(55.0%)	4(18.2%)	19(86.4%)	
adaptation to physical stress	unsatisfactory	19(95.0%)	8(40.0%)	20(90.9%)	9(40.9%)	p>0.05
	satisfactory	1(5.0%)	9(45.0%)	2(9.1%)	10(45.5%)	
	good	-	3(15.0%)	-	3(13.6%)	
general strengthening of the body	unsatisfactory	16(80.0%)	12(60.0%)	17(72.3%)	3(13.6%)	p<0.05
	satisfactory	4(20.0%)	8(40.0%)	5(22.7%)	13(59.1%)	
	good	-	-	-	6(27.3%)	
activity of the cardiovascular system	unsatisfactory	20(100.0%)	9(45.0%)	22(100.0%)	9(40.9%)	p>0.05
	satisfactory	-	11(55.0%)	-	10(45.5%)	
	good	-	2(10.0%)	-	3(13.6%)	
feeling pain from time to time		17(85.0%)	14(70.0%)	18(81.8%)	9(40.9%)	p<0.05
pain in the cervical spine spine		12(60.0%)	8(40.0%)	13(59.1%)	6(27.3%)	p>0.05
pain in the thoracic spine		11(55.0%)	9(45.0%)	11(50.0%)	6(27.3%)	p>0.05
pain in the lumbar spine		11(55.0%)	8(40.0%)	12(54.5%)	3(13.6%)	p<0.01

Table 3. Parameters of the Martinet-Kushelevsky test, points

Parameters	Initial parameters		After the course of rehabilitation		Comparison of initial parameters and after the course of rehabilitation
	Mean	SD	Mean	SD	
Control group (N=20)	2.44	0.21	4.61	0.40	p<0.01
Main group (N=22)	2.46	0.19	5.48	0.37	p<0.01
Comparison between groups	p>0.05		p<0.05		

Table 4. Distribution of the results of the Kotov-Deshin test

Parameters	Initial parameters			After the course of rehabilitation		
	unsatisfactory	satisfactory	good	unsatisfactory	satisfactory	good
Control group (N=20)	19(95.0%)	1(5.0%)	-	10(50.0%)	8(40.0%)	2(10.0%)
Main group (N=22)	20(90.9%)	2(9.1%)	-	6(27.3%)	12(54.5%)	4(18.2%)
Comparison between groups	p>0.05			p<0.05		

Table 5. Distribution of the results of the Romberg test

Parameters	Initial parameters			After the course of rehabilitation		
	unsatisfactory	satisfactory	good	unsatisfactory	satisfactory	good
Control group (N=20)	16(80.0%)	3(15.0%)	1(5.0%)	4(20.0%)	14(70.0%)	2(10.0%)
Main group (N=22)	18(81.8%)	3(13.6%)	1(4.5%)	-	9(40.9%)	13(59.1%)
Comparison of groups	p>0.05			p<0.05		

for hypertensive heart disease (Shalimova, 2022; Pulavskiy et al., 2022; Gevorkyan, Ippolitov, Bocharova 2022). As a result of the analysis of literary sources, the purpose and objectives of the study were formulated and specified, the main approaches to the physical rehabilitation of patients

with hypertension were determined. At the same stage, a program of physical rehabilitation was drawn up using the Pilates health-improving methods.

The rationale for the use of the health-improving Pilates method in patients of the main group in the training motor

mode could be used as traditional therapeutic physical education involves the study of each muscle group separately (Byrnes, Wu, Whillier, 2018), however, a unique healing method developed in the beginning of the 20th century by the German fitness expert Joseph Hubertus Pilates, suggests a system of exercises based on the attitude to the body as a whole.

There are basic principles of the Pilates system: concentration; control; accuracy; breath; center; continuity, smoothness, fluidity of movements (Kashuba et al., 2020). Concentration is an element of the technique that helps to bring the body and spirit together and become calmer internally. Simultaneously with the exercise, it is necessary to create an image of its implementation. With this visualization, the muscles will be subconsciously activated. Control of exercises requires a high degree of coordination and control, since all the muscles involved in the movement must optimally interact with each other. Accuracy in this system, it is not the number of repetitions that is decisive, but the quality and awareness of their implementation. Breath in Pilates exercises, it is about making the center of the body stable. During the training it is recommended to employ thoracic lateral breathing. In this case, the lower part of the chest expands to the sides and back, and at the same time the thin muscles between the ribs are stretched. There is greater mobility in the upper body. Holding the breath during the exercise is not recommended. Center as Joseph Pilates spoke of "Powerhouse", meaning the middle of the body between the pelvis and the rib cage, with the spine as the central axis. Here, first of all, we are talking about four muscle groups: the transverse abdominal muscle, oblique muscles, and pelvic floor muscles. All of them work together and create a muscular corset, which, on the one hand, supports the spine, and on the other hand, makes the stomach taut. Each exercise starts in the center and flows through the limbs. The force that arises in the center coordinates all movements. Continuity, smoothness and fluidity of movements due to soft execution of movements is more important than a high number of repetitions and speed.

As results of our work we could insist, that the health-improving Pilates method involves the achievement of the following positive changes: normalization of blood pressure; strengthening the abdominal muscles; strengthening the muscles of the pelvic floor; improved joint mobility; improved coordination of movements; improved cell supply with oxygen; optimization of the psycho-emotional state (Sofyan, Abdullah, Hafiar, 2022). Optimization of the psycho-emotional state which we obtained in main group is especially important for patients with HD as stress-factor is one of more important in etiology of that disease and we can influent for initial link of pathogenesis.

Systematically conducted physical therapy classes based on the health-improving Pilates complex activate all physiological processes in the body and improve its vital activity. Under the impact of this complex, the activity of the autonomic nervous system increases, the activity of the endocrine glands and the psychological status of the patient improves. This effect is obtained by performing static, breathing exercises for muscle relaxation and others at a slow pace (Nechyporenko et al., 2020; Bales et al., 2020). This results in a decrease in excitation and an increase in inhibition in the central nervous system (Kolupayev et al., 2022).

Following these physical exercises patients' myocardium is found to undergo activation of metabolism and regeneration processes, an increase in blood flow, and an improvement of its nourishment. In this regard, the heart muscle is strengthened and its contractility increases (Arfanda et al., 2022). Tests which were performed, resulted that no one parameter of cardiovascular activity was decreased in comparison with traditional system of rehabilitation.

Thus, the health-improving Pilates complex is a rather specific type of health-improving gymnastics, which gives a rather high effect in the treatment and prevention of patients suffering from stage I HD, subject to specific guidelines.

The study of the cardiovascular and respiratory indicators in patients of the control and main groups showed positive time course was observed in terms of pulse and blood pressure (Mujriah et al., 2022). When comparing the obtained repeated indicators of the cardiovascular and respiratory systems between the control and the main group, no significant differences were found, which indicates a positive effect of complex physical rehabilitation on women in both groups.

Follow-up examination in patients of the control group revealed a decrease in heart rate and blood pressure at rest. After exercise, a higher systolic pressure persisted, but there was no significant decrease in the recovery time of these indicators. In the main group, there was a more pronounced positive trend in terms of heart rate, systolic pressure and recovery time according to Martinet-Kushelevsky and Deshin tests. This indicates an increase in the adaptive capacity of the cardiovascular system of patients in the main group to dosed loads. During the re-examination of the function of the autonomic nervous system after a course of physical rehabilitation, positive time course was established in the main group and slight positive changes in the control group.

Follow-up study of the vestibular stability using the Romberg test detected an improvement in the time to maintain balance, a decrease in tremor of the hands and eyelids, and a decrease in staggering mainly in women of the main group. The percentage of assessments in the performance of the test in women of the main group improved from "unsatisfactory" to "good", and in women of the control group from "unsatisfactory" to "satisfactory" with significantly better results in main group.

Significant reducing of pain feeling in spine was described previously for Pilates complex (Kashuba et al., 2020) but we proved more significant improvement in main group for lumbar area. That is important for background of HD which performs choice of anesthetic medicine not too wide in that suffering (Goncharova et al., 2020; Lyndin et al., 2019).

We could testify according performed study with questionnaire and examination for determination of therapeutic tasks in the application of physical rehabilitation improvement of many states as follows: general strengthening of the patient's body; improvement of the activity of the cardiovascular system; activation of metabolic processes; strengthening and training the heart muscle; regulation of blood pressure and functions of the vestibular apparatus; improvement of psycho-emotional state; normalization of impaired functions of the cardiovascular, respiratory and autonomic systems; increasing the body's adaptation to physical stress.

Conclusions

Thus, our proposed program of complex physical rehabilitation of patients with stage I hypertensive heart disease using the Pilates method is effective and allows healthcare workers to speed up the recovery process in the patient's body. Under the impact of this program, there was a significant decrease in heart rate, systolic and diastolic pressure, an improvement in the response of the cardiovascular system to the Martinet-Kushelevsky functional test, as well as in the state of the respiratory and nervous systems, as evidenced primarily by the indicators of hypoxic tests, spirometry, clino- and orthostatic tests, with the Romberg and Deshin methods. The rationality of the approach significantly increases the effectiveness of treatment, which contributes to an acceleration of the process of recovery of the patient and restoration of working capacity.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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