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PHYSICAL FITNESS OF WOMEN UNDER THE INFLUENCE OF TAE BO EXERCISE

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Abstract: The aim of this research was to determine the changes in the physical fitness of women who recreationally practice tae bo. 15 female exercisers between 25 and 40 years old, who have been practicing this recreational exercise for at least a year, participated in the research which lasted for four months. For assessing physical fitness V test, Back Scratch Test (right and left), 2 minute Step in Place Test, Trunk Flexor and Extensor, Squat Test, Arm Curl Test, Hexagon Agility Test and Modified Agility „T“ Test were used. To determine changes, analysis of variance for dependent samples and post hoc analysis were used. After the tae bo program, which lasted for four months, it was determined that most of the tests showed statistically significant changes of different levels of significance. It is concluded that the tae bo program effectively influenced the improvement of women's physical fitness after four months of performance.

Keywords: tae bo, recreation, female exercisers, physical conditioning

Introduction

Due to the general decrease in physical activity in the modern world (Hallal et al., 2012; Dishman et al., 2022), recreational exercise is a significant factor in disease prevention and health preservation (Thompson et al., 2020). The human body, which is naturally moving, needs a constant physical challenge that will improve the level of physical activity and fitness (De Sousa et al., 2019). The degree of physical (cardiorespiratory)

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fitness is inversely proportional to mortality, because the more physically fit people are, the lower the mortality rate (Imboden et al., 2018; Imboden et al., 2019).

Recreational muscle exercise contributes to general health by increasing the level of physical fitness (Boullosa et al., 2020). Since during the aging process the level of fitness decreases (Taylor, 2021), it is necessary to work on increasing muscle mass as a prevention of further development of osteoporosis, which is a consequence of decreasing bone demineralization (Simon et al., 2022). Recreational exercise improves the performance of the heart (Pinckard et al., 2019) and other organ systems (Stern et al., 2019). Besides, people who already suffer from some diseases can achieve significant improvements in their health status through regular exercise (De Medeiros et al., 2017; Wu et al., 2020). In order to achieve a better quality of life and mobility to a very old age, regular exercise that develops physical fitness is needed (Sharkey, Gaskill, 2008).

Among the many aerobic recreational activities, the very popular tae bo program of the founder Billy Blanks takes its place. This recreational activity is a combination of dance movements (ballet, hip-hop, etc.) and foot and hand striking techniques of taekwondo and boxing and is performed with music (Turgut, Metin, 2019). Tae bo includes aerobic exercises, increases heart and lung capacity, burns calories, reduces stress, strengthens body muscles and their flexibility. The high-intensity exercises of this program belong to cardio exercises, affect strength, muscular endurance, flexibility and largely develop general coordination and agility (Milenković, Veselinović, 2010). It is effective in toning and defining the body's musculature and losing excess weight. With tae bo training lasting 60 minutes, the body will burn 500 to 800 calories compared to 300 to 400 calories burned in traditional aerobics training (Turgut, Metin, 2019).

Taking into account the theoretical assumptions, this research aims to determine the changes in the level of physical fitness of women who practice tae bo recreationally. It is assumed that there are statistically significant changes in physical fitness. The significance of this research is to determine which indicators of physical fitness the tae bo program has the greatest impact on, in order to more optimally direct their further development.

Material an method

Participants and research procedure

15 female tae bo practitioners who have been practicing this recreational exercise for at least a year took part in this research. The research was conducted over a period of four months (16 weeks) during which the female exercisers were subjected to tae bo training three times a week in the afternoon for an hour. Three tests were performed; the initial

testing in the first week, the intermediate after the eighth week and the final one after the sixteenth week. A 20-minute warm-up was performed before each test.

A battery of 10 diagnostic tests was used to assess physical fitness (Wood, 2008), which the previous research has found to be reliable and valid for assessing physical fitness: *V Sit and Reach Test* (Cuberek et al., 2013; Sporiš et al., 2011), *Back Scratch Test - left and right* (Keith et al., 2014), *2-Minute Step in Place Test* (Haas et al., 2017), *Trunk Flexor and Extensor* (Evans et al., 2007; Waldhelm, Li, 2012), *Squat Test* (Yeh et al., 2018), *Arm Curl Test* (Boneth Collantes, et al., 2012), *Hexagon Agility Test* (Beekhuizen et al., 2009) and Modified Agility "T" test - MAT (Sassi, et al., 2009). Trunk flexor and extensor endurance tests were performed according to McGill's protocol (McGill et al., 1999).

Tae bo program

The structure of the training lasting four months (48 trainings, three times a week for 60 minutes of exercising) had the concept of Tae Bo aerobics, which included the performance of hand and foot elements of the technique of boxing, karate and taekwondo, combined in simple choreographies, which achieved the muscular tone of the whole body. This type of exercise improves body coordination, increases aerobic endurance and functional abilities while reducing body weight. The time structure of the training consisted of three parts:

The introductory part (warm-up) lasting five minutes was used to raise the body temperature and to increase blood flow in the body. The tempo of the music in this part ranged from 100 to 120 beats per minute with the steps Walk, Jogging, Step Touch, Double Step Touch, Leg Curl, Double Leg Curl, Knee Up, Double Knee Up.

The main part contained two separate parts: Aerobic part - (30 minutes) was composed of movements, blocks and sequences of movements aimed at the development of the cardiovascular and respiratory systems. The steps were clearly defined and popular international terms characteristic of the Taebo exercise model were used: Jab, Hook, Cross, Upper Cut, Kick (front, side, back). , then with the other hand. This number of repetitions was provided for the first part of the program of 16 training sessions, so that in the next part the number of repetitions would increase by four (28). Four more repetitions (32) were planned for the last part of the program. Body shaping exercises – (20 minutes) this part of the training was focused on body shaping and strengthening exercises. A series of exercises for a different muscle group was used in each training session. The tempo of the music is 100–120 beats per minute. When realizing this part of the training, the load on the cardio-respiratory system was low. Exercises were applied to strengthen the muscles of the arms and shoulder girdle, abdominal wall, back, gluteal region and legs. The first 10 minutes were used for the muscle group being treated, performing three to five series with the number of repetitions from 16 to 20 (the first

part of the program 16, the second 18, and the third 20). The other 10 minutes were intended for exercises to strengthen the abdominal muscles.

The final part (five minutes) consisted of stretching and relaxation exercises with the aim of calming down the body. Static stretching exercises were performed. Each exercise was performed for 20 seconds.

Statistical analysis

The statistical descriptive parameters used in the analysis were the arithmetic mean from the measures of central tendencies and the standard deviation. In order to obtain possible changes (differences) in the three mobility tests in exercisers, analysis of variance for dependent samples (repeated measures ANOVA) and post hoc analysis (Fisher LSD) were used to determine specific changes (differences) between the tests. The level of significance is $p < 0.05$.

Results

Table 1. Basic statistics of all tests in female exercisers and the significance of differences between the tests

Tests	<u>Descriptives (Mean±St.Dev.)</u>			<u>ANOVA</u>	
	Pre-test	Mid-test	Post-test	F	Sig.
V Sit and Reach Test	1.07±2.81	3.33±2.02	5.27±1.67	13.44	<0.001*
Right Back Scratch Test	-4±1.73	-2.4±2.06	-0.8±2.34	9.06	0.001*
Left Back Scratch Test	-8±1.56	-7.33±1.68	-7±1.73	1.42	0.254
2-Minute Step in Place Test	97.6±10.45	101.87±10.29	107.67±8.68	3.96	0.027*
Trunk Flexor	98±3.78	101.2±3.86	106±3.61	17.3	<0.001*
Trunk Extensor	143.33±8.28	148.13±6.72	152.87±5.36	7.18	0.002*
Squat Test	27±1.81	29±1.81	30.6±1.84	14.68	<0.001*
Arm Curl Test	16.2±1.15	17.6±1.12	18.27±1.33	11.50	<0.001*
Hexagon Agility Test	18.21±0.68	17.93±0.63	17.85±0.65	1.17	0.321
Modified Agility „T“test	7.83±0.95	7.12±0.94	6.84±0.85	4.66	0.015*

Note: *Significance level is $p < 0.05$

Table 1 presents the analysis of variance (repeated measures ANOVA) which calculated the changes in the physical fitness tests of female tae bo practitioners. Statistically significant changes were found in most of the tests that cover the area of flexibility (V Sit and Reach Test $p < 0.001$; Right Back Scratch Test $p = 0.001$), endurance (2-Minute Step in Place Test $p = 0.027$; Trunk Flexor $p < 0.001$; Trunk Extensor $p = 0.002$), repetitive strength (Squat Test $p < 0.001$; Arm Curl Test $p < 0.001$) and agility (Modified Agility "T" test $p = 0.015$).

Since the results of the analysis of variance are based on three tests, an additional post hoc analysis is performed using the Fisher LSD procedure to determine precisely between which testing there is a statistically significant change. This analysis is used only for those tests where statistical significance was initially recorded.

Table 2. Post hoc results (Fisher LSD test)

V Sit and Reach Test		Sig.	Right Back Scratch Test		Sig.
pre-test	mid-test	.008*	pre-test	mid-test	.039*
	post-test	<.001*		post-test	<.001*
mid-test	post-test	.022*	mid-test	post-test	.039*
2-Minute Step in Place Test		Sig.	Trunk Flexor		Sig.
pre-test	mid-test	.242	pre-test	mid-test	.024*
	post-test	.008*		post-test	<.001*
mid-test	post-test	.114	mid-test	post-test	.001*
Trunk Extensor		Sig.	Squat Test		Sig.
pre-test	mid-test	.063	pre-test	mid-test	.004*
	post-test	<.001*		post-test	<.001*
mid-test	post-test	.067	mid-test	post-test	.021*
Arm Curl Test		Sig.	Modified Agility „T“ test		Sig.
pre-test	mid-test	.003*	pre-test	mid-test	.038*
	post-test	<.001*		post-test	.005*
mid-test	post-test	.137	mid-test	post-test	.416

Table 2 shows the results of post hoc analyzes for physical fitness tests showing changes between each individual test. In the 2-Minute Step in Place Test ($p = .008$) and Trunk Extensor ($p < .001$) tests, the tae bo program contributed to changes only after the final

testing and only in relation to the beginning of the experimental treatment. Tests Arm Curl Test and Modified Agility "T" test did not have statistically significant changes between transit and final testing, but showed improvement in the first part of the program ($p = .003$; $p = .038$) and at the overall level ($p < .001$; $p = .005$). In the other tests, there were statistically significant changes after each phase of tae bo exercise.

Discussion

This research was carried out with the aim of determining changes in the physical fitness of women who practice tae bo recreationally. After four months of training, it was determined that a statistically significant change was recorded in most of the tests that assessed physical fitness. Only in one test of agility (Hexagon Agility Test $p = 0.321$) and flexibility (Left Back Scratch Test $p = 0.254$) did the tae bo program not significantly affect the improvement of physical performance. Other physical fitness tests covering the areas of flexibility, endurance, repetitive strength and agility indicate improvement in women's physical fitness. The previous scientific research practice confirms these views. Eight-week tae bo programs and combinations with pilates programs have a positive effect on improving physical fitness in women. In his master's thesis, Doğan (2017) found an increase in the values of sprinting parameters, aerobic strength, abdominal muscle strength and flexibility values ($p < 0.050$). The increase in the ratio of muscle strength of the right and left knee flexors and extensors at an angular speed of $60^\circ/s$ was significant in the combined Tae bo+pilates group ($p < 0.050$). The increase in the mean angular velocities of the left knee flexor and extensor at $180^\circ/s$ was significant for both groups ($p < 0.050$). A two-month tae bo exercise program has a positive effect on physiological indicators (heart rate after the exercise, systolic and diastolic blood pressure after the exercise), as well as body composition parameters (body mass, body mass index, waist-to-hip ratio and body fat percentage) (Jaber et al., 2022). In the field of coordination development, the tae bo program also influenced the improvement of the parameters of this ability ($p < 0.001$) after three months of practice (Milenković, Veselinović, 2010). Similar results were obtained by the three-month tae bo program for indicators of strength and balance ($p < 0.001$) (Nikić, Milenković, 2014) as well as trunk flexors, cardio-respiratory endurance and flexibility in young women (Mustedanagić et al., 2014). Whereas tae bo belongs to aerobic activities, studies indicate that it is possible to achieve improvements in aerobic endurance ($p < 0.001$) after three months of aerobics with tae bo elements in the population of women aged 25 to 35 (Milenković, Nikić, 2018). If the impact of tae bo is compared with the impact of other recreational forms of aerobic exercise such as step aerobics or cardio boxing, it is concluded that practicing tae bo improves functional abilities in the form of arterial blood pressure as in other types of exercise.

Nevertheless, tae bo gives better results in the field of isometric muscle potential than step aerobics, and somewhat worse than cardio boxing (Milenković, Nikić, 2020).

Tae bo is also successfully performed in the student population as part of the educational process of students and gives results in improving coordination, strength, endurance and flexibility (Shkola et al., 2022). A 10-week tae bo exercise program was effective in reducing traditional risk factors associated with cardiometabolic disease and improving components of physical fitness in obese female students (Mathunjwa et al., 2013). Tekin et al. (2018) also conducted the research with obese female students and found that after a program lasting 16 weeks, tae bo can contribute to the improvement of certain parameters of physical fitness, such as strength and flexibility, as well as the state of general fitness.

The modified tae bo program also gives results in examining the level of kinesthetic perception of basketball players, as well as elements of physical fitness in the form of muscular ability, respiratory endurance, speed and agility (El Roby, 2010). Ramadan, El-Ruby (2019) believe that the programs with modified tae bo exercises should be included in the training of basketball players, because they indicate a significant improvement in physical and physiological parameters, as well as basketball-specific skills. They also add that precision exercises should be included in the tae bo program to further improve the shooting and passing skills of basketball players.

Potential shortcomings and limitations of this research can be the relatively small number of women who participated, as well as the duration of the program itself, which can have an effect on raising better physical preparedness if it would last longer.

Conclusion

Optimal physical activity is a prerequisite for a healthy, fulfilling and long life. However, there are numerous negative factors, both on the physical and psychological levels, due to reduced physical activity. Automated execution of set goals and needs in everyday life is increasingly encroaching on free time, which should be the property of every man in which he satisfies the physical and spiritual needs of his body. Recreational exercise along with other physical activities satisfies the basic need for movement and thus prevents the emergence of a sedentary lifestyle that increasingly preoccupies us, the consequences of which are inexorable and progressive, and include, among other things, a decrease in the capacity of the body, as well as an increase in physical and emotional discomfort during higher physical demands.

The results of this research showed that the four-month tae bo program (three times a week for 60 minutes) contributed to a significant improvement in the level of physical

fitness in women, which indicates that the initial assumption was not rejected. The level of physical fitness contributes to the establishment of good foundations for a healthy life by creating the general immunity of the body, therefore, you should listen to the advice of experts and ensure adequate physical activity.

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