

Influence of Fitness Program on Body Composition of Women

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Abstract: *The aim of the scientific study is to see the effects of physical activity, ie fitness programs, on body composition and its changes. The research and measurement procedure were conducted on a sample of 28 females (25-40 years). InBody270 was used to measure body composition. The following variables were used to assess body composition: percentage of body fat - Body Fat (%), total muscle mass - Muscle Mass (kg), total body weight - Trunk Weight (kg) and body fat - Trunk Fat (%). Inspection of the obtained results shows moderate influence in the variable BF% = 0.70, small influence in TW = 0.44, MM = -0.33, TF% = 0.35. The analysis of the obtained results established the existence of a positive relationship between the initial and final measurement, that is, the existence of a positive effect of the experimental program on the body composition of women.*

Keywords: effect, physical activity, experimental program, body composition

1. INTRODUCTION

Physical activity is associated with physical fitness and is defined as any movement made by skeletal muscle that causes energy expenditure (Caspersen et al., 1985). Modern living conditions limit the space and time for people to engage in various forms of recreational activities, and the average level of physical activity in the population is becoming lower (Manić et al., 2021). People who are not involved in some type of physical exercise and activity cause serious consequences for health and quality of life in general (Bjelica et al., 2021; Zelenović et al., 2021).

Insufficient physical activity is the biggest health problem of a nation, and it has been proven that it is a factor that contributes to the development of chronic diseases and disorders (Blair et al., 2004). Inactivity is known to increase the risk of developing hypertension by 35% and that subjects who are in poor physical condition have a 52% higher risk of the disease than people who are in good physical shape (Sharky & Gaskill, 2008). When inactivity is mentioned, it is inevitable to mention obesity and a person's body composition on the basis of which one can get an impression of one's own way and lifestyle. Physical activity, exercise and recreational sports encourage and improve the fitness components and health of the individual and have an impact on many organic systems (Lee et al., 2011). Low levels of fitness components are a better indicator of the risk of mortality than obesity or hypertension (Khan et al., 2012).

Regular physical exercise is associated with a reduction in certain diseases, such as depression, high blood pressure, arthritis, diabetes and other diseases (Macera et al., 2003; Bjelica et al., 2021). Research shows that moderate physical activity reduces the risk of cardiovascular disease by 20%, and in people who are significantly more physically active by up to 27% (Williams et al., 2002; Lee et al., 2011). Motivation for physical exercise is not only of a health nature, but other motives are also present (Stojiljković, 1996). The most commonly exercised exercise programs for women are various group fitness programs. The goal of these programs is to satisfy the motives for maintaining health, improving physical appearance and reducing body weight (Mandarić, 2005).

Previous available research (Schmidt et al., 2001) in the field of recreation, which treated recreational aerobic exercise, suggests that aerobic exercise, as one of the most common models of exercise in recreation, can largely serve to preserve and improve fitness components a person. Different models of recreational aerobic exercise can have a great impact on cardiorespiratory fitness, as well as on the body composition segment (Grant et al., 2004; Okura et al., 2012).

The application of various group fitness programs has shown significant effects in improving functional and motor skills (Park et al., 2003; Šebić et al., 2012), as well as changes in women's body composition (Donges et al., 2010; Stasiulis et al., 2010).

Hence the goal of the scientific study to see the effects of physical activity, ie fitness programs, on body composition and its changes.

2. METHOD

2.1 Participants

The research and measurement procedure were conducted on a sample of 28 females (25-40 years). At the initial measurement, the parameters for body composition were obtained, which were measured after the fitness program, at the final measurement. All respondents were informed about the goals and protocols of testing and gave written consent to participate in the research. To avoid potential bias, participants were not informed of the theoretical background and did not receive feedback from the tester. The study

was approved by the Institutional Ethics Committee for Human Research and was conducted in accordance with the Declaration of Helsinki.

2.2 Procedure

In InBody270 was used to measure body composition. The following variables were used to assess body composition: percentage of body fat - Body Fat (%), total muscle mass - Muscle Mass (kg), total body weight - Trunk Weight (kg) and body fat - Trunk Fat (%). All tests were performed in similar conditions (20-25°C), in the same indoor space - gym. Participants were verbally introduced to the testing procedure, through explanations and demonstrations. Before the start of the experimental program (first week), an initial measurement was performed, after which they were included in the fitness program. Experimental programs differed in the intensity of exercise, the intensity was controlled using a heart rate monitor POLAR Ft1 Heart Rate Monitor. The goal of the program was to determine whether a change in body composition occurs under the influence of a fitness program. The program was realized in 8 weeks (2 times a week for 60 minutes), and the load intensity of the fitness program was from 55% to 75% of the maximum.

2.3 Statistical analysis

All statistical analyzes were performed using SPSS Statistics 20 software (SPSS Inc., Chicago, IL). Descriptive statistics were used to calculate the minimum, maximum and mean values of the results (Minimal, Maximum, Mean), standard deviation (Standard Deviation) and standard error (Standard Error), for each variable separately. Cohen's Effect Size (Wilson, 2001) was used to determine the differences between the initial and final measurements.

3. RESULTS

The results of descriptive statistics on the initial measurement, for the monitored variables and all subjects of the experimental program, are shown in Table 1.

Table 1. Descriptive parameters of body composition on initial measurement (N = 28)

Variable	Mean	Min.	Max.	Std.Dev.	Skew.	Kurt.
BF [%]	25.41	18.50	33.20	3.90	.31	-.29
MM [kg]	49.06	38.10	59.40	5.50	.16	-.83
TW [kg]	28.11	19.70	33.40	3.31	-.16	-.12
TF [%]	22.52	16.40	33.70	4.41	.87	-.00

Legend: Mean - arithmetic mean; Min - minimum values of results; Max - maximum values of results; Std.Dev. - standard deviation; Skew. - asymmetry of the distribution distribution curve; Kurt. - flattening of the distribution distribution curve; BF - Body Fat %, MM - Muscle Mass (kg), TW - Trunk Weight (kg); TF - Trunk Fat %.

The results of descriptive statistics on the final measurement, after the conducted experimental program, are shown in Table 2.

Table 2. Descriptive parameters of body composition at the final measurement (N = 28)

Variable	Mean	Min.	Max.	Std.Dev.	Skew.	Kurt.
BF [%]	22.19	16.00	27.50	3.10	-.08	-.87
MM [kg]	51.97	40.30	64.10	6.19	.28	-.79
TW [kg]	25.88	19.10	31.20	2.78	-.14	-.06
TF [%]	21.01	16.20	30.10	3.35	.99	.40

Legend: Mean - arithmetic mean; Min - minimum values of results; Max - maximum values of results; Std.Dev. - standard deviation; Skew. - asymmetry of the distribution distribution curve; Kurt. - flattening of the distribution distribution curve; BF - Body Fat %, MM - Muscle Mass (kg), TW - Trunk Weight (kg); TF - Trunk Fat %.

Table 3 shows the results of the Cohen's Effect Size analysis, which determined the magnitude of the impact of differences between the initial and final state of body composition in subjects after the experimental fitness program. Inspection of the obtained results can show moderate influence in the variable - Total body fat [%] (.70), small influence in the variables - Total body weight [kg] (.44), Total muscle weight in the body [kg] (-.33), Carcass Fat [%] (.35).

Table 3. The magnitude of the influence of differences between the initial and final state of body composition

Variable	Measurement	Mean	Mean Diff.	SD	Cohen's d
BF [%]	initially	25.31	3.10	3.90	.70 ***
	finally	22.21		3.10	
MM [kg]	initially	48.96	-2.95	5.50	-.33 **
	finally	51.91		6.19	
TW [kg]	initially	27.66	1.76	3.31	.44 **
	finally	25.91		2.78	
TF [%]	initially	22.58	1.55	4.41	.35 **
	finally	21.02		3.35	

Legend: Mean - mean value; Mean Diff. - difference of mean values between initial and final measurement; SD - standard deviation; Cohen's d - magnitude of impact; * - trivial; ** - little; *** - moderate; **** - a large; ***** - very big impact; BF - Body Fat %, MM - Muscle Mass (kg), TW - Trunk Weight (kg); TF - Trunk Fat %.

4. DISCUSSION

The purpose and goal of this study was to determine the effects of an experimental fitness program on body composition. The analysis of the obtained results established the existence of a positive relationship between the initial and final measurement, ie the existence of a positive influence of the experimental program on the body composition of women.

Based on the descriptive parameters and numerical values shown in Table 1, for the assessment of body composition, as one of the fitness components, it can be concluded that the subjects at the initial measurement have values within normal limits for the specified age (Mišigoj-Duraković et al., 1998; Mladenović et al., 2001).

The total body fat (%) at the initial measurement was 25.41% and the values obtained were in the normal distribution for the said population (Deurenberg et al., 1998; Tharp & Woodman, 2002; Heyward, 2006). The descriptive parameters obtained from Table 10, on the final measurement, indicate that there was a numerical decrease in the subjects for the assessment of body composition. The largest were found in the reduction of total body fat (%) in the ratio of 25.41-22.19 and total carcass weight (kg) 28.11-25.88 (initially final, retrospective).

The achieved results, with the variable total muscle weight in the body (kg), were higher in the final compared to the initial measurement (49.06-51.97), reduction, or better results were achieved with the variable carcass fat, which is expressed as a percentage initial-final, 22.52-21.01. Changes in body composition are the effect of the application and implementation of the experimental program (Ross et al., 2000; Pantelić & Mladenović, 2004; Ljubojević et al., 2014).

Table 3 shows the differences between the initial and final measurement of body composition, after conducting an experimental fitness program of 8 weeks. Based on the results of Cohen's Effect Size, it can be concluded that no variable was recorded in any of the variables. A moderate effect was recorded in the variable total body fat (.70), while a small effect was found in the variable total body weight (.44), total body muscle weight (-.33) and body fat (.35). The obtained values are in accordance with the research of other authors (Sigmund & Quintova, 2016; Sevimli & Sanri, 2017). In order to change the body composition, it is crucial to dose the load, which is accompanied by the intensity of the activity. The assumption is confirmed by previous research by other authors (Hughes et al., 2002; Jakicic et al., 2003; Gross & Mayhew, 2013).

The results obtained between the initial and final measurements, after the experimental fitness program, coincide with other similar studies, where it was proven that aerobic programs lead to changes in body composition parameters, as well as increase in lean muscle mass and decrease subcutaneous fat and body volume. , when several groups (experimental, experimental and control) are taken into account (Fuentes et al., 2013; Čuprika et al., 2014; Kostrzewa-Nowak et al., 2015).

5. CONCLUSION

Based on the obtained results, after conducting an experimental fitness program, it can be concluded that the 8-week program has an impact on the body composition of the female population. Also, there was a change in the parameters that were assumed to increase or decrease, and that there was a decrease in total body fat, total body weight and body fat, and an increase in muscle weight in the body.

The limitation of the study is reflected in the fact that it may have been necessary to take a larger sample of respondents, to take into account the longer duration of the experimental program and the comparative control group or fitness group.

6. REFERENCES

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