THE EFFECT OF STREET DANCE TRAINING PROGRAM ON BODY COMPOSITION OF FEMALE STUDENTS

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[1]Dejan Stošić,
[2]Slavoljub Uzunović,
[1] Faculty of Sport and Physical Education, University of Priština, Serbia,
[2] Faculty of Sport and Physical Education, University of Niš, Serbia.

ORIGINAL SCIENTIFIC ARTICLE

Abstract: The aim of this research was to determine the effects of a ten-week Street dance training program on body composition in female students. A total sample of examinees consisted of 54 female subjects aged from 19 to 24 years. The subjects were divided into an experiment group (n=27) where they applied a Street dance training program for ten weeks and a control group (n=27). The experimental group subjects participated in the ten-week Street dance training program (Hip Hop and Dancehall) three times a week for 90 min. The control group subjects had regular daily activities and were not involved in any form of organized physical activity. Body composition was assessed before and after the treatment using the bioimpedance method (InBody 770). The body composition was assessed using the following parameters: body fat percentage (BF%); body fat percentage of the upper extremities (BF% Upper); body fat percentage of the lower extremities (BF% Lower); skeletal muscle mass (SMMAPS); a fat-free mass of the upper extremities (FFM Upper); a fat-free mass of the lower extremities (FFM Lower). The results of the experiment at the end of the training program showed that there is no statistical difference between the experiment and the control group. Although there were no statistical differences between the groups, the experimental group had better results in all parameters of body composition than the control group. It is concluded that the ten-week Street dance training program is not an effective model for improving body composition in female students.

Key words: hip hop, dancehall, dance, body composition, students.

INTRODUCTION

When we talk about body composition, we usually talk about the different tissues in the composition of the human body, as well as their mutual relationship. It can be defined as the relative ratio of fat and lean body mass, and is most often expressed through the percentage of fat tissue.

Previous research has shown that ballet dancers have a low level of fat percentage, especially compared to non-dancers and other types of dance (Mihajlović & Mijatov, 2003; Park, Kim, Oh, Kim, & Cho, 2013; Beck, Mitchell, Foskett, Conlon, & von Hurst, 2014; Lichtenbelt, Fogelholm, Ottenheijm, & Westerterp, 1995). These values for ballet dancers vary from 13.8 to 22.1%, depending on the research (Yannakoulia, Keramopoulous, Tsakalakos, & Matalas, 2000), while for sports

dancers, these values range from 9.4 to 21.6% (Bria et al., 2011). There are also differences depending on the length of dance experience, so professional and amateur dancers have a lower percentage of body fat than beginners or non-dancers (Chatfield, Byrnes, Lally, & Rowe, 1990). In addition to the low level of body fat percentage, it was established that female ballet dancers belong to the ectomorphic body type, have smaller measures of transference dimensionality as well as the body mass index, while male dancers correspond to the mesomorphic body type.

Although low values of body fat percentage were recorded in professional dancers, it is not excluded that a certain dance style can influence the change of body composition and the sample of recreational athletes. Each dance style has different functional demands on the dancer's organism and thus a different energy system is activated, which to a lesser or greater extent engages the metabolism of fat burning (Stošić, 2019). Dance is a discipline where the aesthetic and artistic component is important, so it is very common that the requirements of the dance industry dictate a certain visual standard that dancers must fit into with their body composition.

Recreational dance has different requirements than professional dance. Most of the research was done on a sample of professional ballet dancers, which leaves plenty of room for research into the effects of recreational dancing on body composition. This is where the aim of this research came from, which is reflected in examining the effects of the "Street" dance training program on the body composition of female students.

METHOD

Examined female sample

The sample of examinees was defined as the population of female students of the University of Niš, chronologically aged between 19 and 24 years. Of the 59 subjects who volunteered through the survey, 54 subjects were included in the program who met the criteria for inclusion in the experimental program (that they are in good health, that they are not in the process of recovering from some kind of injury and that they are not involved in any form of organized physical or dance activity). Using the method of random selection, the test subjects were divided into an experimental group (n=27) with an average height of 165.4±5.81 cm and an average body weight of 60.1±6.97 kg, who applied the experimental program of "Street" dances for ten weeks. The control group (n=27) whose average height is 166.3±6.09 cm and body weight 60.6±8.21 kg was not involved in any form of organized form of physical exercise and had daily regular activities. All test subjects were informed in detail about the method of conducting the experimental treatment, and considering that they voluntarily joined it, they were allowed to withdraw from the experimental treatment at any time during the duration of the program.

Measuring instruments samples

Anthropometric characteristics of the sample (height, weight and body mass index) were determined for better description and were not used for further analysis. They were measured in accordance with the recommendations of the International Biological Program - IBP (Weiner & Lourie, 1969).

The InBody 770 device (InBody 770 Body Composition and Body Water Analyzer, InBody, USA) was used to assess body composition. The bioimpedance method evaluates the body structure by emitting a low, safe dose of electricity through the body of the subject, which measures the resistance of different tissues. The test subjects were familiar with the test protocol (avoidance of alcohol consumption, products containing diuretics and physical activity at least 12 hours before the measurement) so that the results were as accurate as possible. The following parameters of body composition were assessed using the bioimpedance method: fat mass of the whole body (BF%); fat mass of the upper extremities (BF% Upper); lower limb fat mass (BF% Lower); whole body skeletal muscle mass (SMMAPS); fat-free mass of the upper extremities (FFM Upper); fat-free mass of the lower extremities (FFM Lower).

Experimental program

The experimental program lasted for 10 weeks, 3 times a week for 90 min. Each class had a three-part structure. The dance program was made up of dance elements of "Hip Hop" and "Dancehall" which were rehearsed in the form of choreography to specific music. The duration of the entire choreography that the test subjects mastered during the duration of the experimental program was 3 minutes. Out of a total of 30 trainings, 14 trainings consisted of choreography learning, 10 choreography renewal trainings and 6 dance technique and style correction trainings.

Table 1 Experimental program structure

	Experimental group		**Control group**
Frequency	3 x week		-
Duration of the activity	90 min		-
	Class structure	**Trajanje**	
Introduction	Dance aerobics	5 min	-
	Dynamic warm-up	5 min	
	Specific warm-up	15 min	
The main part	Dance content	50 min	-
Ending	Stretching exercises	15 min	-

Data processing method

All data were processed in the Statistical Package for Social Sciences (v17.0, SPSS Inc., Chicago, IL, USA). Descriptive statistics for all variables included the following parameters: mean value (Mean), standard deviation (SD), minimum (Min) and maximum (Max) score and range (Range). The discriminativeness of the measurement was determined with the help of the Skewness (Skew) and Kurtosis (Kurt) values.

Statistically significant differences between groups for each variable and measure were determined individually with the help of Univariate Analysis of Variance (ANOVA). Differences were tested using the F-test, and the level of significance was expressed as p.

The difference between the initial and final measurements of the experimental and control groups was determined with the help of the t-test for dependent

samples or Effect Size. The criterion for determining the size of the impact was: 0.01 – small impact; 0.06 – moderate influence; 0.14 – a large influence (Cohen, 1988).

Univariate analysis of covariance (ANCOVA) was used to determine the realized effects of the experimental program.

RESULTS

The results of the descriptive parameters of the test subjects of the experimental and control groups at the initial measurement show that there are no significant deviations from the normal distribution in terms of asymmetry and roundness. A slight deviation of skewness values was observed in the experimental group in the variables: BF% Lower Right (1.19), BF% Lower Left (1.17) BF% Lower Average (1.20), i.e. there is a slight positive asymmetry of the results, which indicates higher number of weaker results in these variables.

At the final measurement, there were no significant deviations from the normal distribution in the experimental and control groups.

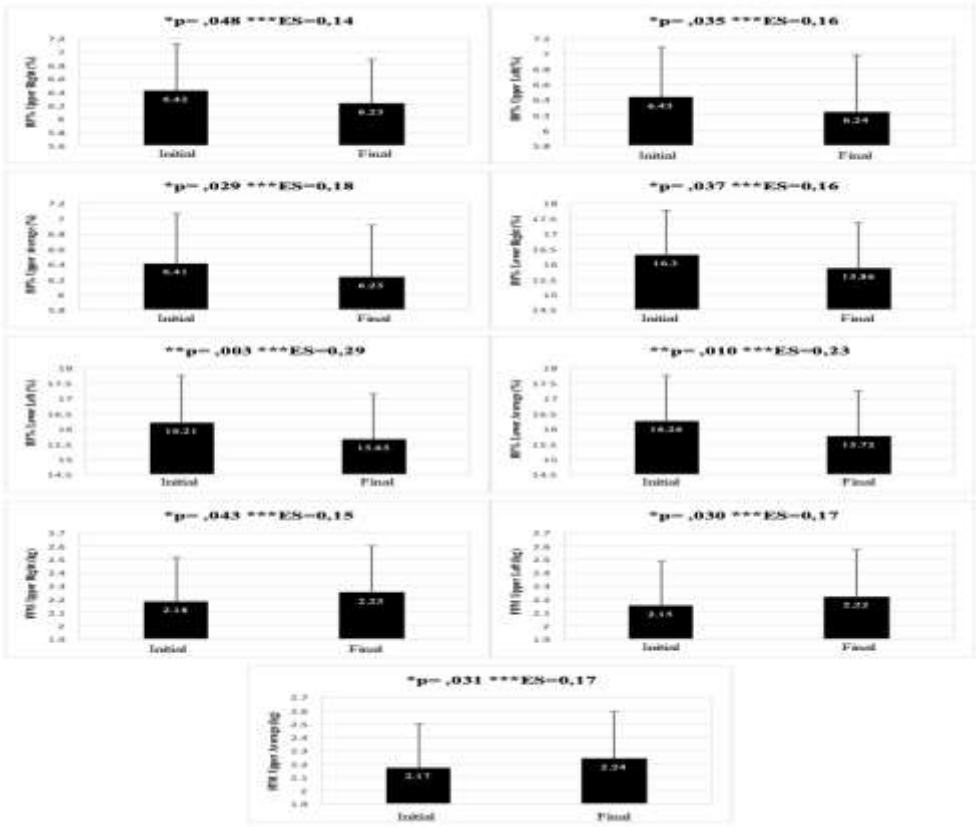
Table 2 ANOVA of body composition between the experimental and control groups at the initial measurement

	Ex	Con	dif	F	p
BF%	25,83	26,61	-,79	,212	,647
BF% Upper Right	6,42	6,55	-,12	,585	,448
BF% Upper Left	6,43	6,52	-,09	,358	,552
BF% Upper Average	6,41	6,54	-,13	,760	,388
BF% Lower Right	16,31	16,37	-,06	,028	,867
BF% Lower Left	16,22	16,19	-,03	,006	,936
BF% Lower Average	16,26	16,28	-,02	,002	,965
SMMAPS (kg)	24,43	24,53	-,01	,017	,898
FFM Upper Right	2,19	2,17	,02	,052	,821
FFM Upper Left	2,16	2,16	,00	,000	,988
FFM Upper Average	2,17	2,16	,01	,007	,935
FFM Lower Right	6,95	7,21	-,26	1,036	,314
FFM Lower Left	6,93	7,19	-,26	1,125	,294
FFM Lower Average	6,94	7,20	-,26	1,100	,299

Legend: *Ex – mean value of the experimental group, Con – mean value of the control group, dif – difference between mean values of experimental and control group, p– significance level * < .05; **< .01*

The results of the univariate analysis of the variance of body composition between the experimental and control groups at the initial measurement showed that there are no statistically significant differences in any of the tested variables and that the numerical differences between the groups are very small.

Graph 1 Differences between the initial and final measurements in the body composition parameters of the test subjects of the experimental group



Legend: *p – significance level * < .05, **< .01; ES – influence amount *0,01= small influence, **0,06= moderate influence, ***0,14= big influence*

The results of the differences between the initial and final measurements of the test subjects of the experimental group showed statistically significant differences in the variables: BF% Upper Right (p= .048), BF% Upper Left (p= .035), BF% Upper Average (p= .029) , BF% Lower Right (p= .037), FFM Upper Right (p= .043), FFM Upper Left (p= .030) and FFM Upper Average (p= .031) at the .05 significance level. The variables BF% Lower Left (p= .003), BF% Lower Average (p= .010) showed statistical significance at the .01 level.

The values of the magnitude of the influence of the ten-week experimental program on body composition parameters show that a large positive influence was recorded for all variables, namely: BF% Upper Right (ES=0.14), BF% Upper Left (ES=0.16), BF% Upper Average (ES=0.18) BF% Lower Right (ES=0.16), BF% Lower Left (ES=0.29), FFM Upper Right (ES=0.15), FFM Upper Left (ES=0 .17) and FFM Upper Average (ES=0.17).

The results of the differences between the initial and final measurements of the test subjects of the control group showed statistically significant differences in

the following variables: FFM Lower Right (p= .006), FFM Lower Left (p= .002) and FFM Lower Average (p= .003) on significance level of .01, where the results on the final measurement were weaker compared to the initial one.

Table 3 ANOVA of body composition between the experimental and control groups at the final measurement

	Ex	Con	dif	F	p
BF%	25,81	26,25	-,43	,0,72	,789
BF% Upper Right	6,23	6,45	-,22	2,013	,162
BF% Upper Left	6,24	6,46	-,22	1,794	,186
BF% Upper Average	6,23	6,45	-,22	2,002	,163
BF% Lower Right	15,86	16,22	-,36	,919	,342
BF% Lower Left	15,65	16,00	-,35	,890	,350
BF% Lower Average	15,75	16,11	-,35	,919	,342
SMMAPS (kg)	24,55	24,18	,36	,220	,641
FFM Upper Right	2,25	2,15	,10	1,135	,292
FFM Upper Left	2,22	2,12	,09	,995	,323
FFM Upper Average	2,24	2,13	,10	1,071	,306
FFM Lower Right	7,04	6,96	,07	,082	,776
FFM Lower Left	7,00	6,92	,08	,112	,739
FFM Lower Average	7,02	6,94	,08	,097	,757

Legend: *Ex – mean value of the experimental group, Con – mean value of the control group, dif – difference between mean values of experimental and control group, p– significance level * < .05; **< .01*

The results of the univariate analysis of variance of body composition between the experimental and control groups at the final measurement showed that there were no statistically significant differences in any of the tested variables. Although the differences are not statistically significant, the experimental group achieved better results on all tests, that is, there are numerical differences in the applied variables in favor of the experimental group.

DISCUSSION

Dance belongs to a sports discipline where the artistic and aesthetic component is very important, so it is expected that body composition is very important for dancers. The applied experimental treatment lasting ten weeks did not lead to statistically significant changes in body composition variables. These results are in agreement with the research of Galanti et al. (1993), which showed that a ten-week "jazz" dance program did not lead to significant changes in body composition. The results of the research by Brown et al. (2007) and Kozai (2012) in which additional weight training and plyometric training were applied to ballet and modern ballet dancers for 6 weeks also showed no changes in body fat percentage and body mass. These results were also confirmed in the study by Koutedakis et al. (2007) in which additional aerobic training and load training was applied to modern ballet dancers and no changes in the thickness of skin folds were recorded after 12 weeks. Vetter & Dorgo (2009) did not record changes in the percentage of fat and lean body mass after applying an eight-week program of manual loading with partner's weight, while Stalder, Noble, & Wilkinson (1990) did not record changes in leg circumferences after applying a nine-week ballet exercise program and additional training with load.

The absence of changes in these parameters of body composition may be the result of inadequate nutrition during the duration of the experimental program, insufficient duration or frequency of training and different loads, which will mostly depend on the type of dances and the structure of the program. Exercise improves muscle tone, accelerates basal metabolism and burns calories, but without dietary control that regulates and reduces caloric intake, independent exercise will have a much smaller effect, so it is recommended that the exercise program is always accompanied by an adequate nutrition plan in order to increase the effects of exercise and diet (Petrofsky et al., 2008). Caloric consumption is one of the main factors that affects the reduction of body composition (Milanović, 2015), which unfortunately was not examined in this research, as well as the dietary habits of the subjects, which we can cite as a limitation of this experimental program. In order to effectively influence the reduction of body weight, it is necessary for the load to be from 70% to 90% HRmax, that is, that about 500 kcal be consumed per training session (Pollock & Willmore, 1990). The workload in dance is mainly monitored through heart rate and VO2 max, where studies have shown that the correlation between heart rate and VO2 max in dancers is poor (Redding, Wyon, Shearman, & Dogart, 2004), and that it arose as a consequence of increased hand work that leads to an overestimation of activity intensity by showing higher heart rate values (Forte, De Vitto, Murphy, & Boreham, 2001). For this reason, VO2 max is recommended as a measure of workload in dance (Rodriquez-Krause et al., 2014; Redding, Wyon, Shearman, & Dogart, 2004), which, in addition to monitoring caloric consumption, can enable detailed monitoring of the effects of a certain experimental treatment on physical changes compositions.

CONCLUSION

Based on the obtained results, we can conclude that the ten-week "Street" dance training program is not effective enough in improving the body composition parameters of female students. Although the results were not statistically significant, there was a numerical difference in all body composition variables in favor of the experimental group. It is possible that a longer application of this treatment could have a positive effect on the change in body composition parameters, but further research is certainly necessary in order to confirm this.

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Correspodence:
Slavoljub Uzunović
Faculty of Sports and Physical Education,
University of Nis, Nis, Serbia
e-mail: uzun@fsfv.ni.ac.rs