Exercise-Mimicking Effects of K-pop Dance on Body Composition and Muscular Strength in Young Female

Shengnan Li¹, Jun-II Yoo², Kyung-Wan Baek¹,², Miran Yu³, Tae-Bong Jeon¹, Eun-Ji Ha¹, Jae-Min Park⁴, Ji-Seok Kim¹

¹Department of Physical Education, Gyeongsang National University, Jinju, Korea, ²Departmen of Orthopaedic Surgery, Gyeongsang National University, Jinju, Korea, ³Broadcasting Entertainment, Dong-Ah Institute of Media and Arts, Anseong, Korea, ⁴Department of Dance, Seoul Art College, Seoul, Korea

ABSTRACT

Li S, Yoo Ji, Baek KW, Yu M, Jeon TB, Ha EJ, Park JM, Kim JS. Exercise-Mimicking Effects of K-pop Dance on Body Composition and Muscular Strength in Young Female. JEPonline 2019;22(5):97-104. The purpose of this study was to investigate the exercise-mimicking effects of K-pop dancing. Among the 70 female collegians recruited, the K-pop group consisted of 18 students who participated in K-pop dance (KPD) 2 hrs ⋅ d⁻¹, 3 times ⋅ wk⁻¹ for 36 months. Twenty-one students who participated in regular exercise for the same time, frequency, and duration with the KPD group were engaged in regular exercise (EXE). Thirty-one subjects did not participate in exercise. They were classified as the control (CON) group. Compared to the CON subjects, fat mass (14.58 ± 0.87 vs. 17.02 ± 0.64 kg) and BMI (20.05 ± 0.43 vs. 22.62 ± 0.39 kg · m⁻²) were significantly lower in KPD subjects, while muscle mass (20.97 ± 0.30 vs. 16.51 ± 0.40 kg), grip strength (22.46 ± 0.82 vs. 19.81 ± 0.83 kg), and BMR (1261.41 ± 11.03 vs. 1212.72 ± 7.24 kcal) were significantly higher. Muscular strength in the EXE group was significantly higher than both the CON and the KPD groups. The findings show that performing K-pop dance has exercise-mimicking effects of decreasing fat and enhancing muscle mass, although it has a limited effect on the increase in muscular strength.

Key Words: Exercise, Exercise-Mimicking Effects, K-pop Dance
INTRODUCTION

The female participation rate in the physical activity is known to be decreased about 4% a year after puberty (11). Reduced participation in physical activity can cause a variety of health problems, such as obesity (12), type 2 diabetes (9), and hypertension (13). In order to increase the participation rate of young females in physical activity, selecting appropriate type of physical activity can be a decisive strategy for the enhancement of their physical fitness and health. K-pop music and dance originated from South Korea, which contain a variety of visual and auditory elements (10). Recently, K-pop dance became one of the most popular dance-genre in all around the world and some of the excellent K-pop dancers are regarded as idols (15, 2). Their K-pop dancing performances are imitated by their fans, most of whom are mainly women in their late teens to early twenties (8).

K-pop dances consist of multiple weight-bearing movements, such as jumping, upper and lower limb extension, rotation, and flexion (6). It is known that the regular practice of modern dance has a positive effect on the development of the skeletal system and limb ligaments. Regular dance movement improves the shape of the body shape, thus helping to create more symmetrically taller and straight figures by enhancing the quality of the musculoskeletal system (15). Therefore, we expected that regular participation in various movements of K-pop dance would help to promote an increase in muscular strength and body composition as much as a regular exercise. The purpose of the study was to determine whether the K-pop dancing is an effective physical activity for the improvement of the young female's physical fitness.

METHODS

Subjects

The subjects consisted of 70 female college students between 19 and 24 yrs of age. They were divided into three different groups: (a) 21 students were included in the exercise (EXE) group who have participated in the regular exercise program for 2 hr·d⁻¹ and 3 times·wk⁻¹ for the past 36 months; (b) 18 of the 70 students made up the K-pop dance (KPD) group who participated in the regular K-pop dancing program for 2 hr·d⁻¹, 3 times·wk⁻¹ for 36 months; and (c) 31 students were included in the control (CON) group, who did not participate in the regular exercise or dancing. All subjects were informed of the purpose of the research, the test-contents of the study, and volunteered to participate. The characteristics of subjects are presented in Table 1. The protocol was approved (approval no. GIRB-A19-Y-0006) by the Institutional Review Boards at Gyeongsang National University, Korea.

<table>
<thead>
<tr>
<th>Table 1. The Characteristics of Subjects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON (n = 31)</td>
</tr>
<tr>
<td>Age (yrs)</td>
</tr>
<tr>
<td>Height (cm)</td>
</tr>
</tbody>
</table>

All data provided of mean ± SD. CON = Control Group; KPD = K-pop Dance Group; EXE = Exercise Group
Evaluation of Body Composition
Body composition was assessed by using a bioelectrical impedance analysis. During the test, the subjects were asked to look straight ahead and while standing barefoot on the electrode plate. Body weight, BMI, %body fat, fat mass, muscle mass, and basal metabolic rate (BMR) were determined in the standing position wearing minimal clothes. The subjects’ waist and hip circumference were tested using standard methods, and the ratio of waist circumference to hip circumference was used to assess the body's fat distribution.

Evaluation of Muscular Strength
Strength of the skeletal muscles was measured with dynamometry (MicroFET2; Hoggan Scientific, Salt Lake City, UT, USA). The reliability and reproducibility of this device have been determined in previous studies (2,8). The strength of skeletal muscle was expressed in kilogram-force. Specifically, the person participated in the test was asked to sit on the measuring table with the legs hanging at the end of the measuring table and the hips and knees bent at 90°. The height of the measuring table was adjusted according to the leg length of the test subjects so that the feet were 10 cm away from the floor and the sides of the measuring table were grasped with the subjects' hands. After several warm-ups using less than 50% of the force, they performed a 5-sec autonomic contraction exercise. The instrument was fixed above the tibial joint line to evaluate the knee stretching muscles, measure the extensor muscles of the strong side legs, and then measure the flexors of the strong side legs. The instrument was fixed above the lateral malleolus to assess the knee flexor. For each test, the subjects performed three equal length maximal voluntary contractions followed by a 1-min recovery between each contraction (6).

Statistical Analyses
All the data were presented as mean ± SD. The differences across the groups were assessed by the one-way ANOVA followed by post hoc testing with the Fisher's least significant difference test. The statistical significance was set at an alpha level of P<0.05. The statistical analysis was performed by using SPSS 24.0 software (IBM Co., Armonk, NY, USA).

RESULTS
Body mass index (BMI) and fat mass were significantly lower in the KPD group compared to the CON group, while waist-hip ratio (WHR), fat mass, and %body fat were significantly lower in the EXE group compared to the CON group (Figure 1). Muscle mass and basal metabolic rate (BMR) were all significantly decreased in both the KPD group and the EXE group compared to the CON group (Figure 2). In regards to muscular strength, although grip strength was significantly higher in the KPD group compared to the CON group, strength of the biceps brachii and the quadriceps femoris muscles were not different between the KPD group and the CON group. However, muscular strength of grip, biceps brachii, and quadriceps femoris were all significantly higher in the EXE group compared to both the CON group and the KPD group (Figure 3).
Figure 1. Effects of Regular K-pop Dancing and Exercise on Body Mass Index, Waist-Hip Ratio, Fat Mass and %Body Fat. Statistical significance was set at *P<0.05 and **P<0.01

Figure 2. Effects of Regular K-pop Dancing and Exercise on Muscle Mass and Basal Metabolic Rate. Statistical significance was set at *P<0.05 and **P<0.01
DISCUSSION

K-pop Dance Improved Body Composition

The subjects’ BMI was obtained by the dividing body weight in kilograms by the square of the height in meters squared. It is used as a standard to measure the fatness and health of the human body (7). Since adult females were selected to be the subjects in this study, the change in height is insignificant, so the only indicator that determines the change in BMI index of young women is the change in body weight. The results of this study showed that there was a significant decrease in BMI in the KPD group compared to CON group, while the EXE group and the CON group were not significantly different from each other.

The findings indicate that the K-pop dance can be more effective in the loss of body weight than the regular exercise. In regards to the WHR, there was a significant difference between the groups. But, all the values in each group were in the normal range, which means all the subjects are not obese. Fat mass and %body fat were significantly decreased in the EXE group compared to the CON group, while only fat mass was significantly decreased in the KPD group compared to the CON group.

However, the pattern as to the decrease in the fat variables has shown that the KPD group has exercise-mimicking effects on the fat metabolism (Figure 1). The KPD group performed K-pop dance requiring systematic cooperation of hands, arms, knees, and feet for 2 hrs each dance session. This type of physical activity can accelerate the rate of fat burning involved in the aerobic energy system (12). The subjects’ BMI was the lowest in the KPD group, while WHR, fat mass, and %body fat were the lowest in the EXE group. Thus, the effect of increasing lean body mass may be slightly higher in the EXE group.
However, K-pop dance also improved body composition very effectively, just a little larger and less effective when compared to general exercise. If the dance style is different, the focus of the dance movements is different and as well the muscles throughout the body are used differently (10). Thus, it is reasonable that the differences in body movement patterns during K-pop dance versus regular exercise explain some of the subjects’ responses in lean body mass rate. Also, given that various joints are actively moved due to the performance of the K-pop dance, a large amount of sweat is evaporated that is consistent with the exercise duration. If the K-pop exercise continues for a long duration, more fat is used to fuel the exercise and, therefore, there is a decrease in dancers’ fat content that promotes a favorable increase in body composition (10).

**K-pop Dance Increases Basal Metabolism**

BMR is the minimum amount of energy metabolism required to sustain life; whereas, basic metabolites of health with the same age and performance are proportional to the body surface area. Pate et al. (14) indicate that basal metabolism accounts for about the total calorie consumption of the human body. Figure 2 shows that the skeletal muscle mass and BMR were significantly higher in both the KPD and the EXE groups compared to the CON group. Basal metabolic rate is known to be positively correlated with muscle mass (4,14). Thus, the current result means that both K-pop dance and regular exercise can induce a positive change in skeletal muscle mass, thereby improving BMR. However, we additionally confirmed the absolute muscle mass (Figure 2). As a result, absolute muscle mass was the highest in KPD group, which means that K-pop dancing effective enough to increase lean body mass.

**K-pop Dance Similar to Aerobic Exercise**

Grip strength and muscular strength of the biceps brachii and the quadriceps femoris muscles were significantly increased in the EXE group compared to both the CON group and the KPD group. On the other hand, the KPD group did have a significant increase only in grip strength compared to the CON group, and there was no significance with the CON group in muscular strength of the biceps brachii and the quadriceps femoris. These findings indicate that the KPD group is less effective in the enhancement of muscular strength compared to regular exercise. In other words, the influence of KPD on the muscular system was similar to aerobic exercise rather than resistance exercise in regards to the energy system. Also, this finding is favored by the fact that the daily training of the EXE group was carried out using a combination of aerobic training and resistance training, but focused more on resistance training. Therefore, resistance exercise training in the exercise program of the EXE group may be the stimulus for an increase muscle fiber strength of the biceps brachii and quadriceps femoris muscles (1,3).

**CONCLUSIONS**

The findings in the present study indicate that regular participation in K-pop dance improved body composition and basal metabolic rate by decreasing fat mass and increasing muscle mass in the young female subjects, although its effect was not as much as the regular strength training exercises.


**Disclaimer**
The opinions expressed in JEPonline are those of the authors and are not attributable to JEPonline, the editorial staff or the ASEP organization.