



## The Effect of Rope-Skipping Exercise on Body Composition of Young Female Adults

Jonathan Lee<sup>1</sup>, P.T · Tae-Seong In<sup>2</sup>, Ph.D., P.T

<sup>1</sup>Dept. of physical Therapy, South Campus Care Center, Leesburg, FL, USA

<sup>2</sup>Dept. of physical Therapy, Gimcheon University

### Abstract

**Purpose:** This study was investigated basic data for verifying the effect of rope skipping exercise by comparing and analyzing the effects on the body composition of female students. **Method:** The subjects of this study were 12 female college students and the rope-skipping exercise program was conducted after the purpose and process of this study were explained and the consent of the subjects was obtained. And we used the body composition analyzer (Inbody 520, Korea) to measure before and after exercise of Body Mass Index (BMI), Percentage Body Fat (PBF) and Waist Hip Ratio (WHR). **Result:** First, the daily living group and the rope-skipping exercise group showed a significant difference in the BMI according to the period and there was no significant difference between the groups. Second, in the PBF, there were no significant differences in the duration, interaction between duration and group and differences between the groups. Third, in the WHR, there were no significant differences in the duration, interaction between duration and group and differences between the groups. **Conclusion:** BMI of each group according to the period was significantly different between before exercise and 6 weeks after exercise.

**Key words :** Rope-Skipping Exercise, Body Composition, Women

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## I. Introduction

In our modern society, the improvement of the income level and the material abundance improved the quality of life, and living in a relaxed lifestyle increased interest in health as well as appearance. Also, due to the rapid increase in the population who are worried about obesity caused by westernized diet and the damage caused by the

lookism, obese people are viewed as an inability to manage themselves, and it began to cause social problems. In addition, even a normal weight person is not satisfied with his/her body and wants a more slender body. Most people want to be recognized and confident enough by meeting the socially required beauty standards.

In Korea, adolescents tend to forget their health because they are confined to intellectual development due

교신저자: 인태성

주소: 경상북도 김천시 대학로 214 김천대학교 물리치료학과, 전화: 054-420-4068, E-mail: in836@naver.ac.kr

to forcible university entrance-centered education activities of their parents and university entrance-centered education. As soon as they become adults, they have a free lifestyle and are especially concentrating on the outer beauty, and the attempt of indiscreet diet is increasing with ignoring the decrease of basic physical strength (Sook-Mi Son et al., 2004).

Today when opportunities for physical activities are reduced, people want the greatest diet effect with the least time investment, so diversification of the market is taking place such as diet food, diet medicine, fast center, obesity clinic, and so on. And extreme wrong diet methods are selected such as wrong diet, one-food diet, and indiscreet drug taking. Incorrect diet or one-food diet is even threatening the life if serious such as lowering basic physical strength and health problems. (Sun-Hyung Lee, 2008).

The World Health Organization (WHO) defined that "a state without physical illness as well as mental and social illness is a happy life" (Sun-Hyung Lee, 2008). Mental health of women deserves more attention. In addition to psychological interventions, doing regular physical exercises can also be helpful (Hawker et al, 2012). Given the role of sport on cutting stress, it is considered as an effective intervention to ensure mental health (Omidnia et al, 2010). Physical practice triggers biological and biochemical changes in body that leads to improvement of mental health so that amateur athletes usually have better mental health than others (Kiyani et al., 2010).

To prevent harmful effects such as hair loss and yo-yo phenomenon caused by wrong diet, regular aerobic exercise, which reduces body fat and blood lipoprotein content and improves basic physical fitness according to one's physical fitness, has been suggested.

Exercise can be divided into aerobic exercise and anaerobic exercise, and it is said that aerobic exercise is more effective in weight loss and changes in body com-

position than anaerobic exercise. Regular aerobic exercises include various exercises such as walking, aerobics, swimming, climbing, rope-skipping exercise and these exercises are recommended because of their high energy consumption. It is said that continuous aerobic exercise not only increases muscle mass but also decreases body fat of each region (Yong-Geum Lee, 2003). Dance sports among aerobic exercises is an exercise that can improve body composition and cardiorespiratory function of obese people and squash, which is similar to aerobic exercise, is known to be a good exercise for strengthening cardiopulmonary function and preventing obesity and geriatric disease because it has the characteristics of lower body development, blood circulation improvement, and mental exercise.

Rope-skipping is an exercise that jumps the rope while turning it from the foot over the head while holding the ends of the rope at the position of the end of the line when the middle of the line is stepped on.

A rope-skipping exercise can consume 720 kcal for 1 hour at a rate of 120 to 140 times per minute (Gi-Chul Jeon, 1998). It is a systemic circulation exercise of the body that can be easily done even in a narrow space due to fewer time and space constraints and is the most popular exercise that can be easily performed by men and women of all ages (Young-Jun Park, 1996). In addition to diet effects, improvement of the coordination of the arms and legs develops the nervous system, which not only improves the immunity to diseases, as well as coordination, strength and muscle endurance (Sung-Soo Kim, 1995).

In a situation where adequate aerobic exercise is needed, a 10-minute rope-skipping exercise is equivalent to a 30-minute jogging exercise (Baker, 1968), so a regular rope-skipping exercise program is needed to improve basic physical fitness and show diet effects.

Therefore, this study is of significance in providing basic data for verifying the effects of rope-skipping ex-

ercise by comparing and analyzing the effect on body composition when the female students attending in the department of physical therapy of G University were divided into the daily life group and the rope-skipping exercise group for 6 weeks.

## II. Method

### 1. Subjects

The subjects of this study were 12 female college students attending G university in Gimcheon city. Inclusion criteria of this study was healthy young adults, and subjects who have pain and musculo-skeletal deformity were excluded. The rope-skipping exercise program was conducted after the purpose and process of this study were explained and the consent of the subjects was obtained. The body average of the subjects is shown in Table 1.

### 2. Measurement Tools

This study used the body composition analyzer (Inbody 520, Korea) to measure before and after exercise of Body Mass Index (BMI), Percentage Body Fat (PBF) and Waist Hip Ratio (WHR). For accurate measurement, the metal was removed from the body, both feet were placed on the electrode, the hand electrode was held, and then both hands were spread open and then the measurement was conducted in a static state.

Table 2 showed the measurement tools used in this study.

### 3. Measurement items and methods

#### 1) Body composition test

This study used the body composition measuring instrument to measure body weight, percentage body fat, body fat mass and circumference per region. For the

measurement, the subjects put their feet on the electrodes without wearing socks and held the hand electrode with both hands spread open.

#### (1) Waist Hip Ratio (WHR)

The experimenter stands on a flat surface and measures just below the navel (Yoon-Seok Lee, 2008).

#### 2) Rope-skipping exercise program

In this study, one round of rope-skipping exercise program was performed in a one jump with both feet put together. The frequency of rope-skipping exercise was 5 times a week and twice a day. Stretching was performed for 5 minutes as warm-up before exercise, and main exercise for 20 minutes, and stretching for 5 minutes as warm-down.

In this study, 5 sets of rope-skipping exercises were performed at 100 ~ 200 times / min for 3 minutes for 6 weeks and the resting time between the exercises was 1 minute and it was repeated continuously according to the prescribed exercise program (Table 3).

### 4. Data processing

The statistics of data of this study were calculated by comparing the changes in body composition of each group using the PASW Window (ver. 18.0).

One-way repeated ANOVA was performed to analyze changes in body composition.

The significance level  $\alpha$  was set to .05.

## III. Results

### 1. Body Mass Index (BMI)

Table 4 shows the BMI of each group before exercise, 3 weeks after exercise, and 6 weeks after exercise.

The daily living group and the rope-skipping exercise

group showed a significant difference in BMI according to the period and there was no significant difference between the groups. There was also no significant difference in the interaction between duration and group. (Table 5)

There are significant differences according to the period, as shown in Table 6. The probability of significance was not significant before exercise and 3 weeks after exercise and the probability of significance showed a significant difference before exercise and 6 weeks after exercise.

## 2. Percentage Body Fat(PBF)

PBF by period of each group before exercise, 3 weeks after exercise, 6 weeks after exercise is as shown in Table 7. In PBF, there were no significant differences in the duration, interaction between duration and group and differences between the groups (Table 8).

## 3. Waist Hip Ratio(WHR)

WHR by period of each group before exercise, 3 weeks after exercise, 6 weeks after exercise is as shown in Table 9. In WHR, there were no significant differences in the duration, interaction between duration and group and differences between the groups.

# IV. Discussion

This study classified female students of G University into the daily living group and rope-skipping exercise program group for 6 weeks analyzed body composition changes by dividing them into before exercise and after exercise and the analysis and comparison based on the results of this study are as follows: The body is composed of body fat and lean body weight. When comparing energy consumption and intake, body weight in-

creases when there is a lot of intake, while it decreases when energy consumption is high. Amiri Farsni and Rezaei manesh (2011) studied the effect of six consecutive weeks of aerobic practices on some types of blood fats and  $VO_2^{max}$ . and They found that doing sport is positively effective on psychological performance (Bostani et al., 2011).

Krotiewski (1979) et al said that body fat accumulates more in the abdomen and hips than in other parts of the body and obesity-related diseases are more closely related to the fat distribution pattern than the total fat content in the body, so that fat accumulation especially in the body center region than in other parts of the body is related to the incidence of various degenerative diseases. Over the past 30 years, abdominal obesity has been assessed by WHR but as there are more and more reports saying that waist circumference itself is more correlated with visceral fat than WHR, the use of waist circumference as an index of abdominal obesity is increasing gradually (Chung, 2006), and as there are more and more reports saying that waist circumference itself is more correlated with visceral fat than WHR, the use of waist circumference as an index of abdominal obesity is increasing gradually but WHR is an indicator which has been used to determine abdominal obesity for a long time (Chung, 2006), and has advantages of greater explanation power about the distribution of body fat (Megnier et al, 1999), easy measurement and fewer errors (Lee, 1990).

Dance sports can improve aerobic exercise capacity within a short period of time and help prevent and improve adult disease or obesity by activating whole body muscles and cardiopulmonary functions. In addition, Lee Chang-gyu and one other person (2002) reported that PBF and body fat mass decreased significantly in the body composition of women through tennis. This study observed changes in body composition by performing a rope-skipping exercise with a relatively less time-space limitation.

A rope-skipping exercise is an aerobic exercise that can reduce fat by regular exercise regularly every day for 10 to 20 minutes, and also prevent the loss of fat. It is effective not only in weight loss, but also in improving respiratory function and body composition (Bouchard et al, 1990). It was found that it is possible to have a well-balanced body, regardless of the place, by showing various exercise effects during repetition of several sets with a short time of rest, and it is an appropriate exercise for people who are at risk of obesity due to lack of exercise (Sun-Hyung Lee, 2008).

The limitation of the exercise for 6 weeks or more and the daily life exercise of the control group is considered to be more effective, so experimental papers of more than 6 weeks, which can indicate the most effective period of BMI change, are needed.

## V. Conclusion

In order to compare changes in the body composition of each group when performing rope-skipping exercise for 6 weeks for female students of G University, this study measured repeatedly before exercise, 3 weeks after exercise and 6 weeks after exercise using a body fat analyzer and obtained the following results.

BMI of each group according to the period was significantly different between before exercise and 6 weeks after exercise.

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This study was received Nov. 2, 2017, was reviewed Nov. 23, 2017, and was accepted Dec. 6, 2017.

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## Appendix 1. Table

Table 1. General Characteristic of subjects

	Daily living group	Rope-skipping exercise group	p
Age(year)	21.83 ± 1.17 <sup>a</sup>	22.00 ± 0.00	0.734
Height(cm)	163.67 ± 3.33	161.67 ± 1.75	0.222
Weight(kg)	56.92 ± 3.98	57.53 ± 7.73	0.866

<sup>a</sup>M±SD : Mean±Standard Deviation

Table 2. Measurement tools

Measurement Tools	Model	Manufacturer
Body Composition Analyzer (Inbody 520, Korea)	SM-200	Aiaa Communication Inc.

Table 3. Rope-Skipping Exercise Program

Weeks	RPM <sup>a</sup> (times/min)	Exercising Time	Resting Time(min)
6	100~120	3min. 5sets	1

<sup>a</sup>RPM: Rotation Per MinuteTable 4. The body mass index (BMI) by period of each group (kg/m<sup>2</sup>)

	Before exercise	3 weeks after exercise	6 weeks after exercise
Daily living group	22.01 ± 2.87 <sup>a</sup>	21.91 ± 2.77	21.59 ± 2.70
Rope-skipping exercise group	21.23 ± 0.92	20.96 ± 1.18	20.49 ± 0.89

<sup>a</sup>M±SD: Mean±Standard Deviation

Table 5. The body mass index (BMI)

	Type III SS	df	MS	F	p
Period	2.104	2	1.052	7.830	0.003*
Group	2.676	1	2.676	0.626	0.447
Period*Group	0.149	2	0.075	0.555	0.583

\* p&lt;.05

Table 6 . The body mass index (BMI)

	Period	SS	df	MS	F	p
Period	Before exercise– 3 weeks after exercise	0.400	1	0.400	1.348	0.273
	Before exercise– 6 weeks after exercise	4.025	1	4.025	13.731	0.004*

\*p&lt;.05

Table 7. Percentage body fat(PBF) by period of each group (%)

	Before exercise	3 weeks after exercise	6 weeks after exercise
Daily living group	25.62 ± 4.37 <sup>a</sup>	23.58 ± 6.16	20.99 ± 7.39
Rope-skiping exercise group	24.94 ± 1.49	25.98 ± 5.24	25.50 ± 4.90

<sup>a</sup>M±SD : Mean±Standard Deviation

Table 8. Percentage body fat(PBF)

	Type III SS	df	MS	F	p
Period	26.908	2	13.454	1.973	0.165
Group	12.931	1	12.931	0.562	0.471
Period*Group	40.862	2	20.431	2.996	0.073

Table 9. Waist hip ratio(WHR) by period of each group (%)

	Before exercise	3 weeks after exercise	6 weeks after exercise
Daily living group	0.74 ± 0.08 <sup>a</sup>	0.73 ± 0.05	0.73 ± 0.04
Rope-skiping exercise group	0.72 ± 0.02	0.73 ± 0.04	0.73 ± 0.04

<sup>a</sup>M±SD : Mean±Standard Deviation