

Effects of obesity adult participation in boxing diets on weight loss, blood pressure and blood sugar improvements

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Abstract

This research is about effects of obesity adults participating in 12weeks of boxing diets program on weight loss, blood pressure and blood sugar improvements. The exercise program was conducted three times a week with a maximum heart rate of 50 to 65 percent for first to fourth weeks and 65 to 85 percent for fifth to twelfth. The study included 59 obese people in their 20s and 50s, with a BMI of 25kg/m² or higher, blood pressure of 140/90mmHg, and high blood pressure and diabetes patients of 125 mg/dl per fasting blood sugar. The following results were obtained by observing the results before and after the boxing exercise program. High blood pressure, diabetes, high blood pressure + diabetes after 12 weeks showed significant weight, BMI and body fat reduction, as well as significant decrease in blood pressure and fasting blood sugar. Consequently, through this study, obese adults can lower their weight, blood pressure, and blasting fasting blood sugar through a 12-week high-strength boxing exercise program and it is believed to help improve and prevent obesity, cardiovascular disease and metabolic diseases

Keywords: *boxing diets, obesity, blood pressure, blood sugar*

1. Introduction

Obesity is an excessive accumulation of fat in the body due to the imbalance between calories and energy consumption [1], increasing the incidence of metabolic diseases such as hypertension and diabetes [2] and it is also known to be associated with the occurrence of cardiovascular disease with the Increase the incidence of heart and brain vessel diseases [3,4]. Also associated with increased risk of breast cancer, colon cancer and liver cancer, reported higher rates of death from coronary heart disease and cancer [5]. Therefore, obesity is serious enough to be the source of lifestyle diseases in aging. Not only physical health, but also the stress and depression caused by the loss of self-esteem, which negatively affects social life problems and mental health [6].

Chronic diseases are caused by an increase in the number of inadequate causes such as decreased physical activity and increased weight and body fat as age increases [7], It is difficult to recover and complete after a long period of development, There is a risk of complications, so continuous management is necessary [8]. Like so, Obesity has emerged as a factor that increases the risk of various diseases and deaths.

High blood pressure, which is closely related to lifestyle diseases, is the main cause of chronic diseases such

as cardiovascular disease, brain vessel disease, coronary artery disease, and kidney disease [9], Stroke and coronary heart disease are known to increase twice as often as systolic blood pressure increases by 20mmHg at normal blood pressure and relaxation period blood pressure increases by 10mmHg [10]. Diabetes can reduce the quality of life or increase the death rate due to complications such as heart disease, kidney disease, foot disease, nerve and eye disease [11]. To solve these problems, healthy lifestyle, proper nutrition, and regular physical activity are required [12]. In particular, regular physical activity increases the diameter of the vessels by removing foreign matter from the vessels and inhibiting abnormal hypertrophy of the intravenous cells, reported a decrease in peripheral resistance, leading to a drop in blood pressure [13], not only reduced the risk of chronic diseases, but also improved the aging delay and quality of life [9,14].

Direct effects of exercise on body fat reduction include an increase in energy consumption, an increase in local consumption, an increase in basic metabolic rate, and an increase in excess oxygen consumption, which increases energy consumption more than stabilization [15,16].

As a treatment for obesity for obese adults, it is recommended to use large amounts of fat as energy fuel because of low intensity of exercise [17]. However, while continuous aerobic exercise at low intensity increases energy consumption, increased paper fat and higher oxygen consumption have the advantage of higher strength exercise [15]. Therefore, for the purpose of inducing selective reductions in fat, high-strength physical activity is reported to be more effective [18,19,20,21].

Recently, boxing has become a popular sport among the general public, with an increasing number of fans. Boxing has to be powerful many times in a short period of time, and it also has to take the next round right after a short break, so it's relatively strong. It is a complex exercise that requires both aerobic and anaerobic [22]. In addition, boxing requires agility and endurance as a whole-body workout, which not only strengthens the right balance of the body and physical development and the heart, but also improves physical strength, strength, mental health, and body care [23,24].

Recently, many sports and sports programs have been developed and disseminated using boxing, such as boxing, hip hop boxing, diet boxing, self-defense boxing, boxing dance, Tae-Bo. Through various sports boxing programs, boxing, which is recognized as the exclusive property of men, is more easily and familiar to women as well as men [23,25,26]. The boxing program also used the movements of upper and lower extremities to report muscle strength and cardiopulmonary functions, stress relief caused by sandbag strikes, and reduced body fat [27].

Therefore, this study is aimed at reducing and preventing high blood pressure and diabetes prevalence as a result of weight gain by analyzing the effects on weight loss, high blood pressure and diabetes through a 12-week high-strength boxing program.

2. Research Method

2.1 Object of study

The participants in the study were adults in their 20s and 50s who are at S city using 5 boxing club. The participants have higher than 125mg/dl, and blood pressure of 140/90mmHg as Korea obesity academic society has suggested. The targets were selected for 59 patients (20 high blood pressure, 20 diabetes patients, and 19 high blood pressure + diabetes patients) who wish to participate in the program.

The physical characteristics of the study subjects are shown in Table 1.

Table 1. physical characteristics of subject

Factor	high blood pressure (n=20)	diabetes (n=20)	High blood pressure + diabetes (n=19)	p
Age(yrs)	38.05±1.86	40.80±2.06	37.21±1.68	.454
Height(cm)	166.56±1.42	167.80±1.47	166.18±1.84	.592
Weight(kg)	84.48±3.24	81.16±3.82	75.42±3.20	.818

BMI(kg/m ²)	30.32±0.92	28.63±1.02	27.18±0.84	.941
Body fat(%)	38.16±1.58	35.12±1.18	34.07±1.00	.319

(mean±SD)

2.2 Design of Experiment

2.2.1 Boxing diet program

The boxing diet exercise program was conducted three times a week for 60 minutes, three times a week by a professional sports coach, and divided into preparation, main exercise, and clean-up exercise. The boxing diet program was applied as table 2 to warm up 10 minutes, 40 minutes of exercise and 10 minutes of clean-up exercise for five to twelve weeks following program adaptation at low and heavy intensity for four weeks.

Table 2. 12 weeks of boxing diet

Category	Program	Intensity of exercise	Time
Preparation	free gymnastics, upper and lower body stretching	1~12 weeks (RPE: 8~9)	10 mins
Main Excercise	- Jumping rope - Step: forward, backward < left < right - standstill step & step & jab < forward jab < backward jab - left jab < double jab < right straight < one-two attack	1~4 weeks/ (RPE: 10~14, Low or Moderate/50~65% HRmax)	40 mins
	- Jumping rope - Step: forward, backward < left < right - forward step jab < backward step jab < step jab < one-two attack - one-two attack < left hook < right hook < left upper cut < right upper cut < one-two attack	5~12 weeks/ (RPE: 14~18, High/65~85% HRmax)	
Clean-up exercise	Gymnastics & Stretching	1~12 weeks (RPE: 8~9)	10 mins

2.2.2 Boxing Diet Intensity Setting

The calculation of the individual strength of the exercise program for each individual boxing diet was done using Karvonen's suggested Target Heart Rate = (HRmax-HRrest)+Hrest. In addition, the maximum heart rate (HRmax) calculation was calculated using the HRmax = 207- (0.7× age) formula presented by [28] and established the motor strength of the boxing diet program. To conduct exercise with the correct intensity of motion, the poly-electro, technogym, and pinland were connected to the wrist by means of elasticity bolts below the thighs.

2.3. Inspection list and methods

2.3.1. Physical measurement

The system banned food intake and exercise four hours before the measurement, and allowed people to urinate in the bathroom 30 minutes before the measurement. In the measurement, the height and weight were measured as simple as possible using the automatic kidney weight system, JENIX (DONG SAHN JENIX, CO.,LTD, Korea), The measured weight (kg) was divided by the square of the height (m) to calculate the Body Mass Index (BMI). In addition, the percentage body fat was measured using In body 3.0 (Biospace Co., Korea).

2.3.2 Blood Sugar Measurement

The blood glucose measurement device, Accu-Check Performa® (Roche, Germany), was used to measure cervical blood sugar and to avoid conditions that could affect blood glucose measurement, all subjects were given a fast after 10 p.m. on the day before, and blood glucose measurement was taken between 8 a.m. and 9 a.m. on the day of measurement.

2.3.3 Blood Pressure Measurement

After arriving at the laboratory, the subjects stabilized for at least five minutes, and then measured blood pressure and heart rate upon stabilization using the Automatic Blood Pressure Monitoring System (BPIBIO 330). Two measurements of systolic Blood Pressure (SBP) and diastolic Blood Pressure (DBP) were taken to calculate the average value.

2.4. Data Processing Method

All data collected in this study were analyzed using SPSS Ver 23.0 to calculate the average and standard deviation by measurement item. To find out the differences between groups before and after participating in the program, two-way ANOVA with repeat measurement was conducted, and One-way ANOVA (one-way ANOVA) and point-in-time response t-test were performed when there was an interaction effect. At this time, the significance level was.

3. Result

3.1. Weight, BMI & Body Fat Percentage

Table 3. Weight, BMI & Body Fat Percentage Result

Category	Group	Before	After		F
Weight(kg)	high blood pressure	84.48±14.48	76.10±11.75	group	2.143
	diabetes	81.16±17.06	72.44±12.70	treatment	108.882***
	High blood pressure + diabetes	75.41±13.97	67.67±10.49	group × treatment	.128
BMI(kg/m ²)	high blood pressure	30.31±4.11	27.34±3.32	group	3.542*
	diabetes	28.64±4.57	25.62±3.38	treatment	123.771***
	High blood pressure + diabetes	27.18±3.64	24.44±2.87	group × treatment	.900
Body Fat(%)	high blood pressure	38.16±7.05	32.79±6.49	group	3.586*
	diabetes	35.12±5.29	28.52±7.68	treatment	145.819***
	High blood pressure + diabetes	34.07±4.38	27.13±6.06	group × treatment	.835

Main Effects & Interaction Effects(* $P < .05$, ** $P < .01$, *** $P < .001$)

3.2. Change in Blood Sugar

Table 4. Blood Sugar Analysis

Category	Group	Before	After		F
Blood Sugar	High blood pressure	95.80±10.18	94.90±8.57	group	57.226***

(mg/dl)	Diabetes	133.65±14.73	125.10±13.65	treatment	41.582***
	High blood pressure + diabetes	130.26±10.31	122.00±10.97	group × treatment	7.55**

Main Effects & Interaction Effects (* $P<.05$, ** $P<.01$, *** $P<.001$)

3.3. Change in Blood Pressure

Table 5. Blood Pressure Analysis

Category	Group	Before	After		F
systolic blood pressure (mmHg)	High blood pressure	139.95±9.84	136.05±10.76	group	16.128***
	Diabetes	126.10±9.75	124.00±7.52	treatment	25.505***
	High blood pressure + diabetes	143.68±9.49	136.00±9.78	group×treatment	3.275*
diastolic blood pressure (mmHg)	High blood pressure	91.50±7.22	86.90±7.10	group	17.313***
	Diabetes	81.10±6.46	80.30±5.81	treatment	26.686***
	High blood pressure + diabetes	94.00±6.46	89.32±6.58	group×treatment	3.908*

Main Effects & Interaction Effects (* $P<.05$, ** $P<.01$, *** $P<.001$)

4. Discussion

This study conducted a 12-week boxing exercise program for obese adults with high blood pressure diabetes to identify improvements in weight loss, blood pressure and blood sugar.

Regular physical activity can help prevent and improve chronic diseases such as cholesterol, high blood pressure, blood sugar and obesity, It has already been reported through prior research that the function of cardiovascular disease as a result of improved cardiovascular disease [29,30,31].

Research on exercise programs that present realistic and scientific methods and period of exercise for people with chronic diseases such as high blood pressure and diabetes should be continuously presented.

The study, which applied the High-Strength Boxing Program, found that the body fat rate and high blood pressure, diabetes, high blood pressure and diabetes all decreased statistically significantly. This is consistent with the results of previous studies, where weight and body fat rates of obese people have been reduced following the treatment of sustained exercise above heavy intensity [32,33]. These results suggest that high-strength exercise reduces body fat [34]. The degree of improvement in body composition when the intensity of motion is high is also consistent with the results of the preceding study [35]. In addition, studies of overweight or metabolic patients reported a significant reduction in WHR in high-strength exercise compared to low-strength or heavy-strength exercise, as shown in this study [33]. Continued apply of high-strength motion is recognized to a certain extent as to the reduction of body fat. As a result, repeated high intensity movements improve aerobic metabolic capability by increasing the duration of exercise, as well as oxygen consumption and oxygen consumption [36,37], It is believed that the energy source of the exercise was saved while controlling the inflow of fatty acids and the synthesis of fat from local tissues, and thus more effectively acted on the increase of fatty acid [33].

High blood pressure is one of the most important risk factors for mortality from cardiovascular disease [38], The effects of regular exercise on non-drug therapies for hypertension patients are widely known. Analysis of the results of this study shows that both high blood pressure + high blood pressure and diabetes are significantly lower in the boxing program. The results showed that high-strength exercise programs have a positive effect

on high blood pressure, The results showed that high-strength exercise programs had a positive effect on high blood pressure, which was consistent with several prior studies. [39] A study on how participation in high-strength physical activity affects metabolic syndrome found that age and body mass indices are controlled and analyzed, The risk of developing metabolic syndrome is 42 percent lower than that of those with high levels of physical activity. That is, by participating in a high-strength exercise program, the increase in physical strength reduces the risk of high blood pressure, high cholesterol and diabetes [40]. Also, In a study by [41], a comparative analysis of adults participating in walking and running high-strength physical activity showed that groups participating in high-strength physical activity each had a lower blood pressure, high cholesterol and diabetes. These results can be inferred as an effective way of exercise where high-strength physical activity can give a positive improvement to high blood pressure than heavy-strength physical activity.

As the number of glucose levels in the body leads to metabolic diseases such as diabetes and obesity, it is necessary to improve proper physical activity and nutrition as a way to improve insulin and glucose [42]. Insulin, which is increased by obesity, can be reduced through active physical activity and is reported to increase the metabolism by improving the insulin activity in fat tissues, skeletal muscles and liver [43]. Also, the metabolism reaction by exercise is affected by the strength of the exercise [44]. Although there is little change in glucose levels in the blood due to the increase in glucose production in the liver and the increase in muscle glucose intake, the increase in glucose composition in the liver was higher than that in the muscle [45]. As a result, it is thought to be involved in controlling high blood sugar, which is caused by insulin resistance, in order to maintain normal blood sugar levels, The reason why exercise reduces blood sugar is because it increases insulin sensitivity in the muscle and suppresses glucose production in the liver, increasing glucose oxidation in skeletal muscle and sugar synthesis [46]. In this study, blood sugar in all groups has been significantly reduced, which is judged to be due to the improvement of metabolic disease.

If you look at all the preceding prior studies, the high-strength boxing diet program appears to have a positive effect on weight loss, blood pressure and blood sugar, helping to improve and prevent obesity, cardiovascular disease and metabolic diseases.

5. Conclusion

In this study, a 12-week high-strength boxing diet program aimed to identify the effects of weight loss, blood pressure and diabetes in obese adults, with the main results are shown as below..

- 1) Boxing diet programs have significantly decreased in weight, BMI, and body fat in all groups..
- 2) Boxing diet programs have significantly decreased in contractural and relaxation blood pressure in all groups.
- 3) The boxing diet program has significantly decreased blood sugar levels in all groups..

Combining the results described above, the weight, BMI, is reduced by the High Strength Boxing Diet program, The systolic blood pressure and diastolic bleed pressure have been reduced, indicating that it is effective in improving cardiovascular function along with weight loss, Also, blood sugar levels have been shown to decrease, and boxing diet exercises have been shown to be effective in preventing metabolic-related illnesses

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