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Effects of 8 weeks of Cycling on Health Indicators and CRP

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Abstract

Background/Objectives: this study, 8 week bicycle exercise program will be conducted to the participants in their middle age to find out the effects on health indicators and inflammation indicators. The ultimate purpose of this study is to provide scientific and systematic exercise information that can help improve health and cardiovascular disease. **Methods/Statistical analysis**: For women in their 50s, a total of 32 bike rides for 50 minutes per day for 8 weeks were conducted four times a week. blood tests were conducted before 8 weeks of cycling and after participation in the 8-week cycling program. Descriptive statistics according to each measurement period were presented, and a dependent t-test was applied to determine the treatment effect. The significance level of interpretation was conducted at .05. **Findings**: Regarding health indicators, descriptive statistics showed positive changes in fat, BMI, SBP, DBP, TG, and HDL. However, as a result of dependent t-test analysis, only HDL showed statistically significant difference (t=-2.68, p=.03), and there was no statistical difference in other indicators. The descriptive statistics of the inflammation index CRP showed positive changes. However, there was no statistically significant difference (t=.583, p=.58). **Improvements/Applications**: This study is expected to be used as the basic data to study the health improvement effect of middle-aged women through regular cycling exercise, and ultimately support and successfully advise middle-aged women's health management.

Index Terms

Cycling, Health indicators, Fat(%), CRP, BMI, SBP, DBP, TG, HDL

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I. INTRODUCTION

Recently, the use of bicycles has increased as people use bicycles to go to their workplace, school, and for the purpose of exercise[1]. Bicycle not only improve or maintain health, but also is considered as an economical and convenient means of transportation[2]. Although the size of a bicycle is small, it is a convenient means of transportation that is used anywhere in the world because it can enjoy speed while riding, and can move anywhere without being restricted by road conditions[3].

Bicycle riding is an aerobic, cardiovascular exercise that mainly utilizes the large muscles of the lower body, and has the advantage of being able to be used as a perfect exercise program that, not only develops the respiratory and circulatory systems, but also make the riders feel less bored when running on a monotonous course[4]. It is also a representative aerobic exercise that does not strain the joints, which is often recommended for older people with joint problems, osteoporosis patients, and overweight people as well as for those with joint problems[5].

Compared to other public transportation, bicycle has its representative advantages – for example, riders can reach destinations even though roads are narrow, are much faster than walking, and have the advantage of being able to efficiently use limited spaces with a smaller occupied area than other means of transportation such as cars and buses. Bicycles do not generate harmful substances in the atmosphere, help to relieve traffic congestion, consume no energy, and show advantages of low financial expenditure [6].

According to research results related to bicycles and health, people who regularly ride bicycles showed positive effects in the prevention and treatment of serious chronic diseases such as heart disease, high blood pressure, overweight, and diabetes, as well as musculoskeletal diseases. Continuous use of bicycles has been shown to be effective in reducing fat, improving flexibility and physical strength[7] and there is also a study that proves that cycling positively affects body composition, muscle strength, and bone density[8]. Furthermore, bicycle riding also improves cardiorespiratory capacity and musculoskeletal function[9,10], and also show magnificent exercise effects such as improving maximal oxygen intake and cardiopulmonary endurance through bicycle exercise[11,12].

Bicycles used to enjoy the benefits of these physical activities provide health benefits such as improved cardiopulmonary functions and reduced the mortality rate due to cardiovascular diseases[13], and have a positive effect on the synchronization of exercise related to health, exercise and pleasure [14]. The bicycle exercise was proven to be effective when applied to middle-aged and elderly people as well. It brought a decrease in all causes and cancer mortality, cardiovascular disease, colorectal cancer and breast cancer and obesity[13].

Therefore, in this study, 8 week bicycle exercise program will be conducted to the participants in their middle age to find out the effects on health indicators and inflammation indicators. The ultimate purpose of this study is to provide scientific and systematic exercise information that can help improve health and cardiovascular disease.

II. METHODS

A. Subject of study

Seven women in their 50s were subjected to bicycle riding for 8 weeks. Specific body characteristics are as follows<Table 1>.

Table1: Physical Characteristic of Subjects (M±SD)

G	N	Age (yr)	Height (cm)	Weight(kg)	Fat (%)	BMI
F	7	57.14 ±2.12	155.36 ±5.12	56.86 ±5.71	33.81 ±2.12	24.46 ±.99

G: Gender, F: female

B. Exercise program

For women in their 50s, a total of 32 bike rides for 50 minutes per day for 8 weeks were conducte d four times a week. For the first week, for the pur pose of controlling the experiment, the researchers were allowed to participate in the bike ride with th e researcher at the same time, and from the second week, each person was allowed to ride a bicycle w hile maintaining the RPE of 12. The researcher ch ecked the bicycle ride time every day. Cycling is a space where you can ride a local bicycle, and the i ntensity of exercise was controlled through the ath lete angle scale, and it was allowed to be carried o ut using a bicycle path.

C. Measurement method

The purpose of this study was to investigate ho w cycling in daily life affects health indicators and CRP. To this end, blood tests were conducted bef ore 8 weeks of cycling and after participation in th e 8-week cycling program. Blood body odor was performed by a professional nurse, and after centri fugation, a blood analysis specialized institution w as requested.

D. Data analysis

The purpose of this study was to investigate the

effect of 8 weeks of cycling on health indicators and CRP. For this, the test data before and after the experiment were analyzed using the PASW 18.0 statistical program in order to find out the effect before and after the experimental treatment. Descriptive statistics according to each measurement period were presented, and a dependent t-test was applied to determine the treatment effect. The significance level of interpretation was conducted at .05.

III. RESULTS

A. Changes in health indicators

Regarding health indicators, descriptive statistics showed positive changes in fat, BMI, SBP, DBP, TG, and HDL. However, as a result of dependent t-test analysis, only HDL showed statistically significant difference (t=-2.68, p=.03), and there was no statistical difference in other indicators <Table2> <Table 3>.

Table 2: Descriptive statistics of health indicators

Factor		M	d	E
fat(%)	pre	3.81	2.12	.80
	post	32.40	2.37	.89
BMI	pre	23.45	.99	.37
	post	23.40	.78	.29
SBP(mmHg)	pre	122.28	17.17	6.49
	post	115.85	20.66	7.81
DBP(mmHg)	pre	79.14	7.33	2.77
	post	75.28	10.68	4.03
TG(mg/dl)	pre	142.14	71.79	27.13
	post	139.57	67.10	25.36
HDL(mg/dl)	pre	50.14	9.08	3.43
	post	52.28	9.14	3.45

Table 3: Changes in health indicators

Factor	determine			t	Df	P
	M	sd	SE			
fat	1.41	2.12	.80	1.763	6	.12
BMI	.05	.37	.14	.405	6	.70
SBP	6.42	10.29	3.89	1.652	6	.15
DBP	3.85	11.23	4.24	.909	6	.39
TG	2.57	41.19	15.56	.165	6	.87
HDL	-2.14	2.11	.79	-2.680	6	.03

B. Changes in inflammation indicators

The descriptive statistics of the inflammation index CRP showed positive changes. However, there was no statistically significant difference (t=.583, p=.58) <Table 4> <Table 5>.

Table 4: Descriptive statistics of CRP

Factor		M	N	sd	SE
CRP(mg/dl)	pre	.63	7	.27	.10
	post	.60	7	.20	.07

Table 5: Change in CRP

Factor	determin			t	df	p
	M	sd	SE			
CRP	.02	.11	.04	.583	6	.58

IV. DISCUSSION

This study was aimed to investigate how the 8 week bicycle riding exercise program might affect the health and inflammation indicators of middle-aged women, and to provide basic data for a bicycle exercise program that can be applied in life. To achieve this purpose, a 50-minute bicycle exercise program was conducted for middle-aged women four times a week for total eight weeks. Changes in health indicators and CRP were compared, and based on the results of this study, we will discuss as follows.

When delving into previous studies which conducted experiments about the relationship between bicycle exercise and health indicators(body composition, blood pressure, and blood lipids), Yun, Kim & Rhyu[15] conducted 16 weeks of bicycle exercise on female students(60 minutes a time, 3 times a week) and reported positive changes in body composition. Kim[16] conducted low, medium and high-intensity bicycle exercise for 8 weeks(once a week, for 20-50 minutes), and proved that it did not show a statistically significant effect. In addition, a study by Kim & Jung[17] analyzed changes before and after 12 weeks of biking for men and women over the age of 60 and reported that reduced body fat was effective in improving health and that bicycle riding had a positive effect on physical development[18].

Kim et al[19] study showed that men in their 20s had reduced systolic blood pressure after conducting a bicycle exercise program for 8 weeks(three times a week, for 30 minutes), and Park & Ju[20] study

showed that patients with varicose veins had reduced their blood pressure after conducting another bicycle workout for 12 weeks (four times a week, 50 minutes each), and lastly Lee[21] conducted a cycling program for 12 weeks(three times a week, 65 minutes each) and had proven that cycling also has a positive effect on blood pressure of people over age 65.

A study by Sung, Nam & Kim[22] reported that female college students had performed bicycle exercises for 8 weeks(60 minutes each, three times a week) had a positive change in their TG, but the change was not statistically significant. However, there was a significant change in factor HDL-C.

In this study, 8 week bicycle exercise program was applied to women in their middle age, and the work out was planned four times a week, 50 minutes a time. It brought positive changes in body composition, blood pressure and blood lipid, but only in HDL-C among blood lipid variables showed statistically significant differences. In the preceding study, most health indicators showed positive changes due to the cycling workout, but meaningful effects were reported in 12 weeks program rather than 8 weeks program. Therefore, we can expect to find out meaningful and significant effects on health indicators by controlling the conducting time and bicycle riding methods in other studies in the future.

When studying the previous cases which dealt with the conversion of inflammatory indicators through bicycle exercise, Cho[23] conducted indoor bicycle aerobic exercise three times a week for obese men in their 20s and was able to find out that their CRP had a significant decrease. Kim[24] reported a significant decrease in inflammation-related factors of obese women in their middle age after conducting a 8 week bicycle program(three times a week, 60 minutes each. In this study, participants underwent a 8 week program four times a week, 50 minutes a time. There was a positive change in the inflammatory index CRP, but that was not a statistically significant difference. Inflammation caused by chronic inflammatory diseases can be lowered by regular physical activity and aerobic exercise in a long-term[25]. Both aerobic and anaerobic exercises are proven to be effective in reducing CRP concentrations, but aerobic exercise is reported to be more effective[26], so long-term regular exercise can be carried out with more positive changes in further studies. Therefore, for the next studies, it is highly recommended to plan a longer-term, regular bicycle program which can effectively manage the inflammation problems and ultimately help the participants to prevent themselves from cardiovascular and chronic diseases.

V. CONCLUSION

This study draws the following conclusions based on the results of comparative analysis of how the 8-week bicycle exercise program affected health indicators and CRP of women in their middle ages.

First, the health indicators showed positive changes in fat, BMI, SBP, DBP, TG, and HDL. However, there was a statistically significant difference only in HDL, and there was no statistical difference in other indicators.

Second, the descriptive statistics of the inflammation index CRP showed positive changes. However, it was not able to show a statistically significant difference.

Considering the two factors mentioned above, we were able to prove that cycling exercise is an effective exercising method that can prevent cardiovascular and chronic diseases by bringing positive changes in the health of middle-aged women by improving health indicators and reducing inflammation-related factors. In addition, this study is expected to be used as the basic data to study the health improvement effect of middle-aged women through regular cycling exercise, and ultimately support and successfully advise middle-aged women's health management.

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