

EIGHT SESSIONS OF HIGH INTENSITY INTERVAL PHYSICAL EXERCISE LOWERING THE STOMACH CIRCUMFERENCE OF OBESE ADULT WOMEN SEDENTER

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Abstract

Sedentary lifestyle is a lifestyle that is associated with an unhealthy diet and lack of physical activity. The study aimed to analyze high-intensity physical exercise at interval intervals (HIIT) for changes in resting pulse and abdominal circumference in overweight young adult women with sedentary lifestyle. Subject is a lot of 20 people aged 21-30 years into 2 groups. The treatment group by performing HIIT and the control group without performing HIIT. Physical exercise with an intensity of 90% of the axial heart rate (HRmax), at intervals. Exercise is done by pedaling ergocycle for 10 seconds at a speed of 100 rpm and 50 seconds with speed 50 rpm, done alternately (intervals), with a total time of 20 minutes. Exercise is done 3x /week or as many as 8 sessions in 3 weeks. The data in this study was taken before and after treatment, in the form of a resting pulse (HR rest) and stomach circumference (LP) measured in position parallel to the navel. The results showed that there was no significant difference in the average value of HR rest between groups ($p \geq 0.05$), while LP indicated that there was a significant decrease in the HIIT group ($p < 0.05$). The conclusion in this study is that HIIT effectively lowers the stomach circumference of the treatment group and also has a tendency to decrease the average HR rest.

Keywords: HIIT, pulse, stomach circumference, exercise, health, bicycle

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INTRODUCTION

Sedentary lifestyle is a lifestyle that is associated with an unhealthy diet and lack of physical activity. Sedentary lifestyle can trigger an increased buildup of body fat accumulation, which can increase the risk of dyslipidemia (Ma, Sahar, Jeong, & Huh, 2019; Mamikutty et al., 2014; Moreno-Fernández et al., 2018; Rask Larsen,

Dima, Correll, & Manu, 2018). Sedentary lifestyle in individuals with overweight will affect the decline of the cardiovascular system, decreased muscle strength and flexibility that causes muscle elasticity to decrease, thereby increasing the occurrence of injury (Nuzzo, 2019).

World Health Organization (2016) data 25.68% of the world's population or >1.9 billion people are overweight. In 2016, 13% of the world's population or 650 million people with >18 years of age were obese with a greater prevalence of women of 4% than men. In Indonesia, the prevalence of overweight (BMI ≥ 25.1 -27kg/m²) increased annually with prevalence of 8.6% in 2007, 11.5% in 2013, and 13.6% in 2018. Meanwhile, the prevalence rate of obesity (BMI >27) was 10.5% in 2007, 14.8% in 2013 and 21.8% in 2018 (Riskesdas, 2018). In addition, if the cycle of obesity occurs repeatedly in the same individual as sarcopenia, then the risk factors for metabolic syndrome attacks will also be higher (Ma et al., 2019). The risk of metabolic syndrome is one of them due to the activation role of the sympathetic nervous system which contributes to improved heart function that stimulates vasoconstriction in blood vessels causing blood pressure to rise (Bastien et al., 2014; Hall et al., 2016). In addition, metabolic balance is also unstable, such as excess lipolysis that can move fatty acid levels so as to interfere with blood vessels and heart function (Ciccarelli et al., 2013). Thus pathological symptoms in general will appear with the characteristics of increased blood pressure (hypertension), increased plasma triglycerides, plasma glucose, as well as disturbances in insulin resistance that lead to an increased risk of CVD disease, stroke, and diabetes (Han & Lean, 2016; Pescatello, 2014). If this continues to happen, it will have an impact on the quality of public health that is decreasing.

One method that can be done to overcome the problem is through physical exercise. Physical exercise has been shown to improve fitness and cardiovascular

health (Palaparathi, 2017). HIIT (High Intensity Interval Training) is a physical exercise that combines high intensity and combined with moderate intensity / low in stead (Stöggel & Björklund, 2017). Thompson (2019) HIIT is also very popular by the public, proven because it has become the number 3 physical exercise trend worldwide. HIIT also improves cardiovascular function by lowering resting pulse rates in obese individuals (Huang, Shi, Davis-Brezette, & Osness, 2005). HR rest, or commonly called a resting pulse is one indicator of physical fitness, this is because HR rest or resting pulse will be lower and the heart rate reserve will be higher showing a good cardiovascular fitness level in individuals (Gillen et al., 2016). In the research conducted (Ahmadizad, Avansar, Ebrahim, Avandi, & Ghasemikaram, 2015; Weston, Wisløff, & Coombes, 2014) showed that HIIT causes a significant reduction in body fat percentage and abdominal circumference.

Thus, HIIT is a recommended and beneficial training method for improving fitness and cardiovascular health. However, the effectiveness of HIIT with ergocycle conducted by obese adult female subjects with sedentary lifestyle is still unknown, so research related to HIIT on changes in resting pulse and abdominal circumference.

METHOD

The research done is experimental research. This research design uses pretest design and posttest control group design, which is where there is data retrieval before treatment and after treatment. There were two groups in the study: the experimental group that was given the treatment of high-intensity physical exercise at intervals (HIIT) with ergocycle and a control group without intervention.

The study subjects were women categorized in over weight body mass index (BMI) in Asia Pacific 23-24.9, ages 21-30 years, and sedentary lifestyle category.

The large sample in this study was 10 people in the control group and 10 people in the HIIT group.



The HIIT protocol is high-intensity physical exercise that is 90% maximum pulse rate (HRmax) at intervals. Physical exercise uses ergocycle for 10 seconds at a speed of 100 rpm and 50 seconds with speed 50 rpm, done alternately (intervals), for a total time of 20 minutes. Exercise is done 3x / week or as many as 8 sessions in 3 weeks.

The data in this study was taken before and after being given treatment, in the form of resting pulse (HR rest) and stomach circumference (LP), as well as changes from HR rest and LP, obtained from the calculation of data difference. after subtracting the data before. The circumference of the stomach is measured in a position parallel to the navel.

Data analysis is done with the help of SPSS software. Data is analyzed descriptively. The normality and homogeneity test is carried out. Data that is distributed normally and homogeneously, then conducted different tests between groups using independent T-tests, and different tests between data before (pre) and after (post) intervention in the group that It's the same with the T-test pair.

RESULT

The data of the study results in the form of resting pulse data (HR rest) in units of beat per minute (bpm) or number of beats per minute and stomach lingkap (LP) in cm units. Data consists of pre(before) intervention and post (after) intervention.

Table 1. Average BMI and Stomach Circumference

Group	Resting pulse (bpm)		Belly Circumference (cm)	
	pre	Post	pre	Post
Control	69.5±1.71	72.6±2.38	95.9±3.23	93.4±2.84
HIIT	78.9±3.03	75.6±2.74	99.8±4.78	91.9±4.26

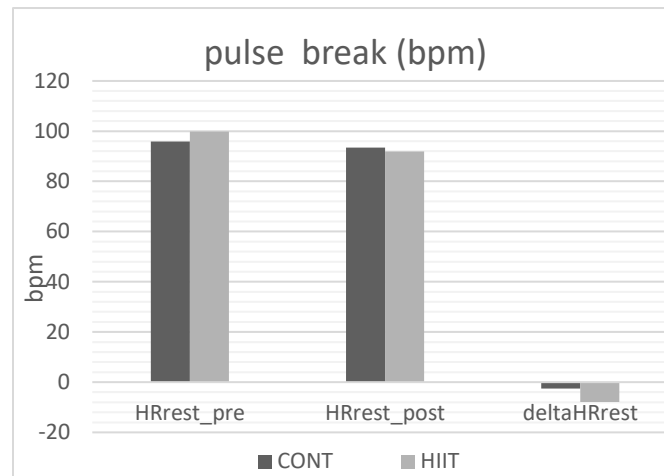


Figure 1 Average pulse break

HR rest_pre= before intervention; HR rest post= after intervention;
Delta HR rest = difference (change) of resting pulse (HR rest posttest reduced pretest).
CONT = control group;
HIIT = high intensity interval training.
Insignificant ($p \geq 0.05$) between groups (independent T test) and between pre & post in the same group (paired T test).

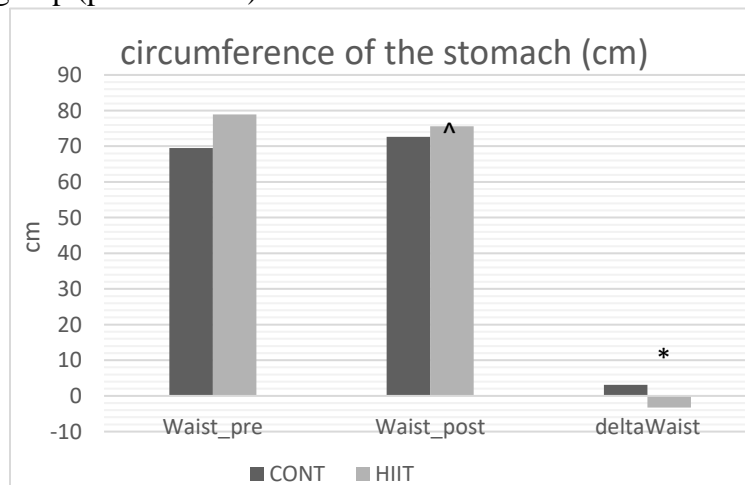


Figure 2. Average circumference of the stomach.

Waist pre= LP before intervention; Waist post= LP after intervention;
deltaWaist = difference (change) of abdominal circumference (LP posttest is reduced pretest).
CONT= control group;

HIIT = high intensity interval training.

^sig. difference ($p < 0.05$) between pre & post in the same group (Paired T test).

*sig. difference ($p < 0.05$) between groups (Independent T test).

Discussion

High Intensity Interval Training on Resting Pulse

Based on the results showed that there was no significant difference in the effect on the average value of HR rest on CONTROL and HIIT. The insignificant decrease in HR rest in this study was likely due to the study time being too short, which was only 2 weeks. According to Reimers et al (2018) the effect of physical exercise on HR Rest can be a significant change if done for at least 3 months with 3 sessions per week. Nonetheless, the HIIT group had a higher hr rest impairment value compared to CONT. This is in line with a meta-analysis by Huang et al (2005) which proved that 13 studies showed that physical exercise with aerobic type performed chronically in subjects with ≥ 60 years can reduce HR rest by 8.4%. In addition, research from Heydari et al (2012) also stated the same thing, in the study mentioned that high intensity intermittent exercise (HIIE) conducted in overweight men for 12 weeks showed a significant decrease in heart rate, as well as increasing fitness levels by 17%. Decreased HR rest after routine HIIT is possible due to the occurrence of induction in increased stroke volume (Heydari et al., 2012). The increase in stroke volume will increase plasma volume thus increasing myocardial contractile which leads to a decrease in HR rest (Helgerud et al., 2007). A normal decrease in HR rest certainly has many health benefits such as lowering the risk of developing cardiovascular disease, high cholesterol and triglycerides, and hypertension (Sharashova et al., 2015).

High Intensity Interval Training on Abdominal Circumference

Based on the results of the study in figure 2 there was a significant difference in the HIIT group. It is clear that there was a decrease in pretest-posttest abdominal circumference in the HIIT group. In contrast, in the control group there was an increase

from the baseline value. Adaptation of HIIT exercises in overweight young adult women with sedentary lifestyle affects the decrease in the circumference of the back. This is in line with research (Ahmadizad et al., 2015) that HIIT on a treadmill of 3 days per week for 6 weeks effectively lowered Percentage Body Fat (PBF), also in research conducted by (Allen et al., 2017) exercise with HIIT with a brisk run of 30 seconds at passive intervals of 4-5 minutes, for 9 weeks effectively reducing abdominal circumference. In sedentary adulthood. This is possible because the increase in work done by skeletal muscles, causing an increase in ATP consumption, thus causing the levels of ATP present in the skeletal muscle to decrease. Decreased ATP leads to the activation of the enzyme AMPK (Adenosine Monophosphate-Activated Protein Kinase). This enzyme that causes the mobilization of fat from fat tissue, through the ACC enzyme then adipose tissue that stores fat, especially in the abdomen can be reduced (Marcinko et al., 2015). Fat loss in overweight women was positively correlated with improved physical fitness. Decreased abdominal circumference is positively correlated with increased flexibility, which is one component of physical fitness. A person with good physical fitness can facilitate in carrying out various daily activities and reduce the possibility of injury (Nuzzo, 2019)

CONCLUSION

The influence of High Intensity Interval Training (HIIT) on the fitness component in this case HR Rest and Abdominal Circumference is carried out by an exercise intervention consisting of 8 meetings for 2 weeks and divided by 4 meetings in each week. HIIT effectively lowered stomach circumference in the treatment group and also had a tendency to decrease average HR rest in overweight young adult women with sedentary lifestyle.

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