

# Physical Activities of High Intensity Intermittent Exercise (HIIE) *Between Obesity and Self Esteem*

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Abstract: Purpose: This Study aimed to examine the activity of HIIE on BMI, Fat and self-esteem students' obesity. Methods: Sample in this Study was involved 12 students, which consist of 6 people control group received the Ergometer Cycling Low Intensity exercise and 6 people experimental group received the HIIE with protocol HIIE: 5 minutes warming up, 8 second cycle sprint followed by 12 s of low intensity cycling for a period of 20 min, and 5 minutes cooling down. The two of group received duration of exercise about 30 minutes, frequency 3 times a week during 3 weeks. The research used experimental method, using technique Randomize Pre-test - Post-test Control Group Design and Correlation Bivariate. The instrument to measure Self Esteem is used Self Esteem Inventory. Result: this results study showed that HIIE decrease BMI with the pre-test 35,7% and post-test 33,4%, fat decrease with pre-test 32,85% and post-test 28,68%. Furthermore, HIIE increase self-esteem, with the pre-test 16,7% and post-test 19%. Conclusion: this study showed that the activity of HIIE can decrease of obesity and improve student self-esteem, especially for the obese students.

## 1 INTRODUCTION

The increasingly sophisticated era by means of communication makes people prefer things that are instant and practical to do their activities. Many people prefer to use the transportation rather than walk it is supported by the abundant use of online transportation applications which makes it easy, saves energy and time. Moreover, many children spend more time watching television, playing video games and computers. These things have been reducing the amount of physical activities to a much lower level (Gibney, 2008, p. 101). Someone can be considered active when the person participating in strenuous activities, at least 3 times a week for at least 20 minutes per day. In general, Indonesians are considered as the less active community (Research and Development, 2013), which is only 26.1%. In Indonesia, there are 22 provinces that are classified as the less active population of physical activities. The proportion of Indonesian population with a sedentary behaviour in  $\geq 6$  hours per day is 24.1%. The five provinces that are above the national average percentage are Riau (39.1%), North Maluku (34.5%), East Java (33.9%), West Java (33.0%) and

GORONTALO (31.5%). Furthermore, the research of South East Asian Nutrition Survey (SEANUT) showed that 57.3% of Indonesian adolescents are classified as inactive. Frisian Flag's research showed that 62.2% of boys are inactive, while active girls are 52.3%, whereas children, who are less physically active, are at risk 3.6 times higher of obesity than children in high-activity.

It is feared that low physical activities in children will increase every year and will give impact on their health in the future, for instance obesity. Obesity is often defined as a condition of abnormal or excessive fat accumulation in adipose tissue (World Health Organization (WHO) Technical Report Series (TRS), 2004). Obesity occurs because of an imbalance between intake and energy use. Consequently, the excess energy will be stored in the form of fat tissue (Arywibowo and Prihartanti 2009). According to WHO data, more than 1.4 billion overweight adults and 2.8 million adults die each year due to obesity and overweight. In addition, people with obesity are at risk of degenerative diseases such as diabetes, heart disease, cancer (Fukuda et.al, 2001) and sleep apnea (Kopelman, 2000). Moreover, not only physical

illness, but obese people tend to be at risk to have social and psychological problems, such as discrimination, low self-esteem, depression, negative self-concept, eating disorders, and negative body image (Kim, Park, Ma, and Ham, 2015 dan National Center for Chronic Disease Prevention and Health Promotion 2004a).

In a broad term, self-esteem is depicted in someone who believes in him/herself, his/her ability, self-efficacy, success, and someone useful, both for him/herself and for others (Coopersmith, 1981). Low self-esteem in adolescence can predict poor physical and mental health, antisocial, depressed, and obese people most likely to be described by their friends as ugly, ignorant, liar, and lazy people (Pearce, Boergers, Prinstein, Michelle, and Boergers, 2002). Previous research has suggested that adolescents who are accustomed to physical activities on a regular basis have low characteristics of depression and anxiety, and show far less bad social behavior than their less-active peers (Siefen, 2002). Self-esteem in girl's influences participation in physical activities, and participation in sports teams is positively associated with high self-esteem. (Debate et al, 2009). Approximately, 60% of research reports show that physical activities are positively associated with people who participate in physical activities, and it can increase the level of self-esteem, (McAuley Edward et al., 2000).

The purpose of this study is to improve the health status, emphasize the rate of obesity, and improve self esteem of the future teenagers through High Intensity Intermittent Exercise activities. HIIE is a more effective exercise to remove the fat on the abdomen compared with other types of exercise (Boutcher, 2011). HIIE is an exercise with has fast repetition followed by low intensity exercise or rest. HIIE gives high results for losing weight (Trapp, Chisholm, Freund, and Boutcher, 2008).

## 2 METHODS

### 2.1 Research Design

This study used a quantitative approach with Purposive Sampling technique. The total sample consisted of 12 people in two groups, namely 6 students of experimental group (HIIE) that consisted of 4 male students and 2 female students and 6 students of control group that consisted of 4 male students and 2 female students, which have done the ergometer activity of low intensity cycling.

### 2.2 Population and Sample

The research was conducted on UPI Laboratory senior high school students with the characteristics of the sample that aged 15-17 years old who were obese or had big body mass index (BMI)  $\geq 30$  kg / m<sup>2</sup>, weight 81-127 kg.

### 2.3 High Intensity Intermittent Exercise (HIIE) Program

The experimental group was given HIIE training using ergometer cycling with the exercise frequency 3 times a week for 3 weeks. The training duration was 30 minutes: 5 minutes of warming up, 20 minutes HIIE, and 5 minutes cooling down. The applied HIIE protocol was 8 second cycle sprint, followed by 12 seconds of low intensity cycling for 20 minutes. The pulse should be at 80-90% of Maximum Pulse, the rhythm was 120 -130 rpm during sprint, and the rhythm down to 40 rpm during recovery. (Boutcher, 2011, 2013; Heydari, Freund, and Boutcher, 2012; Trapp et al., 2008)

### 2.4 Instrument

The research instrument that was used was Coopersmith Self Esteem Inventory (1976) (Institute, 1965), (Fahey, Insel and Reports, 2005) which was modified by Ryden (1978) and adapted in the present study to facilitate the participants in filling out the given questionnaire. This questionnaire contained 58 items of statements which then was validated into 28 statements. The questionnaire was used to measure attitudes and self-esteem with two choices of answers that are "Agreed" and "Disagree". The results of the validity and reliability test state that the value of Cronbach's Alpha instrument is 0.705.

### 2.5 Procedure

Prior to the study, pre-test was done by providing knowledge about healthy lifestyle and obesity, filling out a Self Esteem Inventory questionnaire to measure students' self-esteem levels, and measuring the Body Mass Index using Body Fat Monitor OMRON HBF-306 Model, and measuring their height and weight. After that, group division was done to determine the experimental group and the control group.

## 2.6 Statistic Analysis

Data were analysed by using Statistical Package for Social Science with Windows software IBM 21.0. Paired Samples t-test was used to test the effect on each variable and in order to find correlation, Correlation Bivariate with significance value  $< 0.05$  was utilized.

Table 1: The of the total body weight, BMI, fat, and self-esteem of the experiment group (HIIE) and control group (N=12; average and standard deviation)

	Experiment		Control	
	Pre Test	Post Test	Pre Test	Post Test
Body Weight	96,8±17,8	96,3±17,6	83,4±10,8	82,8±11,2
BMI	35,7±3,01	33,3±1,2	29,5±2,3	30,3±1,88
Fat	32,9±5,88	28,7±2,76	29,1±3,77	29,7±6,95
Self Esteem	16,7±3,55	19±2,89	19,3±3,44	19±3,03

## 3 RESULTS AND DISCUSSION

### 3.1 Results

#### 3.1.1 High Intensity Intermittent Exercise (HIIE) Activities Affect the Decrease of Students Obesity

The average weight score in the experimental group (HIIE) at pre-test was  $96.8 \pm 17.8$  and decreased at the post-test level to  $96.3 \pm 17.6$  (table 1).

It was known that the average score of the experimental group BMI during the pre-test was  $35.7 \pm 3.0$  and the post-test was  $33.3 \pm 1.2$ . Meanwhile, the average on pre-test score was  $29.1 \pm 3.77$  and at the post-test was  $29.7 \pm 6.95$  (table 1).

In the control group, it was found that the average score during pre-test was  $29.5 \pm 2.3$  and at the post-test was  $30.3 \pm 1.88$  (table 1). In the control group there was an increase in the number of BMI while in the experimental group (HIIE) there was a significant decrease ( $p < 0.05$ ), (figure 1). So, it can be concluded that in the experimental group that was given the treatment of High Intensity Intermittent Exercise (HIIE) physical activities decreased their BMI.

The mean score of fat in experiment group on pre-test showed the result as  $32.9 \pm 5.88$  and at post-test was equal to  $28.7 \pm 2.76$ .

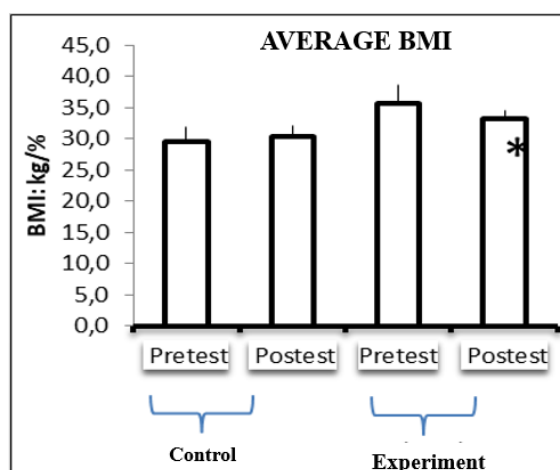


Figure 1: Result of BMI change of the experiment group (HIIE) and control group.

(N=12, average and standard deviation).

\*: Significant on the experiment group ( $p < 0.05$ ).

In the control group, there was an increase in the amount of fat while in the experimental group (HIIE) there was a significant decrease ( $p < 0.05$ ), (figure 2). So it can be concluded that in the group that was given the treatment of High Intensity Intermittent Exercise (HIIE) physical activities decreased the amount of fat.

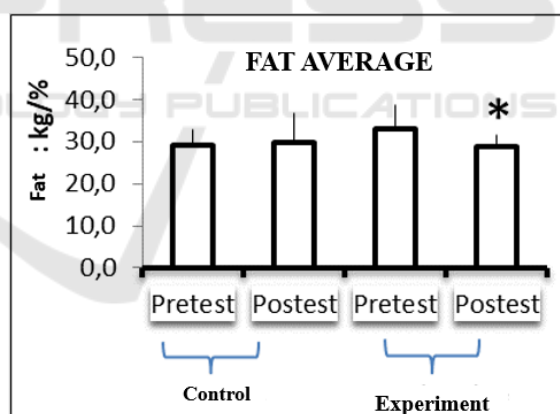


Figure 2: Result of BMI change of the experiment group (HIIE) and control group.

(N=12, average and standard deviation).

\*: Significant on the experiment group ( $p < 0.05$ ).

#### 3.1.2 Intensity of Intermittent Exercise (HIIE) Affect the Increase of Obese Students' Self Esteem

The average score of the experimental group at pre-test was  $16.7 \pm 3.55$ , and at the post test was  $19 \pm 2.89$ . Whereas, in the control group it was known that the average score at the pre-test was  $19.3 \pm 3.44$  and at the post-test was  $19 \pm 3.03$ , (table 1). Figure 2

shows the decrease of self-esteem in the control group, from pre-test and post-test. But in the experimental group which had done the HIIE activities, there was a significant increase of self-esteem on pre-test and post-test. Thus, it can be concluded that in groups that was given the physical activities increased their self-esteem.

**3.1.3 There is No Relation between the Decrease of Obesity through the High Intensity Intermittent Exercise (HIIE) Activities towards the Students' Self Esteem**

Table 2 shows the average obesity rate of both pre-test and post-test and the self-esteem improvement through HIIE activities. Subsequently it shows the relationship between the decreases of obesity through HIIE activities towards the self-esteem in the experimental group. In table 2, the results show the relationship rate was -0.189, which means it has a very weak relationship, while the significance value was  $0.721 > 0.05$ . It shows that there is no relationship between the decreases of obesity through HIIE activities towards the students' self-esteem.

Table 2: The relation between obesity on HIIE activities with experiment group's self-esteem. (N=6,  $p > 0,05$ )

	SELF ESTEEM
OBESITY	-0,189± 0,721

**3.2 Discussion**

The overweight body, especially obese, is highly susceptible to the degenerative diseases such as diabetes, heart disease, lowers one's confidence causing serious psychological disturbance (Pesa, Syre, Thomas R and Jones, 2000), which also can cause musculoskeletal disorder, work disorder, and sleep apnea, (Gibney, 2008, pp. 214-215). In addition, people with overweight and obesity are associated with comorbidities (complications) that reduce quality of life, and premature death of the foetus (Stein and Colditz, 2014). Obesity on children can increase the risk of low self-esteem.

Low self-esteem is associated with lower mental health. More active life and eat healthy foods are more useful ways to prevent obesity, and increase self-esteem in the short term, and prevent chronic disease and improve mental health in adulthood, (Wang et al, 2009). The excess of body fat or obesity and loss of weight due to the loss of muscle tissue will affect the performance (Ronald, 2009).

Improving the health by doing physical activities is one of the efforts to get used to stay dynamic.

The results of the study show that the activities of High Intensity Intermittent Exercise (HIIE) affect the decrease of student obesity. The HIIE protocol consisted of sprint followed by low intensity exercise or rest. This type of exercise is performed with repetition in each training session, (Boutcher, 2011). Regular HIIE exercise has shown significant improvement of physical abilities in aerobic and anaerobic (Trapp et al., 2008). Furthermore, HIIE has shown greater results in weight loss, as well as a more effective type of exercise in reducing abdominal fat folds, (Boutcher, 2011), (Stiegler and Cunliffe, 2006).

Besides, HIIE activities have an effect on increasing students' self-esteem. It has been proved by the results shown in Table 1. There was an increase of self-esteem in pre-test and post-test of experimental group that did the HIIE activities. Self-esteem in girls influenced their participation in physical activities, and participation in sports teams is positively associated with high self-esteem (Debate et al, 2009). Thus, one's self esteem would increase if he/she did the physical activities, and it will be better if it was accompanied by the given HIIE physical activities.

Furthermore, the results show that there is no relationship between the decreases of obesity by doing High Intensity Intermittent Exercise (HIIE) physical activities towards the students' self-esteem. Previous research has suggested that physical activities through exercise may increase the self-esteem and foster positive self-image, skill, and self-ability. Positive self-efficacy through the recognition from family, friends, and the growing environment is a result of involvement in sports and physical activity (Peggy and Edwards, 2003). The absence of a relationship between the decrease of obesity and self-esteem, might occur because, basically everyone has a different level of self-esteem. The high and low self-esteem of a person differs from each other. It happens because, self-esteem is a feeling, a behavior and an individual is able to choose what is desired and will make feelings about his/herself better and more confident (Maryam et al., 2013). In addition, positive individual development with feelings of belonging, feeling appreciated and accepted in the midst of the family and the environment, can form a positive self-esteem in the teenagers (Prameswari and Mifbakhuddin, 2013).



## 4 CONCLUSIONS

The High Intensity Intermittent Exercise (HIIE) activity is an alternative exercise that can be used in reducing obesity, which is now widespread among teenagers and even young children. It is feared that it will continue into adulthood. The decrease of self-esteem due to obesity can give a person psychological influence, so one way to improve self-esteem is by doing physical activities. Although the value of self-esteem of every person is different, but by doing physical activities and accompanied by exercise, for instance by doing High Intensity Intermittent Exercise physical activities, will increase the value of one's self esteem especially in obese students.

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