

Research Article

The Influence of Exercise and Nutritional Diet on Metabolism Status of Overweight Police in Semarang, Indonesia

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Abstract: The prevalence of overweight and obesity increased significantly in developing countries, including Indonesia. Overweight and obesity is the most important public health problems and the prevalence of metabolic syndrome is increasing. Therefore, this study aims to investigate the changes of metabolism status such as; triglycerides (TG), LDL cholesterol, HDL cholesterol, total cholesterol. The study conducted on 40 overweight police, in 30-45 years of age, then divided into two groups: 20 police in control group and 20 police in intervention group that provide with aerobic class and nutritional diet. Both of groups got health education about nutritional healthy diet and exercise, healthy life style. After that, the metabolism status was checked at baseline and after 4 weeks of intervention. Result shows that there were significant correlations in intervention group on the risk factor for metabolic syndrome were decreased significant in LDL cholesterol level and total cholesterol. This study was only reducing not significant in metabolism status such as; triglycerides and HDL level. It concludes that aerobic class and nutritional diet have a positive effect on reducing risk factor of overweight and obesity.

Keywords: metabolic syndrome, aerobic, nutrition diet

Introduction

Globally, the World Health Organization (WHO) describes that overweight and obesity as one of today's most important public health problems, which is escalating as a global epidemic. That problems was developed properly in the developing country, such as Indonesia (Jahnavi et al., 2011). In Indonesia, 21.7% of adults are overweight (including obesity), and women (26.9%) have a higher prevalence than men (16.3%) (Diana et al., 2013). The overweight and obese could be measured by Body Mass Index (BMI). BMI is a method for measuring the relationship between a person's height and weight, and resulting it as a ratio (Defelice, 2002). The ratio would be classifying person as overweight or obese (Table 1). Overweight is defined as having a body weight greater than what is considered a normal weight range as established for a person's height and bone structure with a Body Mass Index (BMI) between 25.0-29.9. While, obesity is defined as having a body weight greater than normal weight range as established for a person's height and bone structure with a BMI between 30 or higher (LeDoux C, 2010).

Table 1. Classification of obesity and overweight (World Health Organization, 2004)

No.	Classificaton	Obesity class	Body Mass Index (Kg/m ²)
1.	Underweight	-	18.5
2.	Normal	-	18.5-24.9
3.	overweight	-	25.0-29.9
4.	obesity	I	30.0-33.9
5.	obesity	II	35.0-39.9
6.	extreme	III	≥ 40

Obesity is caused by complex factors include genetic and environmental factors including food consumption, socio-cultural, physical activity or exercise, and metabolic. The consumption rate of vegetables, fruits and other high-fiber foods in Indonesia is still low. The majority about 93.6% of Indonesian population are eating less vegetables and fruit.

It could be increased incidence of obesity significantly and almost half which is about 48.2% of Indonesian population less are physical activity. High-energy food intake without balanced with enough physical activity will boost energy savings in the form of fat in the body (Humayrah, 2009). Moreover, overweight and obesity are strongly related to

several diseases like cardiovascular diseases (CVD), type 2 diabetes and some type of cancers (Coggi et al., 2012).

In 2006-2010, the prevalence of overweight which includes obesity in Central Java were reached 10%-21% with detail 11.5% in men and 21.7% women (Adhi D. H, 2012). Unfortunately, the Indonesian Police in Semarang are undergoing a obesity with nutritional problems and infectious diseases.

Then, it still has not been resolved. Therefore, this study aims to identify the changes of metabolism status of Indonesian police in Semarang to know the effect of combination between aerobic class and nutrition improvement. Previous study shown that aerobic exercise and healthy foods reduce the total cholesterol in obese populations (Dinas P, 2014).

Materials and Methods

The research was conducted on Indonesian Police in Semarang from August 2nd - 31st 2015.

Materials

In this research, the target is police who work in Semarang. The target were take with consecutive random sampling and must meet the inclusion and exclusion criteria (Table 2). There were selected 84 man and women police overweight and obesity but only 40 respondents are involved in the inclusion criteria, while 44 were excluded from the study. The target should be met an inclusion criteria, such as; age 30-45 and BMI 26-30 %, women and men police with overweight.

Table 2. Inclusion and exclusion criteria

Inclusion	Exclusion
Police man and women	Obese with drug reduction
Age 30-45	Doing regularly exercise
BMI 26 – 30%	If some one follow diet program
	Chronic hard disease
	Stroke heart
	Stress

Methodology

The design of study was experimental, randomized control trial group design. The target, 40 police, was divided into two groups (20 people in each group) such as control and intervention group. The intervention group was provided by aerobic class in 16 times regularly and Indonesian healthy food (Table 3) with nutritional diet by 1500 Kcal for women and 1700 Kcal for men in five times a day in a

month. Then, the control group was provided by health education about nutritional healthy diet, exercise of physical activity and the way to change the lifestyle to prevent overweight and obesity before developing to diseases. Moreover, control and intervention group were confirmed by post-test after 4 weeks. The analysis was conducted with one parameter metabolic state was identify triglycerides, LDL cholesterol, HDL cholesterol and total cholesterol by pre-test and post-test.

Table 3. Menu of Indonesia healthy food for overweight

Healthy Food
BREAKFAST (07.00 AM)
<ul style="list-style-type: none"> - Rice / penerkar - Meat / penerkar - Tempe / Penerkar - Vegetable / group A - Vegetable / group B - Papaya / penerkar
SNACK (10.00 AM)
<ul style="list-style-type: none"> - Papaya / penerkar
LUNCH (13.00 PM)
<ul style="list-style-type: none"> - Rice / penerkar - Meat / penerkar - Vegetable / group A - Vegetable / group B - Papaya / penerkar
SNACK (16.00 PM)
<ul style="list-style-type: none"> - Buah pepaya / penerkar
DINNER (19.00 PM)
<ul style="list-style-type: none"> - Rice / penerkar - Meat / penerkar - Tempe / penerkar - Vegetable / group A - Vegetable / group B - Papaya / penerkar
SNACK (22.00)
<ul style="list-style-type: none"> - Papaya / penerkar

Statistical Analysis

The data was analyzed by comparing the value of intervention group with the daily activity, nutrition and control groups. Results are expressed as mean \pm SD.

The distribution data of both groups were tested using test of Shapiro-Wilk (the total number of respondent in each group less than 25) with normal distribution of data in both groups then performed statistical tests using independent t-tests. The tes was carried out by SPSS 16 software followed coupled with least p-value of < 0.05 is consider as statistically significance.

Ethical clearance

The entire procedure was requested research ethics committee approval from the medical faculty of health research Diponegoro University NO. 411/EC/FK-RSDK/2015

Result and Discussion

Metabolism Status of Overweight Police Affected By Aerobic Class and Nutritional Diet

Based on the research result, the baseline data was entirely higher than the collected data after intervention for 4 weeks. This study found that there was a significant effect of aerobic class and nutrition on metabolic status among police overweight. Metabolic status in this study expressed by several indicators; Triglycerides, LDL cholesterol, HDL cholesterol, and total cholesterol. But, only LDL cholesterol and total cholesterol that have reduce significantly after treatment. After exercise, the LDL cholesterol was reduce from 131.65 ± 38.35 mg/dl into 114.00 ± 27.10 mg/dl with $p < 0.036$.

The total cholesterol also show the same result, the total cholesterol reduce from 194.10 ± 35.84 mg/dl to 171.00 ± 28.34 mg/dl (Table 4). Reducing of LDL level and total

cholesterol are benefit to lose the weight. Otherwise, the higher LDL level and cholesterol will increase the opportunity of heart attack. High levels of LDL mean that cells have more cholesterol than they can use and there is no reducing process in the blood vessels. This can lead to cholesterol deposits, which cause arteries to narrow, become hard, and slowing down blood flow to the heart

(National Institutes of Health, 2001). Therefore, aerobic or exercise was appropriate to reduce the LDL and cholesterol level because the exercise would be lead the oxidation of cholesterol (Wolfe, 1998). Every 1% reduction in cholesterol will reduce the risk of getting heart disease by 2%. (Heartpoint, 1997).

Table 4. Metabolism and inflammation status of two groups in baseline and after 4 weeks

Variable	Intervention (mean ± SD)	Control (mean ± SD)	p
Baseline data			
Triglycerides (mg/dl)	160.90 ± 127.75	167.70 ± 70.66	0.172 [§]
LDL cholesterol (mg/dl)	130.15 ± 34.57	139.75 ± 31.59	0.365 [‡]
HDL cholesterol (mg/dl)	45.95 ± 11.96	43.25 ± 8.66	0.419 [‡]
Total cholesterol (mg/dl)	197.65 ± 35.46	206.20 ± 31.56	0.250 [§]
Data after 4 weeks			
Triglycerides (mg/dl)	103.85 ± 43.32	141.85 ± 81.28	0.113 [§]
LDL cholesterol (mg/dl)	114.00 ± 27.10	131.65 ± 38.35	0.036 ^{*§}
HDL cholesterol (mg/dl)	43.00 ± 12.25	41.30 ± 9.72	0.776 [§]
Total cholesterol (mg/dl)	171.00 ± 28.34	194.10 ± 35.84	0.030 ^{*‡}

Note : * Significant p < 0.05

‡ Independent t-test

§ Mann Whitney test

This research found that the mean of triglycerides was reduced non-significantly after 4 weeks intervention. triglycerides in intervention group, baseline were about 160.9 mg/dl, after intervention was 103.8 mg/dl and in the control the were about 167.7 mg/dl baseline intervention and 141.9 after 4 weeks. Same result on HDL level was reduced in intervention group. It means that aerobic class and nutritional diet reduced triglycerides and HDL level better in intervention group compare to

control group but there were not a significant effect. HDL levels could be modulated by lifestyle factors as in other populations with the determined benefits of increasing physical activity. Because of HDL levels, policy reforms in schools to promote physical activity were warranted. (Cuhadar, 2013). Study was conducted by Leite et al in 2008, the study showed that obesity had been correlated with triglycerides (p < 0.001).

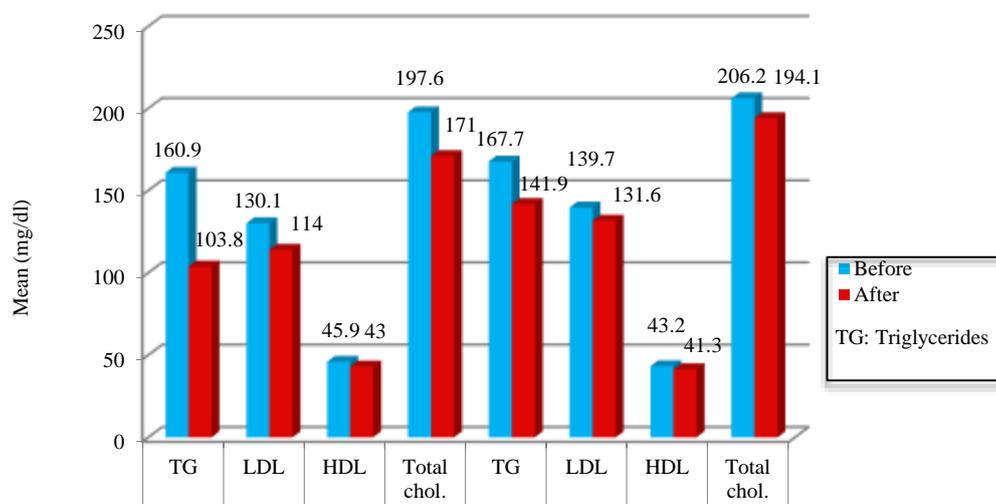


Figure 1. Distribution of metabolism status TG, LDL, HDL and total cholesterol components before and after intervention

Conclusion

Based on the research, the metabolism status of overweight police were influenced by aerobic class and nutrition supply. The element of metabolism status, only LDL cholesterol and total cholesterol that significantly affected by aerobic class and nutrition. Moreover, the triglycerides and HDL cholesterol level were not significantly affected by intervention but reduced better in intervention group.

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