



Correlation Between Physical Activity Adequacy and The Incidence of Obesity and Non Obesity in Adults at Wiyata Dharma Private School Medan

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Abstract : The prevalence of obesity is increasing worldwide. Based on World Health Organization (WHO) data, more than 1,9 billions of adult in the world were overweight and 600 millions of them were obese in 2014. The prevalence of obesity in Indonesia is also increasing, from 21,7% in 2007 to 28,9% in 2013. Obesity has become a global epidemic and is a health problem due to its associated morbidity. Globally, there is an increased intake of high calorie food and decrease in physical activity due to various ease in lifestyle. Physical inactivity is a risk factor for obesity. The objective of this research is to investigate the correlation between physical activity adequacy and the incidence of obesity and non obesity especially in adults (above 18 years old). This research was an analytical observational research with case-control study design. A total of 64 respondents were taken using consecutive sampling during September 2015 in Wiyata Dharma Private School Medan. Nutritional status data were obtained by measuring respondents, body height and weight and were converted into Body Mass Index (BMI), while physical activity data were obtained through direct interview using WHO Global Physical Activity Questionnaire(GPAQ) Statistical analysis was performed by using Chi-square (χ^2) test. The results showed that there is a significant correlation between physical activity adequacy and the incidence of obesity and non obesity ($p \geq 0,05$) with an Odds Ratio of 3,667 (95% CI 1,303;10,321).

Keywords : Physical activity, obesity.

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation in adipose tissue that may interfere with one's health.¹ Body Mass Index (BMI) is a simple indicator that provides an overview of a body weight for a particular height and is used to classify adult weight into underweight, normal, overweight and obese. BMI is calculated by dividing the weight in kilograms with the square of height in meters (kg/m^2). One is classified as overweight if the BMI is $\geq 25 \text{ kg}/\text{m}^2$ and obese if it is $\geq 30 \text{ kg}/\text{m}^2$.² In Asia Pacific the classification of overweight and obesity is quite different where one is classified as overweight if the BMI is $\geq 23 \text{ kg}/\text{m}^2$ and obese if it is $\geq 25 \text{ kg}/\text{m}^2$.³ Overweight and obesity greatly increase the risk of having health problems, including Coronary Heart Disease, type 2 Diabetes Mellitus, Cancer (endometrium, breast, colon), Hypertension, Dyslipidemia, Stroke, Liver and Gallbladder Disease, Obstructive Sleep Apnea (OSA), Osteoarthritis, as well as Gynecological Disorders such as Infertility and menstrual disorders.⁴

The prevalence of obesity has doubled since 1980 and is increasing worldwide, both in developed and developing countries. In 2014, more than 1.9 billion adults aged above 18 years were overweight and 600

million of them were obese. WHO states that obesity is already a global epidemic, it is a health problem that must be addressed immediately. WHO predicts that by 2015 about 2.3 billion adults worldwide will be overweight and over 700 million will be obese.⁵ In Indonesia the prevalence of obesity also continues to rise. Based on the data of Indonesia Ministry of Health, in 2013, the prevalence of overweight and obesity in adults in Indonesia reached 28.9 percent, 7.2 percent higher than in 2007 (21.7%).⁶

The etiologies of obesity are multifactorial, including genetical, environmental and behavioral factors. However, the fundamental etiology of obesity is due to nutritional imbalance and inadequate physical activity.⁷ Globally, there has been an increase in the intake of high-calorie and fat-rich foods, as well as the decrease in physical activity due to the ease of lifestyle, such as changes in transport models and urban lifestyles.⁸

Physical activity is defined as any movement of the body produced by skeletal muscle contraction that increases energy expenditure above the basal level.⁹ Some people may become obese not because they eat too much, but because they are too physically inactive. Some people who suffer from obesity are very inactive in doing physical activity so that although they eat less than the other, they still have surplus energy. Physical inactivity increases both visceral fat and total body fat regardless of genetic factors.¹⁰ The influence of the environment and the advancement in technology have made people in both developed and developing countries experience decrease of physical activity, which in turn causing decrease of energy expenditure. Physical inactivity is an independent risk factor for the occurrence of obesity and chronic diseases. Data from WHO shows that 60% of the world's population do not meet the recommendations of physical activity.¹¹

Based on the descriptions above, it appears that obesity has become a very important health issue. In addition to the prevalence that continues to increase each year, obesity also plays a very important role in the incidence of chronic and degenerative diseases that can increase the country's burden of health and economy. The ease of life makes a person experience decrease in physical activity that ultimately lead to obesity. Therefore, we conducted a research to assess the relationship between physical activity and the occurrence of obesity and non obesity. The main goal is to know the correlation between physical activity adequacy and the incidence of obesity and non obesity especially in adults above 18 years of age, in which we perform in Wiyata Dharma Private School Medan, Indonesia.

Materials and Methods

Research Design and Sample Size

An analytical observational case-control study was undertaken to determine the correlation between physical activity adequacy and the incidence of obesity and non obesity among adults aged above 18 at Wiyata Dharma Private School Medan, North Sumatera, Indonesia.

Sample size estimation in this research was determined using the formula of the sample size and the minimum sample size obtained for the study was 32 respondents per group: 32 Case (respondents who were obese) and 32 Control (respondents who were not obese) with a total of at least 64 respondents. Respondents included in this research were selected through consecutive sampling during September 2015 following inclusion and exclusion criteria. The inclusion criteria were defined as follows: teachers and school staffs who were working at Wiyata Dharma Private School Medan, above 18 years old, willing to be a research respondent. The exclusion criteria were as follows: not in good health state, such as having comorbid disease that could affect physical activity (eg: heart disease or other physical or mental disability), or pregnant lady.

Procedures

Respondents were interviewed to meet inclusion and exclusion criteria, then were asked to fill out informed consent sheets. Once the approval was obtained, the data retrieval began. Data of Nutritional Status were obtained through measurements of height and weight. Body weight data was measured using a GEA digital weight scale with a capacity of 150 kg and 0.1 kg accuracy. While the height data was measured using microtoise with a scale of 200 cm with accuracy of 0.1 cm. Body height and weight data were converted into BMI and were classified as obese or non-obese group. Data of physical activity was obtained by conducting interviews led by researchers using WHO Global Physical Activity Questionnaire (GPAQ), which covers three domains: work activities, travel to and from certain places, and recreational activities. Each answer was

analyzed, calculated and converted in units of MET/week to be grouped whether the physical activity of the respondent were adequate or inadequate. The physical activity was considered adequate if the respondent performs at least moderate intensity physical activity for at least 150 minutes per week, OR severe intensity physical activity for 75 minutes per week, OR a combination of mild, moderate, and severe physical activity reaching a minimum of 600 MET-minute/week.

Data Analysis

The data analysis includes univariate and bivariate analysis. Univariate analysis was used to see the respondents' distribution of gender, age, weight, height, physical activity, and nutritional status. Bivariate analysis is used to see the correlation between physical activity and obesity and non obesity by using Chi Square (χ^2) test.

Results

Research respondents who participated in the study consisted of 64 people, 32 respondents for case group (obese respondents) and 32 respondents for control group (non obese respondents).

Table 1 shows the distribution of respondents based on the characteristics of gender, age physical activity and nutritional status. Based on gender, most of the respondents were female. Based on age, most respondents are in range of 31-65 years old. Based on physical activity adequacy, majority of the respondents have inadequate physical activity. Based on nutritional status, the respondents in the non-obese group consisted mostly of the respondents of normal weight. While the respondents in the obese group consisted mostly of respondents in grade I obesity.

Table 1. Characteristic of Respondents

Characteristic	n	%
Gender		
Male	22	34,4
Female	42	65,6
Age (years)		
18-30	15	23,4
31-65	49	76,6
Physical Activity		
Inadequate	34	53,1
Mild Activity	34	53,1
Adequate	30	46,9
Moderate Activity	19	29,7
Severe Activity	11	17,2
Nutritional Status		
Non Obese	32	50
Underweight	1	1,6
Normal	16	25
Overweight	15	23,4
Obese	32	50
Grade I	27	42,2
Grade II	5	7,8
Total	64	100

Table 2 shows the results of cross-tabulation of physical activity adequacy with the incidence of obesity and non obesity. Respondents with inadequate physical activity majority have obese nutritional status. While respondents with adequate physical activity majority have non obese nutritional status. Chi Square (χ^2) statistical test results about the correlation between physical activity adequacy and the incidence of obesity and non obesity shows p value of 0.012 with an Odds Ratio 3.667.

Table 2. Cross tabulation of Physical activity adequacy with the incidence of Obesity and Non Obesity in Adults aged above 18 at Wiyata Dharma Private School Medan

Physical Activity	Status Gizi				Total		p-value
	Obese		Non Obese				
	n	% total	n	% total	n	%	
Inadequate	22	64,7	12	35,3	34	100	0,012
Adequate	10	33,3	20	66,7	30	100	

(OR=3,667, CI 95% 1,303;10,321)

Discussion

The result of bivariate analysis using Chi Square statistical test obtained the p value of 0,012 ($p \leq 0,05$) which means there is a significant relationship between physical activity adequacy and the incidence of obesity and non obesity with Odds Ratio (OR) 3,667 (CI 95% 1,303; 10,321). This suggests that a person with inadequate physical activity has a higher risk to develop obesity (3,667 times higher) than those with adequate physical activity.

The same result is disclosed in a study about the association between obesity and physical inactivity in Indonesia 2010. In which respondents with inadequate physical activity were 1,232 times more likely to develop obesity (CI 95% 1.199, 1.266) than respondents with adequate physical activity.¹²

A study in about overweight and obesity among older adults in Canada found out that the risk of obesity in men with inadequate physical activity was 2.49 times higher (CI 95% 1.65, 3.75) compared to men with adequate physical activity. While the risk of obesity in women with inadequate physical activity was 1,85 times higher (CI 95% 1.65, 2.07) compared with women with adequate physical activity.¹³

A same study conducted by Martinez-Gonzales et al on physical inactivity, sedentary lifestyle and obesity in European Union also found a strong association between obesity with inactive lifestyle and lack of physical activity in the adult population.¹⁴ Obesity is common in people who have sedentary lifestyle. In the current industrial world, with increasing mechanization and ease of transportation, people tend to be less mobile and use less energy for daily activities.¹⁵ A sedentary lifestyle will affect the health and condition of one's body. Physical activity is needed to burn energy in the body. Excessive energy intake that is not balanced by adequate physical activity will allow a person to become fat.¹⁶

A study that evaluate the treatment and prevention of Obesity in America revealed that physical activity is the main behavior that can prevent weight gain and significantly increase long-term weight loss and also reduce the health risks associated with many chronic diseases. Lifestyle in the modern era with mild physical activity will facilitate the buildup of fat in the body.¹⁷

Based on some research results that have been presented, it can be concluded that physical activity has a significant relationship to the incidence of obesity and non obesity.

Conclusion and Suggestion

The results of this study concluded that there is a significant relationship between physical activity adequacy with the incidence of obesity and non obesity in adults in which the risk of obesity is higher in people with inadequate physical activity compared to those with adequate physical activity.

A suggestion that can be given through this research is that there is a necessity to increase the awareness of physical activity inadequacy to the development of obesity. In Wiyata Dharma private school itself, they can start considering making a policy related to the effort of increasing the physical activity for teachers, school staff and the students, holding counseling about the importance of physical activity, including the adverse effects of lack of physical activity on one's health, so as to generate awareness to further increase physical activity.

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