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Determinants of Overnutrition: A Cross-Sectional Study of Small-scale Garment Workers in Cipadu, Tangerang

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ABSTRACT

Small-scale garment workers are susceptible to overnutrition. Preliminary studies show that out of 30 workers in small-scale garment industries in Cipadu, Tangerang, 40% experience overnutrition. To analyze the determinants of overnutrition in workers so preventive measures can be implemented. A cross-sectional design was conducted for this study. The population of this study comprises all small-scale garment workers in Cipadu, Tangerang. Simple random sampling was used to determine the sample size, amounting to 125 workers. Nutritional status was determined by body fat percentage measured with bioelectrical impedance instruments. Data were analyzed using multiple logistic regression to identify the main determinant. Results showed that 55.2% of workers experience overnutrition. The majority of workers that experience overnutrition is characterized by <35 years of age, low levels of nutritional knowledge, excess nutrient intake, adequate carbohydrate consumption, heavy levels of stress, <6 hours of sleep, and light physical activity. Statistical analysis shows that age, physical activity, energy intake, and fat consumption are significantly associated with overnutrition. Energy intake is the main determinant of overnutrition in small-scale garment workers. Workers that are 35 years and older and perform light physical activity are advised to regulate their diet, especially towards foods containing high energy and fat levels.

KEYWORDS: Overnutrition; Small-scale Garment Workers; Energy Intake

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1 INTRODUCTION

Overnutrition is a nutritional status that can be categorized into overweight and obese. This term also identifies a weight range that has been proven to increase the chances of specific diseases and other health problems. Nutritional problems have become more widespread and have become a risk factor in causing degenerative diseases. In 2008, the United States, a developed country, recorded that out of the individuals with a body mass index (BMI) greater than 30, 2.2% were men and 35.5% were women. Similar results were also found in Australia. In 2008, it was found that out of the individuals with a BMI greater than 30, 25.66% were men and 24.0% were women (1). Indonesia, a developing country, is not left out of facing overnutrition. According to Indonesian Basic Health Research, nutritional problems in adults were dominated by obesity and overnutrition. This was shown by a prevalence of 15.4% in obesity and 13.5% in overnutrition. Therefore, it can be concluded that 28.9% of adults experience overnutrition (2).

Nutritional problems in Indonesia are mainly experienced by the working-age population, or individuals older than 15 and dominated by those who have a job or are still seeking. A preliminary study was conducted on 30 workers spread throughout 4 *rukun warga* or RW (the second smallest division of a city) in an informal small-scale garment center in Cipadu, Larangan, Tangerang. The results showed that 40% of workers in this area experience overnutrition (measured by body fat percentage).

Overnutrition has negative implications for individual workers and their life quality. In a study by Firman, the impacts of overnutrition in workers vary widely, e.g., adverse linear posture influenced by excess weight, 6 – 10% less muscle strength compared to normal workers, difficulty in fulfilling metabolic needs, an increased risk of heat disorder, a decrease in speed of anti-gravitational movements, and increased absence which in turn decreases work productivity. Other than that, obese workers spend more on medical care than normal workers because of an increased threat of coronary heart disease (CHD), stroke, type 2 diabetes, high blood pressure, dyslipidemia, metabolic syndrome, cancer, osteoarthritis, sleep apnea, reproductive problems, and gallstones (3).

Generally, nutritional problems are caused by many factors. A study by Khusun H *et. al.* shows that being overweight or obese is not related to only one factor, but many interrelated factors, including age, marital status, food consumption, and physical activity. A worrying fact is that in a survey conducted on office employees, it was found that fat intake was much higher than the average Indonesian, with a high frequency in consuming fried food and sweetened drinks (tea, coffee) that are high in energy. Meanwhile, the intensity of physical activity is relatively low (4). Mutritional problems in workers are due to several factors, including educational background, socio-economic conditions, culture, dietary habits, and degree of well-being (5). This study was intended to assess the factors associated with overnutrition status of small-scale garment workers.

2 METHODOLOGY

A cross-sectional design was conducted for this study. The population of this study comprises all workers across 55 small-scale garment workers in Cipadu, Tangerang. Each garment center employs 3 – 7 workers. The small-scale garment industry centers in Cipadu are an informal work sector where marginal economic activities are done using simple technology. In informal sectors, occupational health and safety are not yet well implemented

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because of the lack of legal bases in the informal sector, limited capacity building for workers, the lack of occupational health awareness, and the lack of cross-sector collaboration (6). This serves as the justification of this study within the identified area, with a sample size of 125 workers chosen through simple random sampling.

The data collection process was conducted by three undergraduate students at the Department of Public Health, Faculty of Health Sciences, State Islamic University Syarif Hidayatullah Jakarta that underwent prior training. The dependent variable, nutritional status, was measured using bioelectrical impedance instruments. Information regarding determinant variables was collected through various techniques. Age, nutritional knowledge, and sleep duration were asked through questionnaires. Nutritional intake data that consists of energy intake, carbohydrate consumption, fat, and protein was collected through a 2x24 hour food recall, differentiated between weekends and workdays. Physical activity was measured using the physical activity questionnaire by Baecke JA et al., consisting of work index, sports index, and leisure index. Stress levels were identified through a number of questions regarding individual stress perception using the Perceived Stress Scale (PSS-10) (7). All instruments used have been tested for validity and reliability. Data from this study was analyzed step-by-step, starting from characterizing the variables in the study up to performing multiple logistic regression to identify the main determinant of overnutrition in workers.

3 RESULTS

This study found that out of 125 small-scale garment workers involved, 69 workers (55.20%) experienced overnutrition. Table 1 below shows that workers with overnutrition were mostly characterized by ≥35 years of age (80.0%), total sleep duration of <6 hours (74.3%), and light physical activity (65.6%). Psychological characteristics showed that workers with overnutrition also had low levels of nutritional knowledge (55.4%) and high stress levels (58.1%). Nutritional characteristics showed that overnutrition was experienced by workers with excessive energy intake (89.7%), adequate carbohydrate consumption (66.0%), excessive fat consumption (68.0%), and excessive protein consumption (73.9%).

Multiple logistic regression results showed that significant factors (α=5%) associated with overnutrition in small-scale garment workers include age, physical activity, energy intake, and fat consumption. Workers aged ≥35 years were 9.84 times more likely to experience overnutrition compared to workers aged <35 years. Aside from that, workers categorized as having light physical activity were 3.43 times more likely to experience overnutrition compared to workers that were categorized as having vigorous physical activity (95% CI:1.08-10.86).

Unbalanced nutrition is also a determinant of overnutrition in workers. This study found that excessive energy intake is the main determinant behind overnutrition in small-scale garment workers. Workers with excessive energy intake are 18.31 times more likely to experience overnutrition compared to workers with adequate energy intake (95% CI: 4.60-72.88). Additionally, workers with a high fat intake are 4.79 more likely to experience overnutrition compared to workers with adequate fat intake (95% CI: 1.10-20.94).

Tabel 1. Characteristics and Determinants of Overnutrition in Small-scale Garment workers in Cipadu, Tangerang

Variable	Category	Overnutrition Status		Adjusted Odds Ratio (95% CI)	Pvalue
		Yes	No		
		n (%)	n (%)		
Age	≥35 years	36 (80,0)	9 (20,0)	9.48 (2.90-30.98)	<0.001**

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	<35 years	33 (41,3)	47(58,8)		
Sleep Duration	< 6 hours	28 (74,3)	9 (25,7)	2.05 (0.62-6.78)	0.237
	≥ 6 hours	43 (47,8)	47 (52,2)		
Physical Activity	Light	59 (65,6)	31 (34,4)	3.43 (1.08-10.86)	0.036*
	Vigorous	10 (28,6)	25 (71,4)		
Nutritional Knowledge	Low	41 (55,4)	33 (44,6)	1.17 (0.424-3.23)	0.761
	Sufficient	28 (54,9)	23 (45,1)		
Stress Level	Heavy	54 (58,1)	39 (41,9)	1.34 (0.44-4.09)	0.607
	Moderate	15 (46,9)	17 (53,1)		
Energy Intake	Excessive	35 (89,7)	4 (10,3)	18.31 (4.60-72.88)	<0.001**
	Adequate	34 (39,5)	52 (60,5)		
Carbohydrate Consumption	Excessive	36 (48,0)	39 (52,0)	1.14 (0.26-4.94)	0.857
	Adequate	33 (66,0)	17 (34,0)		
Fat Consumption	Excessive	51 (68,0)	24 (32,0)	4.79 (1.10-20.94)	0.037*
	Adequate	18 (36,0)	32 (64,0)		
Protein Consumption	Excessive	17 (73,9)	6 (26,1)	2.33 (0.54-10.16)	0.259
	Adequate	52 (51,0)	50 (49,0)		

* $p < 0.05$, ** $p < 0.01$

4 DISCUSSION

The indicator of overnutrition in this study is individual body fat percentage. Body fat percentage is a nutritional indicator using anthropometric measurements that describes the ratio of fat mass and fat-free mass in an individual's body. Over half of the workers in this study experience overnutrition. The results of this study are a bit higher than the results shown in a study conducted by Aryatika et al., who found that 42.4% of garment workers experienced overnutrition (8). The difference in characteristics of the chosen sample could be the reason behind the difference between the two studies. However, it is still important to note that overnutrition is an important problem in the garment industry and needs further attention. Overnutrition in workers may impact workers' physical endurance, which may adversely influence linear posture, muscle strength, increased risk of heat disorder, increased work absence, and other degenerative diseases (3) (1).

Energy intake is the main determinant behind overnutrition in small-scale garment workers in Cipadu. Workers with excessive energy intake are 18.31 times more likely to experience overnutrition compared to workers with adequate energy intake (CI 95%: 4.60-72.88). According to the data found in the 2x24 hour food recall, it was found that the main energy sources consumed by workers are staple foods such as rice and side dishes that were eaten 3 times a day. Other than staple foods, workers' energy intake may also be derived from snacks, which are usually consumed during work. Results showed that most of the snacks consumed by workers are high in calories. The type of snack that is most frequently consumed by workers is fried foods, which are high in calories. Based on this finding, it is concluded that workers with a high calorie intake during work hours are 90% more likely to experience overnutrition compared to workers with a high calorie intake outside of work hours.

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Small-scale garment workers in Cipadu have been found to excessively consume foods high in fat because of their good taste, yet low in satiety. Data from the 2x24 hour food recall showed that the majority of respondents consume at least 2 pieces of fried food during lunch. Other lunch menus such as chicken, fish, eggs, tofu, tempeh, and fish-flavored crackers are also fried. This, of course, increases workers' fat intake through frying oil. Other than that, 60.6% of workers consume adequate levels of fat outside of working hours. Fat is consumed through milk, chocolate-filled bread, wafers, and flavored biscuits.

Excessive fat intake may cause workers to experience overnutrition. In this study, it was found that over half of the small-scale garment workers have a fat intake ≥ 25% of their total energy intake, while 68.0% of workers experience overnutrition. Similar results were found in a study by Ashteria where 71.8% of workers with excessive fat intake are more likely to experience overnutrition in comparison to workers that do not consume fat excessively (9). Our study found that workers with an excessive fat intake are 4.79 times more likely to experience overnutrition compared to workers with an adequate fat intake (CI 95%: 1.10-20.94). This could be caused by the fact that fat cells have unlimited storage capacity. Fat excess is not accompanied by increases in fat oxidation as a compensation mechanism to maintain energy balance. Therefore, around 96% of fat will be stored as adipose tissue (10). Consecutive increases in adipose tissue will result in excessive body fat percentage (11).

Age is an internal factor that determines nutritional needs and may be related to nutritional status (Apriadji, 1986). This study found that 80% of workers ≥ 35 years of age experience overnutrition. Similar conditions were also found in studies by Hutajulu (2012) and Ashteria 2013) that showed overnutrition in 63% and 73% of workers over 35 years, respectively (12)(9)

Physical activity is another determinant of overnutrition. This study found that workers that are categorized as having light physical activity have an increased potential of overnutrition compared to workers that are categorized as having rigorous physical activity. According to Choi *et al* (2010), light physical activity at the workplace (sedentary work) plays a role in the rising prevalence of obesity in American workers. Sedentary work, low physical activity, or a combination of both may increase the risk of total obesity and central obesity in men, especially those with over 40 hours of weekly worktime (13). If an individual performs physical activity that is able to balance energy intake and expenditure, energy accumulation in the form of fat would not occur. Conversely, if high energy intakes are not balanced with high energy expenditure, fat accumulation will occur and may develop into obesity over time. Routine physical activity may stimulate major decreases in fat tissue, sometimes without weight loss (14).

5 CONCLUSION

The majority of small-scale garment workers in Cipadu, Tangerang experience overnutrition. There are four factors that are significantly associated with overnutrition in workers, which are age, physical activity, energy intake, and fat consumption. Energy intake is the main determinant behind overnutrition in workers. Workers that are aged 35 years and older and perform light physical activity are advised to regulate their diet, especially towards foods that contain high energy and fat.

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