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RESEARCH ARTICLE

Impact of Education Level on Waist Circumference Among University Workers

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Abstract:
Introduction: Waist Circumference (WC) may be a more accurate indicator of obesity than BMI because it is a simple and more practical method of assessing abdominal fat deposition. The level of education may be associated with waist circumference. The study aims to investigate the relationship between educational level and waist circumference (WC) among workers at a university in Yogyakarta. **Method**: The study enrolled 497 participants as part of a medical check-up event in December 2022, using a total sampling approach. Education level was determined by secondary data and classified into two groups: group I (senior high school and bachelor's degrees), and group II (master's and postgraduate degrees). Mann-Whitney and logistic regression models were used to estimate associations**. Result**: There were significant mean differences in WC between group I (82.83 cm) and group II (93.13 cm) with a p-value < 0.05. WC was significantly higher among university workers with higher education levels. A higher degree of education had 2,4 greater risks for higher WC than others (OR: 2,464 [1,674-3,627]). **Discussion:** Higher WC is strongly associated with a higher level of education in this study. University workers with higher levels of education should be the primary target of public health programs aimed at reducing obesity.
Keywords: Level of Education, Obesity, Waist Circumference, Worker

INTRODUCTION

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Obesity, which is a rapidly increasing public health issue, is frequently linked to a range of negative health consequences, such as hypertension, diabetes, and dyslipidemia.[1] Obesity is also a significant risk factor linked to rising cardiovascular mortality in Indonesia and globally.[2,3] Historically, BMI has been the preferred indicator for determining body composition and size and diagnosing obesity. However, it has been proposed that other indicators of abdominal adiposity, such as waist circumference and waist-height ratio, are more accurate at predicting the risk of cardiovascular disease than BMI. Beyond the BMI calculation, WC offers a distinct indicator of body fat distribution that can be used to identify patients who are more susceptible to obesity-related cardiometabolic disease.[4] Central obesity was present in 41.5% of people overall (95% CI 39.9–43.2%). A greater prevalence was observed in older people (> 40 years old) and female participants.[5]

WC is a significant predictor of health risks related to obesity, including type 2 diabetes, hypertension, hypercholesterolemia, joint pain, hyperuricemia, and OSAS (Obstructive Sleep Apnea Syndrome).[6] The main justification for this is that higher visceral adipose tissue is linked to impaired insulin sensitivity, impaired glucose tolerance, and unfavorable lipid profiles, all of which are risk factors for type 2 diabetes and cardiovascular disease. Cutoffs for waist circumference and waist-hip ratio have also been recommended by the International Diabetes Federation (IDF). It is recommended that South Asians, Chinese, and Japanese use sex-specific cut-off points of 80 cm for women and 90 cm for men.[7]

Education level is a complex socioeconomic element that affects a person's overall health outcomes. It is closely related to health behavior, healthcare access, and health literacy. The quality and length of education have been proven to be key variables that affect health and health literacy throughout a person's life. The amount and level of education have an impact on people's future social and economic well-being, health, and other outcomes, reinforcing the effects of early development.[8] Education correlates with more stable, better-paying jobs that enable families to build wealth that can be utilized to enhance health.[9] A shortage of education restricts healthcare access throughout any setting and is associated with the absence of information and perceived necessity.[10] Health literacy was higher in patients with high education levels and a young age.[11] The goal of health education is to improve the health-related behavior of individuals and communities.[12]

The association between waist circumference and education level is an actively investigated topic. Understanding the association between waist circumference and education level can provide valuable insights into the social determinants of health

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and inform targeted interventions to reduce health disparities.[6]

METHOD

The methodological framework underpinning this investigation was a quantitative, cross-sectional study design. The population for this study was all employees of Ahmad Dahlan University Yogyakarta, with a total sampling method. The criteria for participation eligibility included the following: (1) all employees of Ahmad Dahlan University; (2) participants were aged more than 18 years at the time of enrollment; and (3) they consented to the study. Participants were excluded from the study if they declined to provide consent or if their data were incomplete. A total of 497 employers took part in this study. The dependent parameter of the study was waist circumference (WC). Experienced professionals performed physical assessments of the participants' waist circumference. Waist circumference will be measured using a standardized protocol, employing a flexible, non-stretchable measuring tape at the level of the iliac crest. Measurements will be taken twice, and the average of the two readings will be recorded to minimize measurement error.[4,7] The World Health Organization determines the healthy limit of the waist and hip circumference ratio in Asian countries to be 90 cm for men and 80 cm for women.[6] The independent parameter was the level of education. Participants will self-report their education level, with responses categorized into two categories: group I consists of university workers with a bachelor's degree and a senior high school; group II consists of Master's and Doctoral degrees. The data analysis used descriptive statistics to define the sample population, followed by inferential statistical methods to investigate the relationship between waist circumference and education level. The statistical significance level will be set at $p < 0.05$, and confidence intervals will be calculated to estimate the precision of the findings. Ethical considerations will be paramount throughout the study, with informed consent obtained from all participants before data collection and strict adherence to privacy and confidentiality protocols. The Ethics Committee of Ahmad Dahlan University approved this study (Ethics Approval No. 012408254).

RESULT

Table 1 displayed an overview of the demographic composition of the study participants, predominantly consisting of young to middle-aged adults with elevated educational attainment. A total of 497 participants took part in the study, comprising 247 men and 250 women. A significant proportion of participants (364 individuals, 73.3%) were aged between 18 and 44 years. The remaining age categories include 45-54 years (93 individuals, 18.8%),

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55-65 years (38 individuals, 7.7%), and a solitary participant (0.2%) exceeding 65 years of age. The above breakdown indicates that the predominant demographic of participants consists of young to middle-aged adults. The distribution of participants' educational attainment is relatively balanced, with 124 participants (24.9%) possessing a high school diploma, 183 participants (36.9%) holding a bachelor's degree, and 190 participants (38.2%) having a master's or postgraduate degree. This designation signifies that most participants possess higher education qualifications. A predominant portion of participants (322 individuals, 64.8%) are non-lecturers, whereas 175 participants (35.2%) are lecturers.

Table 1. Characteristic of Participants

Demography	Category	Frequency (Percentage)
Gender	Male	247 (49.7%)
	Female	250 (50.3%)
Age	18-44 years	364 (73.3%)
	45-54 years	93 (18.8%)
	55-65 years	38 (7.7%)
	> 65 years	1 (0.2%)
Level of education	Senior High School	124 (24.9%)
	Bachelor's degree	183 (36.9%)
	Master's and Postgraduate degrees	190 (38.2%)
Type of occupacy	Non-lecturer	322 (64.8%)
	Lecturer	175 (35.2%)
Duration of work	1-3 years	302 (60.8%)
	4-6 years	82 (16.5%)
	7-10 years	81 (16.3%)
	>10 years	32 (6.4%)
Category of Obesity	High WC	274 (55.1%)
	Normal WC	223 (44.9%)
Total		**497 (100%)**

Table 2 displayed that in this study population, females had a significantly higher odds of having a high waist circumference compared to males. Individuals with Master's and postgraduate degrees had a significantly higher odds of having high waist circumference compared to those with a Bachelor's degree and other levels of education.

Table 2. Bivariate analysis

Variable		Normal WC	High WC	OR (95%CI)
Gender	Female	92	159	1,778
	Male	131	115	(1,230-2,569)
Level of Education	Group I	58	132	2,464
	Group II	165	142	(1,674-3,627)

Group I : High School/Bachelor; Group II : Magister/Doctoral

DISCUSSION

Some research indicates that the relationship between education and obesity can vary. Our study found that the level of education was associated with central obesity. This result was similar to a previous study in India,

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which found that obesity was higher among educated individuals compared to those with no education.[13] This is contrary to findings in other regions like Australia, Canada, and England that a higher education level is inversely associated with general obesity, but only in women for abdominal obesity. These trends are evident across all educational strata, yet individuals with lower educational attainment consistently exhibit elevated obesity metrics.[14,15,16] Lower educational attainment correlates with elevated body mass index (BMI) and waist circumference (WC) in both genders, with more pronounced effects in women.[17,18] Despite the general trend, obesity rates have increased across all age and educational demographics in recent decades, with the highest rates among women and individuals with the lowest levels of education.[16]

In this study, respondents with a master's degree are university lecturers. Professionals in academic settings spend considerable time researching and working at desks, which can lead to decreased energy expenditure and increased accumulation of abdominal fat.[19] Moreover, the demands of higher education can contribute to stress and irregular eating patterns, often resulting in the consumption of processed foods and sugary drinks.[20] The sedentary nature of lecturing, coupled with the psychological stressors inherent in the academic environment, may contribute to an energy imbalance, decreased physical activity, and altered hormonal profiles, ultimately leading to increased abdominal fat accumulation. The multifaceted responsibilities of lecturers often entail prolonged periods of sitting while teaching, preparing lectures, grading assignments, and engaging in scholarly writing.[21] Moreover, the demanding nature of academic work, characterized by tight deadlines, research pressures, and the constant need to stay abreast of developments in their field, can lead to chronic stress.[22] Furthermore, lecturers may experience irregular eating patterns and a tendency to consume calorie-dense, nutrient-poor foods due to time constraints and the ready availability of unhealthy options on university campuses, exacerbating the risk of weight gain and increased waist circumference.[20] The convergence of these occupational and lifestyle factors creates a perfect storm for the development of abdominal obesity in lecturers. Understanding the specific factors within the lecturing profession that contribute to increased waist circumference is essential for developing targeted interventions aimed at promoting the health and well-being of lecturers and mitigating the long-term risks associated with abdominal obesity.

Targeted interventions aimed at mitigating the risk of increased waist circumference among lecturers should incorporate strategies to reduce sedentary behavior, manage stress, and promote healthy eating habits. Encouraging regular physical

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activity, such as walking meetings, standing desks, and participation in workplace fitness programs, can help increase energy expenditure and improve insulin sensitivity. Implementing stress management techniques can help reduce cortisol levels and promote psychological well-being. Additionally, providing access to healthy food options on campus and promoting nutrition education can help lecturers make informed dietary choices and reduce their intake of calorie-dense, nutrient-poor foods.

Epidemiological studies have consistently reported a higher prevalence of abdominal obesity, as defined by elevated waist circumference, among women compared to men in many populations.[23] This disparity is particularly evident in certain ethnic groups, where cultural factors and genetic predispositions may further exacerbate the gender-specific differences in body fat distribution. Female workers had a greater risk of being obese than males. Occupational factors also contribute to the risk of obesity and are useful for identifying workplace-targeted intervention strategies.[24] The intricate interplay between multiple pregnancies, hormonal fluctuations inherent in the menstrual cycle, and their collective influence on long-term waist circumference in women represents a significant area of investigation in women's health.[25] Each pregnancy initiates a cascade of physiological adaptations, encompassing hormonal shifts, metabolic alterations, and structural changes within the reproductive system and beyond, potentially leaving a lasting imprint on a woman's body composition and fat distribution.[26] The repetitive nature of these changes across multiple pregnancies could amplify their cumulative effects, predisposing women to an elevated risk of central adiposity, a key determinant of metabolic health.[6]

CONCLUSION

These findings indicate the importance of targeted interventions to mitigate abdominal obesity in individuals with higher educational attainment, especially in a lecturer at a university, considering the intricate interaction of socioeconomic, behavioral, and environmental factors. Monitoring waist circumference can help identify individuals at higher risk and guide interventions. This study emphasizes the imperative of enacting comprehensive public health strategies aimed at individuals with higher educational levels to address the escalating obesity epidemic. The institution is also responsible for health workers by regularly conducting medical check-ups for preventive measures.

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and making it possible for this study's analysis to be carried out.

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