

Factors associated with central obesity among university workers in Syarif Hidayatullah State Islamic University Jakarta

Yustiyani Yustiyani^{1*}, Mochamad Iqbal Nurmansyah¹, and Febrianti Febrianti¹

¹Department of Public Health, Faculty of Health Sciences, UIN Syarif Hidayatullah Jakarta, 15412 South Tangerang, Indonesia

Abstract. Central obesity poses a greater risk than general obesity. The global prevalence of obesity is increasing, including in Indonesia. The incidence of central obesity is associated with several factors, including sociodemographic status and physical activity levels. This study aims to investigate the association between sociodemographic status and physical activity level with central obesity. This study employed a cross-sectional study involving 111 adults aged 18-59 in South Tangerang City, Indonesia. Sociodemographic factors included age, sex, educational level, family size, and marital status. Physical activity levels were assessed using International Physical Activity Questionnaire (IPAQ). Both sociodemographic status and physical activity data were collected through interviews. The waist circumference was measured using inelastic tape. More than half of the respondents (57.63%) were centrally obese. Sex, marital status, educational level, and physical activity were significantly associated with central obesity (p -value < 0.05). Female (OR 3.639), married (OR 3.381), and less active (OR 2.746) respondents were more likely to have central obesity. A low educational level was found to be protective against central obesity (OR 0.285). Females, individuals with high education level, and married individuals are advised to be physically active to prevent the central obesity.

1 Introduction

Central obesity, often called visceral or abdominal obesity, is an abdominal fat accumulation [1] which poses a greater risk than peripheral or general obesity. Central adiposity is associated with insulin resistance, metabolic syndrome, cardiovascular disease, type 2 diabetes (T2D), and impaired lung function [2]. Moreover, central obesity in midlife raised the risk of dementia, independent of diabetes, and cardiovascular diseases [3]. Obesity is projected to result in over \$4 trillion in potential economic losses worldwide by 2035 [4].

There is an increased trend of obesity worldwide. Overweight and obesity have become significant public health issues in Indonesia, alongside other types of malnutrition, including stunting and wasting. In 2018, 20% (7.6 million) of school-aged children, 14.8% (3.3 million)

* Corresponding author: yustiyani@uinjkt.ac.id

of adolescents, and 35.5 % (64.4 million) of adults in Indonesia were categorized as overweight or obese [5]. In the context of central obesity, the incidence of central obesity increased from 26.6% in 2013 to 31.8% in 2023 [6]. South Tangerang City is one of the Cities with a considerable high prevalence of central obesity. The data showed that central obesity prevalence in South Tangerang City reached 40.5% [7]. However, the exploration of determinants of central obesity in South Tangerang remains understudied.

Central obesity is associate several factors, including environmental, behavioral, sociodemographic, and hereditary factors. Urban residents (40.5%) had a greater prevalence of central obesity than rural residents (31.6%) [6]. Indonesia's food and physical environments are becoming more obesogenic, making it difficult to adopt healthy diets and active lifestyles [5]. Asian countries, including Indonesia, have experienced a significant shift in their diet, with increased fast-food consumption driven by rapid economic growth, urbanization, and social change [8]. A previous study showed that fast-food consumption could increase the risk of central obesity [9].

Addressing the problem of central obesity is essential for enhancing the quality of life, particularly for adults during their prime years of productivity. Several studies have been conducted concerning the prevalence of central obesity in Indonesia. A research investigation carried out in Indonesia has identified several risk factors contributing to central obesity in men, including smoking status, the type of smokers and cigarette used, levels of physical activity, and the frequency of meat consumption [10]. Analysis of Indonesian basic health research data reveals that various factors significantly correlate with central obesity, including physical activity and sociodemographic variables such as age, gender, educational attainment, and marital status [11]. Therefore, this study aims to investigate the association between sociodemographic status and physical activity level with central obesity among workers in this area.

2 Materials and methods

This cross-sectional study was conducted in South Tangerang from September until December 2023. The samples consisted of 111 adults aged 19–59 who worked at Syarif Hidayatullah State Islamic University Jakarta, Indonesia. The minimum sample was 94, calculated for two independent proportion based on previous studies [12]. Respondents were recruited from five purposively selected faculties out of 13 at Syarif Hidayatullah State Islamic University, Jakarta, including one health-related faculty and four non-health-related faculties. All educational staff members from the selected faculties who were available for data collection were enlisted as a respondent. Pregnant women were excluded from the study.

The sociodemographic status and physical activity data were collected through interviews. The sociodemographic status consisted of age, sex, education level, family size, and marital status. The educational level was categorized as low for individuals who had only completed high school or even lower educational degrees, and as high for those who had graduated from college. The family size was categorized based on the median values. The marital status was categorized as married and single/widowed. Respondent's physical activity level for the past seven days was assessed using the International Physical Activity Questionnaire (IPAQ) [13]. The metabolic equivalent of task (MET) below 3000 was categorised as less active, while 3000 and above was categorized as active. The waist circumference was measured using inelastic tape. The respondent would be categorized as having central obesity if the waist circumference was more than 80 cm for female or more than 90 cm for male.

All the data were analyzed descriptively. The associations between socioeconomic status, physical activity level and central obesity status were assessed using the chi-square test.

Statistical significance was defined as a p-value of less than 0.05. The study was approved by the Ethical Commission, Faculty of Health Sciences, UIN Syarif Hidayatullah Jakarta.

3 Results and discussion

More than half of the respondents (57.6%) were centrally obese (Table 1), supporting evidence of the high prevalence of central obesity among adults in Indonesian urban areas [6]. Most of the respondents were early adults (63.1%), male (60.5%), and college graduates (72.1%). The majority were married (81.1%) and belonged to a small household (74.8%). Only 23.4% of the respondents were categorized as physically active.

Table 2 shows the association of socioeconomic status and physical activity with central obesity. Sex, education level, marital status, and physical activity level were significantly associated with central obesity. Female respondents were more likely to be centrally obese compared to men. Respondents who are married tend to have central obesity. Conversely, a lower educational level was identified as a protective factor against central obesity. Respondents with minimal physical activity were at a higher risk of developing central obesity.

Table 1. Characteristics of the respondents

Variables	n	%	Mean ± SD
Central obesity			89.39 ± 10.6
Central obese (F >80 cm, M >90 cm)	64	57.6	
Normal (F ≤ 80 cm, M ≤ 90 cm)	47	42.4	
Age			40.98 ± 10.5
Late adult (45-59 years old)	41	36.9	
Early adult (19-44 years old)	70	63.1	
Sex			
Female	45	39.5	
Male	66	60.5	
Education level			
Low (high school graduate)	31	27.9	
High (college graduate)	80	72.1	
Family size			3.9 ± 1.3
Big (> 4 people)	28	25.2	
Small (≤ 4 people)	83	74.8	
Marital status			
Married	90	81.1	
Single/widowed	21	18.9	
Physical activity level			2486.67 ± 2914.1
Less active (<3000 MET min/week)	85	76.6	
Active (≥3000 MET min/week)	26	23.4	

This study had limitations in providing data to explain why female, high educational, and married respondents were more likely to be centrally obese. It is suspected that married women gain weight during pregnancy, which is often retained after the childbirth [14]. During pregnancy, a woman's body undergoes various changes such as placental development, expansion of maternal blood volume, fat deposition, amniotic fluid, and fetal growth, all of which contribute to gestational weight gain [15]. Gestational weight gain varies among individuals. Zhou and colleagues, conducted a systematic review and meta-analysis, suggesting that risk factors for excessive weight gain, including pre-pregnancy overweight, younger age (less than 30 years old), unemployment, primiparity, smoking, and being unmarried (including divorced) [16].

High-education level respondents usually have an office desk job that involves heavier workload and psychological stressors compared to those with low-education respondents. Under stressful circumstances, the hypothalamus secretes corticotropin-releasing hormone (CRH), which prompts the pituitary gland to release adrenocorticotrophic hormone (ACTH) into the bloodstream. It stimulates the adrenal gland to secrete glucocorticoids, such as cortisol. Elevated cortisol level induces several physiological changes to help the body cope with stress, including the stimulation to produce energy from glucose. Increased blood glucose levels trigger insulin release. A constant rise in insulin levels due to chronic stress might cause insulin resistance, which in turn increases abdominal fat [17].

Table 2. Association of socioeconomic status and physical activity with central obesity status

Variables	Central obesity status						<i>p</i> value	<i>Odds Ratio (95% Confidence Interval)</i>
	Central Obese		Normal		Total			
	n	%	n	%	n	%		
Age							0.347	1.450 (0.659 – 3.266)
Late adult (45-59 years old)	26	63.4	15	36.6	41	100		
Early adult (19-44 years old)	38	54.3	32	45.7	70	100		
Sex							0.001*	3.639 (1.606 – 8.737)
Female	34	75.6	11	24.4	45	100		
Male	30	45.5	36	54.5	66	100		
Education level							0.003*	0.285 (0.115 – 0.673)
Low (high school graduate)	11	35.5	20	64.5	31	100		
High (college graduate)	53	66.3	27	33.8	80	100		
Family size							0.705	1.177 (0.491 – 2.910)
Big (> 4 people)	17	60.7	11	39.3	28	100		
Small (≤ 4 people)	47	56.6	36	43.4	83	100		
Marital status							0.012*	3.381 (1.260 – 9.888)
Married	57	68.0	33	32.0	90	100		
Single/widowed	7	36.1	14	63.9	21	100		
Physical activity level							0.023*	2.746 (1.116 – 7.057)
Less active (<3000 MET min/week)	54	63.5	31	36.5	85	100		
Active (≥3000 MET min/week)	10	38.5	16	61.5	26	100		

Physical inactivity has been associated to central obesity in numerous studies. A systematic review and meta-analysis conducted by Silveira and colleagues concluded that sedentary behaviours and physical inactivity are positively correlated with both obesity and central obesity [18]. Spending eight hours in a day job may contribute to the high prevalence of central obesity among respondents. Adults are suggested to engage in 150 minutes of moderate exercise or 75 minutes vigorous exercise per week [19]. For weight loss, a weekly total of 300 minutes of moderate exercise is advised. Evidence suggested that combination of high-intensity aerobic and high-load resistance training are more beneficial to decrease central obesity, improve lean body mass, and increase cardiorespiratory fitness [20].

The result of this study indicated that neither age nor family size was associated with central obesity. This result aligns with findings from a previous study [21]. These results may be attributed to other factors that significantly influence the respondent's distribution of abdominal fat.

The rising prevalence of central obesity in Indonesia highlights the urgent need for increased efforts to address this issue. Promoting public awareness should be prioritized through interprofessional collaboration, not only within health care facilities, but also in

workplaces, educational institutions, and public places. Additionally, a non-stigmatizing public policy approach should be considered, focusing not only on individual behavior change but also on integrating the environmental changes [22].

4 Conclusion

In conclusion, sex, education level, marital status, and physical activity level are associated with central obesity. Females, individuals with higher education, and married individuals are advised to engage in physical activity to prevent central obesity.

References

1. Magriplis E, Andreou E, Zampelas A, The Mediterranean Diet: What It Is and Its Effect on Abdominal Obesity. *Nutrition in the Prevention and Treatment of Abdominal Obesity*. pp 281–299. (Academic Press, Massachusetts, 2019).
2. Grover B, Misra A. Abdominal obesity and adipose tissue depots: Focus on intra-abdominal versus subcutaneous adipose tissue depots in Asian Indians. In: *Metabolic Syndrome*. pp 635–645. (Academic Press, Massachusetts, 2024).
3. Whitmer RA, Gustafson DR, Barrett-Connor E, Haan MN, Gunderson EP, Yaffe K, Central obesity and increased risk of dementia more than three decades later. *Neurology*, 71 (14): 1057-1064. (2008).
4. Koliaki C, Dalamaga M, Liatis S, Update on the Obesity Epidemic: After the Sudden Rise, Is the Upward Trajectory Beginning to Flatten? *Curr Obesity Report* **12**: 514-527. (2023).
5. UNICEF, Landscape analysis of overweight and obesity in Indonesia. (2019)
6. BKPK KEMENKES. Indonesia Health Survey 2023. (BKPK Kemenkes, Jakarta, 2023).
7. National Institute of Health Research, Ministry of Health, Banten Province Report Basic Health Research 2018. (2019).
8. Andriyani A, Lee YZ, Win KK, Tan CK, Amini F, Tan ESS, Thiagarajah S, Ng ESC, Ahmad Bustami N, Fast food consumption, obesity, and nutrient intake among adults in Indonesia. *Food Research* **8** (Suppl. 3): 55-65. (2024).
9. Mohammadbeigi A, Asgarian A, Moshir E, Heidari H, Afrashteh S, Khazaei S, & Ansari H, Fast food consumption and overweight/obesity prevalence in students and its association with general and abdominal obesity. *J Prev Med Hyg*, **59** (3), E236–E240. (2018).
10. Dahlia, Pribadi GS, Martini S, Yi-Li C, The Risk Factors of Central Obesity in Indonesian Men : A Cross-Sectional Data Study of the Indonesia Family Life Survey 5 (IFLS 5). *Fol Med Indones* **58** (3) : 228-233. (2022)
11. Fakhriah N, Dominant factors of central obesity incidence on People Aged 25-64 in Indonesian Urban Area (Analysis of Riskesdas Data 2018). <https://lib.fkm.ui.ac.id/detail?id=135870&lokasi=lokal> (2022).
12. Sudikno S, Syarif H, Dwiriani CM, Riyadi H. Risk factors central obesity of in 25-65 year old Indonesia adults (Analysis data of basic health research 2013). *Penel Gizi Makan* **38** (2) :111-20. (2016)
13. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund U, Yngve A, Sallis JF, Oja P. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*, **35**(8), 1381–1395. (2003).

14. Janghorbani M, Amini M, Rezvanian H, Gouya M-M, Delavari A, Alikhani S, Mahdavi A, Association of body mass index and abdominal obesity with marital status in adults. *Arch Iran Med.*; **11**:274–81. PMID: 18426318. (2008)
15. Kominiaiek MA, Peaceman AM, Gestational weight gain. *Am J Obstet Gynecol*, **217** (6), 642–651. (2017).
16. Zhou, M., Peng, X., Yi, H. *et al.* Determinants of excessive gestational weight gain : a systematic review and meta-analysis. *Arch Public Health* **80**, 129 (2022).
17. Kumar R, Rizvi MR, Saraswat S. Obesity and Stress: A Contingent Paralysis. *Int J Prev Med.* **13**:95 (2022).
18. Silveira, EA, Mendonça CR, Delpino FM, Elias Souza GV, Pereira de Souza Rosa L, de Oliveira C, Noll M, Sedentary behavior, physical inactivity, abdominal obesity and obesity in adults and older adults: A systematic review and meta-analysis. *Clin Nutr ESPEN*, **50**, 63–73. (2022)
19. World Health Organization, WHO Guideline on physical activity and sedentary behaviour. (2020).
20. O'Donoghue G, Blake C, Cunningham C, Lennon O, Perrotta C, What exercise prescription is optimal to improve body composition and cardiorespiratory fitness in adults living with obesity? A network meta-analysis. *Obesity reviews : an official journal of the International Association for the Study of Obesity*, **22** (2), e13137. (2021).
21. Getahun, M.S., Deybasso, H.A., Komicha, M.A. *et al.* Magnitude of central obesity and associated factors among adult patients attending public health facilities in Adama town, Oromia region, Ethiopia, 2022. *J Health Popul Nutr* **42**, 57 (2023).
22. Tiwari A, Balasundaram P. Public Health Considerations Regarding Obesity. [Updated 2023 Jun 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. (2024)