Original Research

CENTRAL OBESITY AND ASSOCIATED FACTORS AMONG TYPE 2 DIABETES MELLITUS PATIENTS AT 19-8 HOSPITAL, 2024-2025

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SUMMARY

Aims: To describe the prevalence of central obesity and identify associated factors among patients with type 2 diabetes mellitus at 19-8 Hospital.

Methods: A cross-sectional study was conducted on 179 patients with type 2 diabetes mellitus attending both outpatients and inpatients at the Department of Endocrinology–Diabetes from November 2024 to February 2025. Data were collected through interviews, anthropometric measurements, body composition analysis, and laboratory tests. Logistic regression was applied to identify associated factors.

Results: The prevalence of central obesity was 68.7% by waist circumference, significantly higher in females than in males ($p < 0.01$). Elevated waist-to-hip ratio and waist-to-height ratio were observed in 81.6% and 89.9% of participants, respectively. Overweight/obesity by BMI was 60.3%, yet only 39.7% self-identified as overweight and 52.5% reported no intention to lose weight. Central obesity was associated with female gender (cOR = 12.57; 95%CI: 5.25–30.11), older age (cOR = 2.06; 95%CI: 1.00–4.24), high body fat (cOR = 9.70; 95%CI: 4.44–22.30), high visceral fat (cOR = 6.49; 95%CI: 3.00–14.06), and exercising with fixed equipment (cOR = 4.50; 95%CI: 1.18–17.21) or without equipment (cOR = 3.75; 95%CI: 1.23–11.45).

Conclusion: Central obesity remains highly prevalent, while body image misperception is still common among patients with type 2 diabetes mellitus. Personalized nutrition counseling and regular follow-up are essential for effective management, weight control, and complication prevention.

Keywords: *central obesity, type 2 diabetes mellitus, 19-8 Hospital.*

I. INTRODUCTION

Obesity is a global health problem, particularly common in developing countries, and contributes to severe complications such as cardiovascular and vascular diseases as well as an increased risk of metabolic syndrome[1]. Central obesity, defined as the accumulation of visceral fat in the abdominal region, is considered a major risk factor for the development of metabolic syndrome in individuals with type 2 diabetes mellitus (T2DM) [2].

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Indicators commonly used to assess central obesity include waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR). According to the International Diabetes Federation, central obesity is defined as a WC ≥ 90 cm in males and ≥ 80 cm in females [2]. Several studies have demonstrated strong associations between central obesity, insulin resistance, dyslipidemia, and cardiovascular complications, even when body mass index (BMI) remains within the normal range [3]. A systematic review in 2020 involving 174 studies and over 13.2 million adults reported that the global prevalence of increased WC was 41.5%, with the highest rates observed in Central and South America (52.9%–55.1%) [4]. In Vietnam, recent studies found that the prevalence of central obesity among patients with type 2 diabetes mellitus reached 52.6% [5]. These findings highlight the usefulness of central obesity assessment as a screening tool for early detection of metabolic risks and effective disease control. The Ministry of Health of Vietnam, through Decision No. 5481/QĐ-BYT in 2020, recommended regular WC monitoring as an essential indicator for weight management and early detection of metabolic complications [6].

The 19-8 Hospital, a first-class hospital under the Ministry of Public Security, admits more than 150 patients daily at its Department of Endocrinology–Diabetes. The majority of its patients are retired public employees with sedentary lifestyles and specific occupational backgrounds. Regular monitoring of anthropometric indices, especially WC, may support early detection of risks and improve management outcomes. However, few studies have specifically evaluated central obesity among patients with type 2 diabetes mellitus at police-affiliated hospitals such as 19-8 Hospital, despite their unique demographic and lifestyle characteristics. Therefore, this study aimed to describe the prevalence of central obesity and analyze associated factors among patients with T2DM at 19-8 Hospital.

II. METHODS

2.1. Study design

This was a cross-sectional study. Data were collected at the C1 outpatient clinic and the Department of Endocrinology–Diabetes (A10), 19-8 Hospital, from November 2024 to February 2025.

2.2. Sample size and sampling method

Sample size was calculated using the single population proportion formula, based on Pourhosein Holi et al. (2013). With p = 0.755 (the prevalence of overweight/obesity reported in a 2023 study at the Can Tho Traditional Medicine Hospital) [7] α = 0.05 (95% confidence), and Δ = 0.1 (10%), the minimum required sample size was 125. In reality, 179 eligible participants were enrolled. Convenience sampling was carried out in this study. The study utilized data from the research project titled “Nutritional status of patients with type 2 diabetes mellitus at 19-8 Hospital in 2024–2025”.

2.3. Research variables

+ *General characteristics*: demographics (age, gender), clinical characteristics (duration of diabetes, treatment history, comorbidities).
+ *Anthropometric indices*: weight, height, BMI, waist circumference (WC), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), body fat percentage, visceral fat.
+ *Related characteristics*: body image perception, lifestyle behaviors within the last 6 months (fruit and vegetable intake, smoking, physical activity type).

2.4. Data collection methods

Data were obtained through face-to-face interviews using a structured questionnaire, combined with anthropometric measurements following WHO STEPS guidelines [8].
+ *Height* was measured in standing position with nine-point contact, without shoes (cm);
+ *Waist circumference* was measured at the midpoint between the lower margin of the last rib and the iliac crest (cm);
+ *Hip circumference* was measured at the widest point of the buttocks below the iliac crest (cm);
+ *Weight and body composition* (body fat percentage, visceral fat) were measured using a Rapido digital scale with bioelectrical impedance analysis, classified according to the manufacturer's cut-offs.

Evaluation criteria

Central obesity was classified based on established cut-off values [8]*: large WC (*Male ≥ 90 cm, Female ≥ 80 cm), high waist-to-hip ratio (Male ≥ 0.90; Female ≥ 0.85), High waist-to-height ratio (≥ 0.50)

Classification of body mass index (BMI) according to the WHO Western Pacific Region (WPRO) [8]: chronic energy deficiency (CED) (< 18.5 kg/m^2), normal *(*18.5 – 22.9*),* overweight (23.0 – 24.9), obesity (≥ 25.0).

Classification of body composition indices: Based on manufacturer's cut-off points: visceral fat percentage > 10% indicates high visceral fat; high total body fat percentage was defined as follows [9]:

Age group	High total body fat		Low muscle mass	
	Male	Female	Male	Female
< 20	> 20%	> 25%	< 38%	< 35%
20 - 30	> 21%	> 25%	< 43%	< 38%
30 - 40	> 23%	> 27%	< 48%	< 42%
40 - 50	> 24%	> 28%	< 46%	< 40%
50 - 60	> 25%	> 29%	< 44%	< 39%
> 60	> 26%	> 29%	< 41%	< 35%

Assessment of body perception:

After being informed of their measured weight and height, participants were asked to classify their own nutritional status as underweight, normal, or overweight/obese. This self-assessment represented each participant's perceived body image and was recorded as an indicator of body perception

+ *Actual BMI* was calculated from the measured height and current weight and classified according to the WPRO criteria for Asian adults.

+ *Desired BMI* was derived from participants' self-reported desired weight (i.e., how much they would like to weigh) using the same height value.

+ *Self-assessed BMI* reflected participants' own perception of their nutritional status (underweight, normal, or overweight/obese) after being informed of their current weight and height.

Lifestyle characteristics:

Fruit and vegetable intake was classified according to the recommendations of the National Institute of Nutrition of Vietnam for adults, with a minimum threshold of 240 g/day, equivalent to at least three servings of vegetables and three servings of fruits per day. One serving was defined as 80 g [10].

Lifestyle physical:

+ Body weight-only exercise included activities using one's own body weight as resistance without equipment, such as squats, lunges, push-ups, planks, or similar strength-based movements.

+ Equipment-based exercise refers to physical training using tools or machines (e.g., treadmills, dumbbells, resistance bands).

+ Combined exercise indicated participants who engaged in both bodyweight and equipment-based activities within their routine.

2.5. Statistical analysis

Data were collected using paper questionnaires and entered into RedCap version 14.9.1. Data cleaning and management were performed in Microsoft Excel 2019. Statistical analyses were conducted using Stata version 17.0. Descriptive statistics were applied to present frequencies and percentages for categorical variables. The association between independent factors and central obesity was examined using univariate logistic regression, expressed as crude odds ratios (cOR) with 95% confidence intervals. Statistical significance was set at $p < 0.05$. The dependent variable was waist circumference.

2.6. Ethical considerations

The study was approved by the Thesis Evaluation Committee of Hanoi Medical University under Decision No. 2273/QĐ-ĐHYHN dated May 27, 2025. Approval was also obtained from the Board of Directors of 19-8 Hospital prior to data collection. All participants were fully informed about the purpose and details of the study before giving their consent to participate in the interview. All personal information was kept confidential and used solely for research purposes.

III. RESULTS

3.1 General characteristics of participants

Among 179 patients with type 2 diabetes mellitus, the mean age was 65.7 ± 11.6 years, with 52% being male. The majority (71.5%) were in the 60–80 age group. Most participants resided in urban areas (94.4%), and the most common education level was lower or upper secondary school (50.8%). More than half were retired (60.9%), and 88.3% were married.

3.2. Prevalence of central obesity and body image perception

Table 1. *Prevalence of central obesity by BMI-defined overweight/obesity among patients with type 2 diabetes mellitus at 19-8 Hospital (n = 179)*

Indicator	Overweight/obesity		Total, n (%)
	No, n (%)	Yes, n (%)	
Large waist circumference			
Yes	32 (26.0)	91 (74.0)	123 (68.7)
No	39 (69.6)	17 (30.4)	56 (31.3)
High waist-to-hip ratio			
High	53 (36.3)	93 (63.7)	146 (81.6)
Normal	18 (54.6)	15 (45.4)	33 (18.4)
High waist-to-height ratio			
High	54 (33.5)	107 (66.5)	161 (89.9)
Normal	17 (94.4)	1 (5.6)	18 (10.1)

Table 1 illustrates that the prevalence of large waist circumference among patients with type 2 diabetes mellitus was 68.7%, of which 74.0% belonged to the group without Overweight/obesity. In addition, the prevalence of high waist-to-hip ratio and waist-to-height ratio was 81.6% and 89.9%, respectively. These findings suggest that central obesity may occur even in the absence of BMI-defined overweight/obesity, reflecting the hidden accumulation of visceral fat.

Figure 1 shows the nutritional status of participants according to WPRO classification, their desired weight, and their self-assessment. The actual prevalence of chronic energy deficiency was 2.2% according to WPRO, yet 17.9% perceived themselves as underweight. In contrast, 60.3% were classified as having Overweight/obesity , but only 39.7% self-identified as such. Moreover, 52.5% of participants reported no intention to lose weigh.

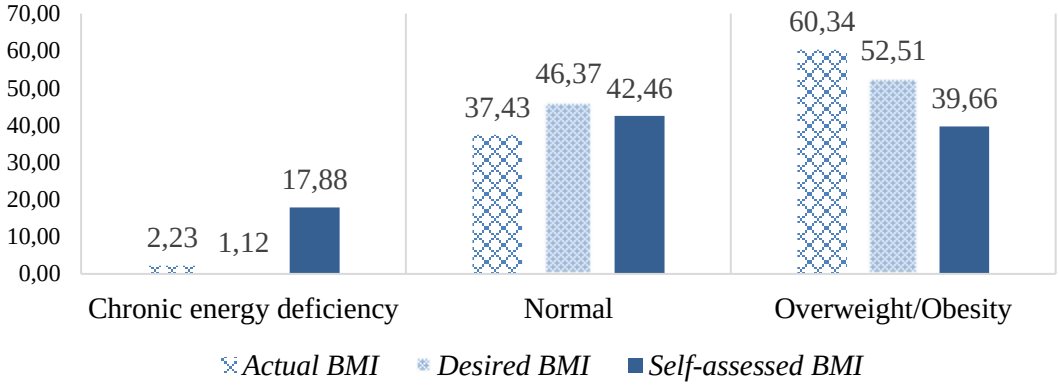

Figure 1. *Actual – Desired – Self-assessed body image among patients with type 2 diabetes mellitus at 19-8 Hospital (n = 179).*

Note: Actual BMI was classified based on current weight according to WPRO criteria; desired BMI was calculated from participants' self-reported desired weight; self-assessed BMI was based on participants' own perception after knowing their current weight.

3.3. Factors associated with central obesity among participants

Table 2. *Demographic and clinical factors associated with central obesity among patients with type 2 diabetes mellitus at 19-8 Hospital (n = 179)*

Factors	Central obesity		p-value	cOR (95%CI)
	Yes, n (%)	No, n (%)		
Gender				
Male	44 (47.31)	49 (52.69)		1
Female	79 (91.86)	7 (8.14)	0.00*	12.57 (5.25–30.11)
Age group				
< 60 years	23 (56.10)	18 (43.90)		1
≥ 60 years	100 (72.46)	38 (27.54)	0.05*	2.06 (1.00–4.24)
Duration of diabetes				
≤ 1 year	16 (61.54)	10 (38.46)		1
1–5 years	26 (81.25)	6 (18.75)	0.1	2.71 (0.83–8.89)
6–10 years	30 (62.50)	18 (37.50)	0.94	1.04 (0.39–2.78)
> 10 years	51 (69.86)	22 (30.14)	0.44	1.45 (0.57–3.69)
Treatment method				
Medication only	62 (68.13)	29 (31.87)		1
Medication + diet	22 (78.57)	6 (21.43)	0.29	1.72 (0.63–4.68)
Medication + exercise	8 (66.67)	4 (33.33)	0.92	0.94 (0.26–3.36)
Diet + exercise	2 (33.33)	4 (66.67)	0.1	0.23 (0.40–1.35)
Combined [a]	29 (69.05)	13 (30.95)	0.92	1.04 (0.47–2.30)

Factors	Central obesity		p-value	cOR (95%CI)
	Yes, n (%)	No, n (%)		
Nutritional status (BMI)				
Without OWOB	32 (45.07)	39 (54.93)		1
With OWOB	91 (84.26)	17 (15.74)	0.00*	6.50 (3.25–13.11)
% Body fat				
Normal	47 (49.47)	48 (50.53)		1
High	76 (90.48)	8 (9.52)	0.00*	9.70 (4.44–22.30)
% Visceral fat				
Normal	51 (52.58)	46 (47.42)		1
High	72 (87.80)	10 (12.20)	0.00*	6.49 (3.00–14.06)
% Muscle mass				
Normal	5 (55.56)	4 (44.44)		1
Low	118 (69.41)	52 (30.59)	0.39	1.82 (0.47–7.04)

Note: [a] Combined = diet, exercise, and medication.

OWOB = Overweight/obesity. cOR = Crude Odds Ratio. p < 0.05.

Table 3. *Lifestyle factors associated with central obesity among patients with type 2 diabetes mellitus at 19-8 Hospital (n = 179)*

Factors	Central obesity		p-value	cOR (95%CI)
	Yes, n (%)	No, n (%)		
Meal duration				
> 30 minutes	16 (55.17)	13 (44.83)		1
≤ 30 minutes	107 (71.33)	43 (28.67)	0.09	2.02 (0.90–4.56)
Vegetable intake				
≥ 240 g/day	19 (67.86)	9 (32.14)		1
< 240 g/day	104 (68.87)	47 (31.13)	0.92	1.05 (0.44–2.49)
Fruit intake				
≥ 240 g/day	60 (65.93)	31 (34.07)		1
< 240 g/day	63 (71.59)	25 (28.41)	0.42	0.77 (0.41–1.45)
Exercise type (n = 148)				
Combined	6 (40.00)	9 (60.00)		1
Bodyweight-only	75 (71.43)	30 (28.57)	0.02*	3.75 (1.23–11.45)
Equipment-based	21 (75.00)	7 (25.00)	0.03*	4.50 (1.18–17.21)
Smoking habit (males; n=93)				
Current/former	30 (44.12)	38 (55.88)		1
Never	14 (56.00)	11 (44.00)	0.31	1.61 (0.64–4.06)

OWOB = Overweight/obesity. cOR = Crude Odds Ratio. p < 0.05.

Univariate logistic regression (Tables 2 and 3) indicated that central obesity was associated with female gender (cOR = 12.6; 95%CI: 5.3–30.1), age > 60 years (cOR = 2.1; 95%CI: 1.0–4.2), high body fat (cOR = 9.7), high visceral fat (cOR =

6.5), and engaging in single-type exercise, either equipment-based (cOR = 4.5) or bodyweight-only (cOR = 3.8). Notably, 54.9% of participants without Overweight/obesity by BMI still presented central obesity. No associations were observed with diabetes duration, treatment method, muscle mass, diet, or smoking.

IV. DISCUSSION

The findings from 179 patients with type 2 diabetes mellitus at 19-8 Hospital in 2024 indicated that central obesity remained highly prevalent (70–90%), with large waist circumference (WC) observed in 68.7%, markedly higher than the 32.5% reported by Dong Thi Phuong et al. [11]. Meanwhile, the prevalence of elevated WHR in this study (81.6%) was lower than that reported in the same study (86.8%) [11]. For WHtR, the proportion of patients above the cut-off was higher compared with the results of Nguyen Phuong Thao et al. [12]. Differences across studies may be explained by variations in sample size, study period, population distribution, and treatment approaches. These results underscore that central obesity is a major concern among patients with type 2 diabetes mellitus and highlight the clinical value of WC, WHR, and WHtR, which should be monitored regularly.

Univariate regression analysis showed that gender, age, exercise type, and body fat composition were associated with central obesity. In this study, females had a higher prevalence of central obesity compared with males, consistent with Dong Thi Phuong (2020) et al., who reported higher rates in females (47.7%) than in males (17.3%) [11]. Similarly, Nguyen Thi Huong Lan et al. (2020) found that 95.8% of females had elevated WHR, suggesting that abdominal fat accumulation in women is both common and persistent [5]. This may be explained by decreased estrogen after menopause, reduced physical activity, and increased metabolic disturbances in older females.

Central obesity was also more common among older participants, in line with Hoang Thi Trang et al., who reported that adults ≥ 60 years had a 2.6- to 3-fold higher risk compared with those < 60 years [13]. Aging alters body composition and fat distribution, contributing to visceral fat accumulation even without major changes in total body weight. The American Diabetes Association (ADA) 2020 also recommends early screening and management of diabetes in individuals aged 45 years and older.

Regarding physical activity, participants who combined exercise modalities had a lower prevalence of central obesity. This is consistent with the meta-analysis by Habib Yarizadeh et al. (2021), showing that aerobic, resistance, and combined training were all effective in reducing abdominal fat compared with inactivity ($p < 0.001$) [13]. Thus, individualized exercise programs integrating aerobic and resistance training may represent an effective strategy for weight management.

High total body fat and visceral fat were strongly associated with central obesity, reinforcing the importance of body fat distribution in identifying early metabolic risks among patients with type 2 diabetes. Hoang Thi Trang et al. (2024) reported that over 75% of patients had high body fat, while Nguyen Trong Hung

et al. (2020) found 57.2%, both showing significant associations with overweight/obesity ($p < 0.05$) [12, 14]. These findings strengthen the value of WC as a practical screening tool for metabolic and nutritional risk, supporting more personalized interventions. Notably, central obesity was observed even among patients with normal BMI, reflecting hidden visceral fat accumulation and the need to include WC in routine assessments.

In addition, the study revealed a marked discrepancy between actual body status and self-perception. In China, Peng Zhang et al. (2016) found that 55.6% of adults with central obesity did not recognize it, and only 12.7% attempted weight loss [15]. Such misperception may undermine motivation for behavior change, potentially explaining the persistently high rates of overweight, obesity, and central obesity among long-term diabetes patients.

This study is among the first to evaluate the role of central obesity (based on WC, WHtR and WHR) in assessing nutritional status and body image perception among patients with type 2 diabetes mellitus. However, the non-optimal sampling approach and the cross-sectional design limit the interpretation of the findings, and further research on lifestyle and behavioral factors is needed to better understand changes in health habits. Tailored health communication and nutrition counseling programs targeting high-risk groups, such as older adults, females, and sedentary individuals, may enhance the effectiveness of diabetes management.

V. CONCLUSION

Central obesity continues to be a common issue among patients with type 2 diabetes at 19-8 Hospital. The gap between perceived and actual nutritional status suggests that many patients may not fully recognize their health risks. These findings emphasize the need to include waist circumference in routine assessments and to improve patient education on body weight and health. Strengthening nutrition counseling and guiding patients toward suitable physical activity may support better weight control and metabolic management.

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