Int J Nutr Sci 2026;11(3):427-434

International Journal of Nutrition Sciences

Journal Home Page: ijns.sums.ac.ir

ORIGINAL ARTICLE

# Prevalence of Central Obesity among Adult Patients Attending Merjan Medical City, Babylon Province, Iraq

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ARTICLE INFO

**Keywords:**
Prevalence
Central obesity
Body mass index
Waist circumference
Iraq

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**Received:** April 10, 2026
**Revised:** July 1, 2026
**Accepted:** July 10, 2026

ABSTRACT

**Background:** Central obesity is linked to metabolic syndrome, cardiovascular diseases, and death that makes it more dangerous than general obesity. Waist circumference (WC) and waist-to-hip ratio are greater health risk predictors when compared to body mass index (BMI) alone, making them essential in diagnosis. Its rising incidence, caused by lifestyle and nutritional changes, highlights the need for early identification and focused therapy. The aim of study was to assess the prevalence of central obesity among adult patients attending Merjan Medical City, Babylon Province in Iraq.

**Methods:** In a cross-sectional research in Merjan Medical City, Iraq, 153 patients were assessed for BMI and central obesity using World Health Organization (WHO) BMI and WC classifications. Demographic and health data were determined by direct interview. A WC>94 cm for men and >80 cm for women was deemed central obesity.

**Results:** The study population had a very high prevalence of central obesity (65.4%), which was significantly correlated with older age groups, female gender, chronic conditions, and higher BMI categories ($p$<0.001 and $p$=0.0001, respectively). BMI showed a strong association with WC, while 76.4% of the populations were overweight or obese. Metabolic risk factors, age, and male sex increased the likelihood of central obesity.

**Conclusion:** Central obesity was shown to be common and linked to a higher BMI, feminine gender, older age, and chronic illnesses. Its rising BMI showed the relationship between abdominal fat and obesity. These findings suggest that health risk assessments and focused therapies should include central obesity in the area.

Please cite this article as: Kadhem QI, Hussain NA, Alhamdany MH. Prevalence of Central Obesity among Adult Patients Attending Merjan Medical City, Babylon Province, Iraq. Int J Nutr Sci. 2026;11(3):427-434. doi: 10.30476/ijns.2025.108128.1546.

## Introduction

Central obesity has often been more often referred as abdominal or visceral obesity that can actually affects a large population. It has a close link with a range of metabolic and cardiovascular diseases. The principal distinction between central obesity and the more general forms of obesity is that the fat is laid down around the stomach and abdominal area rather than around the body as a whole; so health risks are much greater with the former (1, 2). This would have been diagnosed through anthropometric measurements such as waist

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circumference (WC), the waist-hip ratio, and waist-to-height ratio showing that central (or abdominal) obesity and body mass index (BMI), which have been established as key indicators of central obesity were not completely influenced by individuals and more strongly linked to all-cause morbidity and mortality when compared to BMI. It is also a better predictor of cardiovascular diseases and mortality risks. Finally, since BMI can portray fat instead of the muscle, it is necessary to diagnose central obesity based on peripheral obesity rather than general obesity for diagnosing obesity practically in the clinical environment (3-5).

For adults, the prevalence of central obesity is estimated to exceed 20-40%, depending on the population and global criteria of measurement (e.g., WC or waist-to-hip ratio). In high-income countries, like the United States, the prevalence of central obesity exceeds 50% among adult populations and sharply increases in younger age groups. In Europe, again, this centrally obese condition affects 30-40% of adults, with the figures for countries in Southern Europe being higher because of dietary and lifestyle habits. Central obesity is predicted to affect approximately 40-60% of adults in the Middle East, while some countries have reported higher rates among specific groups, such as women, the elderly and urban residents (6, 7).

The increasing prevalence of central obesity is attributed to global changes in lifestyle, the first of which is an increase in the consumption of high calorie diets, a decrease in physical activity, and sitting behaviors. These trends are particularly prevalent in urban areas and among individuals that seek dietary advice regarding weight loss. Central obesity is considered a significant cause of metabolic syndrome, diabetes, dyslipidemia, hypertension, and heart diseases, as a result, its early detection and treatment are crucial in reducing the long-term health burden (8, 9).

A high BMI has been responsible for over four million deaths and 120 million disability-adjusted life years globally (10). The relationship between BMI and central obesity can even be more precise that varies across populations because of genetic, ethnic, and lifestyle factors. Several studies have found that people from various ethnic groups had different cut-offs of risk for central obesity even with the same level of BMI. It has also been noted that Caucasians have higher BMIs and some believe that it is critical to understand the relationship in developing both population-specific cut-offs and interventions (11, 12).

In clinical and public health practice, the assessment of both BMI and central obesity should be considered for more complete risk stratification. Some researchers suggested that those with high BMI and central obesity had the strongest risks of adverse health outcomes. However, even in normal-BMI subjects, the presence of central obesity is a very sensitive sign of future metabolic and cardiovascular complications and, therefore, there should be routine screening not only for BMI but also for central obesity, which, otherwise, would miss quite a few people at risk (13, 14). The aim of study was to assess the prevalence of central obesity and its association with BMI among adult patients attending Merjan medical city, Babylon Province in Iraq.

## Materials and Methods

In a cross-sectional research study from July 1 to November 1, 2024, a total of 153 patients who attended Merjan Medical City in Babylon Province, Iraq were enrolled. Data were collected by direct interviews with patients who were consent to participate in this study. The collected information were age (years), gender, residence, employment, smoking history, marital status, and history of any chronic illnesses. The World Health Organization (WHO) classification of BMI as less than 18.5 kg/m$^2$ (underweight), 18.5-24.9 kg/m$^2$ (normal), 25–29.5 kg/m$^2$ (Overweight) were employed, while obesity was classified as a BMI of 30 kg/m$^2$ or higher (15). The WHO classified central obesity as having a WC of more than 94 cm for males and more than 80 cm for women (16). Also for each patient, lipid profile was available in the hospital. Lipid profile was consisted of total cholesterol (TC) defined as normal (Less than 200) and high (≥200 mg/dL). Low-Density Lipoprotein (LDL) was considered normal (less than 130 mg/dL) and high (≥130 mg/dL). High-Density Lipoprotein (HDL) was described normal (more than 40 mg/dL in men, less than 50 mg/dL in women) and low (Less than 40 mg/dL in men, less than 50 mg/dL in women) (1). All patients visited the nutritional consultant at Merjan Medical City.

Pregnant females and children were excluded from the study. Statistical analysis was performed using SPSS software (Version 22, Chicago, IL, USA). Descriptive statistics were calculated using frequency and percentage for categorical variables. Chi-square test was utilized to find out any association between categorical variables, while $p<0.05$ signified a significant relationship. The study followed the ethical rules that came from the Declaration of Helsinki (Reg. no. 932, 1/2/2025). The patients gave their verbal and written consent to participate in the study too.

**Table 1:** Distribution of patients according to sociodemographic factors.

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Age groups (years) | ≤30 | 63 | 41.2 |
| | 31-59 | 54 | 35.3 |
| | ≥60 | 36 | 23.5 |
| Smoking | No | 114 | 74.5 |
| | Yes | 39 | 25.5 |
| Gender | Female | 83 | 54.2 |
| | Male | 70 | 45.8 |
| Residence | Rural | 54 | 35.3 |
| | Urban | 99 | 64.7 |
| Occupation | Employed | 48 | 31.4 |
| | Student | 22 | 14.4 |
| | Unemployed | 83 | 54.2 |
| Marital status | Married | 109 | 71.2 |
| | Un married | 44 | 28.8 |
| Chronic diseases | Yes | 57 | 37.3 |
| | No | 96 | 62.7 |
| Low density lipoprotein | Normal | 48 | 31.4 |
| (LDL) | High | 105 | 68.6 |
| High density lipoprotein | Normal | 48 | 31.4 |
| (HDL) | Low | 105 | 68.6 |
| Total cholesterol | Normal | 50 | 32.7 |
| (TC) | High | 103 | 67.3 |
| Total | | 153 | 100 |

## Results

The data in Table 1 provided an overview of the sociodemographic characteristics of the 153 study population. The mean age of patients was 41±16 years, indicating a relatively broad age range. The majority of patients (41.2%) aged ≤30 years, followed by 31-59 years (35.3%), while 23.5% were ≥60 years suggesting that younger patients (≤30 years) formed the largest proportion of the population. A significant majority of patients (74.5%) were non-smokers, while 25.5% reported to be smokers implying that smoking prevalence in the study group was relatively low compared to non-smokers. Females constituted a slight majority (54.2%), while males represented 45.8% of the population revealing minimal gender disparity in the sample population.

Urban residents made up the majority (64.7%) of the study population, with rural residents accounting for 35.3% indicating a predominance of urban dwellers in the patient group. A notable proportion of patients were unemployed (54.2%), followed by those who were employed (31.4%) and students (14.4%) reflecting a significant representation of non-working individuals, possibly due to socioeconomic challenges. The majority of the population was married (71.2%), with 28.8% being unmarried providing insights into social and emotional support structures within the study group. Totally, 37.3% of patients had chronic diseases; while 62.7% did not suffer from chronic diseases. A total of 68.6% of patient exhibited high LDL and low HDL levels; while 67.3% demonstrated a high TC level.

The distribution of patients according to their BMI revealed 40.5% to be overweight, 35.9% to be obese, 7.3% to be morbid obese with low BMI and 16.3% to be normal. The distribution of patients according to their central obesity showed that 65.4% of patients had central obesity; while 34.6% had normal WC. There was a significant association between age groups and central obesity. Among patients with normal WC, the highest proportion was with a normal WC. Those who aged ≤30 years were 52.4%, while only 24.1% and 19.4% of patients in the 31-59 and ≥60 age groups, respectively fell in this category. Moreover, the prevalence of central obesity increased with age as 47.6% in ≤30 years, 75.9% in 31-59 years, and 80.6% in ≥60 years. A statistically significant association ($p$=0.001) was noticed between age group and central obesity. Older age groups were more likely to have central obesity.

Males (54.3%) were more likely to have a normal WC compared to females (18.1%); while obese females (81.9%) exhibited a significantly higher prevalence of central obesity than males (45.7%, $p$=0.0001) showing a highly significant association. Females were shown to be more prone to central obesity in comparison to males. The highest proportion of normal WC was seen among students (50.0%), followed by employed individuals (35.4%)

and unemployed individuals (30.1%). On the other hand, obese unemployed individuals had the highest prevalence of obesity (69.9%), followed by employed individuals (64.6%) and students (50.0%) ($p$=0.21) indicating no statistically significant association between occupation and central obesity.

Rural residents (31.5%) and urban residents (36.4%) displayed similar proportions of normal WC. Central obesity was slightly higher among rural residents (68.5%) compared to urban ones (63.6%) ($p$=0.6) revealing no significant association between residency and central obesity. Normal WC was observed in 34.2% of non-smokers and 35.9% of smokers. Obesity prevalence was comparable between non-smokers (65.8%) and smokers (64.1%) ($p$=0.8) suggesting no significant association between smoking status and central obesity. Unmarried individuals (43.2%) were more likely to have a normal WC compared to married individuals (31.2%); while married individuals (68.8%) were more likely to have central obesity compared to unmarried individuals (56.8%) ($p$=0.19) depicting no statistically significant association between marital status and central obesity.

Among normal WC was seen among 43 individuals (44.8%). Obese WC was noticed among 53 individuals (55.2%). Among those with normal WC 10 individuals (17.5%) were with chronic diseases. In obese WC, 47 individuals (82.5%) suffered from chronic diseases ($p$=001) denoting to a statistically significant association between WC (central obesity) and the presence of chronic diseases (Table 2). Totally, 83.8% of patients with central obesity had significant high LDL and low HDL levels; while 84.5% of patients with central obesity showed a significant high TC level.

Table 3 demonstrates the relationship between central obesity and BMI categories. The vast majority of patients with a normal BMI (84.0%) had a normal WC and only 16.0% of patients with a normal BMI had central obesity. Totally, 46.8% of overweight patients were found with a normal

**Table 2:** Association between central obesity of patients and their sociodemographic factors.

| | Waist circumference (Central obesity) | | |
|---|---|---|---|
| **Age group (years)** | **Normal** | **Obese** | ***P* value** |
| ≤30 | 33 (52.4%) | 30 (47.6%) | 0.001 |
| 31-59 | 13 (24.1%) | 41 (75.9%) | |
| ≥60 | 7 (19.4%) | 29 (80.6%) | |
| Gender | Normal | Obese | 0.0001 |
| Female | 15 (18.1%) | 68 (81.9%) | |
| Male | 38 (54.3%) | 32 (45.7%) | |
| Occupation | Normal | Obese | 0.21 |
| Employed | 17 (35.4%) | 31 (64.6%) | |
| Student | 11 (50.0%) | 11 (50.0%) | |
| Unemployed | 25 (30.1%) | 58 (69.9%) | |
| Residence | Normal | Obese | 0.6 |
| Rural | 17 (31.5%) | 37 (68.5%) | |
| Urban | 36 (36.4%) | 63 (63.6%) | |
| Smoking | Normal | Obese | 0.8 |
| Yes | 14 (35.9%) | 25 (64.1%) | |
| No | 39 (34.2%) | 75 (65.8%) | |
| Marital state | Normal | Obese | 0.19 |
| Married | 34 (31.2%) | 75 (68.8%) | |
| Unmarried | 19 (43.2%) | 25 (56.8%) | |
| Chronic diseases | Normal | Obese | 0.001 |
| No | 43 (44.8%) | 53 (55.2%) | |
| Yes | 10 (17.5%) | 47 (82.5%) | |
| LDL | Normal | Obese | 0.0001 |
| Normal | 36 (75.0%) | 12 (25.0%) | |
| High | 17 (16.2%) | 88 (83.8%) | |
| HDL | Normal | Obese | 0.0001 |
| Normal | 36 (75.0%) | 12 (25.0%) | |
| Low | 17 (16.2%) | 88 (83.8%) | |
| TC | Normal | Obese | 0.0001 |
| Normal | 37 (74.0%) | 13 (26.0%) | |
| High | 16 (15.5%) | 87 (84.5%) | |

**Table 3:** Association between central obesity of patients and their body mass index (BMI).

| | Waist circumference (Central obesity) | | |
|---|---|---|---|
| **BMI** | **Normal** | **Obese** | ***P* value** |
| Normal | 21 (84.0%) | 4 (16.0%) | 0.0001 |
| Overweight | 29 (46.8%) | 33 (53.2%) | |
| Obese | 3 (5.5%) | 52 (94.5%) | |
| Morbid | 0 (0.0%) | 11 (100.0%) | |

WC and the majority (53.2%) of overweight patients exhibited central obesity. Only 5.5% of patients in the obese BMI category were with a normal WC and an overwhelming 94.5% of obese patients were classified as having central obesity. None of the patients with a morbid BMI were seen with a normal WC and 100% of patients in the morbid BMI category exhibited central obesity ($p$=0001) indicating a highly significant association between BMI and central obesity. The likelihood of central obesity increases progressively with higher BMI categories too.

## Discussion

Central obesity, which is characterized by a lot of fat in the vicinity of the abdominal region, has become a significant issue in the public health field globally (17). In current study majority of patients who visited the institution nutrition clinic were overweight (40.2%) and 35% of them were obese; while the prevalence of patients with central obesity was 65.4%. This finding is similar to the study done by Wong *et al.* who stated that regions with the greatest prevalence (over 55%) to be in Hungary (67.0%), Peru (64.7%), Kuwait (64.5%), Mongolia (64.3%), Qatar (62.0%), Pakistan (61.8%), South Africa (58.4.5%), Jordan (58.4%), and Poland (57.9%) (7). Similar to current study, Pengpid *et al.* found that the percentage of overweight individuals to be 31.8%; while 33.9% were obese or overweight/obesity individuals (65.7%) (18).

Our results revealed a strong association between central obesity and some sociodemographic factors. The age was the most striking determinant, with the prevalence of central obesity growing gradually with the increase in age (47.6% in patients ≤30 years, 75.9% in 31-59 years, and 80.6% in ≥60 years). This corresponds with the findings by Jin *et al.* who had noted the prevalence of central obesity to rise in old age due to hormonal changes with reduced physical activity (13). Powell-Wiley *et al.* described the same opinion as central obesity can increase with age (1). People over 40 years had a roughly doubled prevalence of central obesity compared to young adults (48.0% versus 23.8%). It is, of course, quite reasonable that older people had a lower basal metabolic rate than young ones (20). Therefore, they had more stored fat in the body based on the rise of energy intake relative to energy expenditure (21).

The second reason may well be that older people are not as active as young adults and thus have relatively lower energy expenditure (22). Despite the facts above, it is really amazing that in the younger adult generation, the prevalence of central obesity doubled within the similar two-country comparative age as compared to older subjects (From 1985–1999 to 2010–2014), which can be related to more individuals, especially children and teenagers, being much fatter already at a lower age with a fat-accumulating lifestyle (23). Equally important can be the gender differences, with central obesity being much more prevalent in females (81.9%) than in males (45.7%). The work of Muscogiuri *et al.* supports this gap as a function related to hormonal reasons, wherein especially postmenopausal women underwent some changes that led to the redistribution of fat more towards the abdominal area (24).

In another study show that the global prevalence of central obesity was largely higher in women (47.6%) than in men (30.4%), mainly attributed to cultural and biological reasons; while biological reasons are higher body fat percentage ratio, menopausal effects, hormonal differences, cultural reasons, and lifestyle-related such as low physical activities and inactivity (7, 25). Paradoxically, trend increase in central obesity is much steeper among men, mainly attributed to lifestyle risk factors, including higher percentages of smoking and alcohol use (26). Inactivity in females has been at a standstill since 2001, thereby fueling this trend for central obesity in this subgroup (22).

Preventive targeted strategies with early detection are important to reduce the increasing health burden of central obesity in females. This rising tides would be mediated with evidence-based recommendations and modifications of lifestyles. The unemployed group had the highest prevalence of central obesity (69.9%), while students showed the lowest prevalence (50.0%). These results are in line with a study by Alhashemi *et al.* in which unemployment was identified as a potential risk factor for obesity because of the inactivity of life and limited healthy food availability (27). Interestingly, no significant relationship with residence, smoking

status, or marital status and central obesity though some trends were observed. Comparable results were seen in those of Alhashemi *et al.* who noted that cessation of smoking may had an impact on central obesity but the relationship was very complicated and multilateral (27).

Finally, in regard to central obesity, chronic diseases were strongly associated, as 82.5% of the chronic cases had central obesity. This finding is in line with the work of Welsh *et al.* who noted highly significant relationships between central obesity and chronic diseases such as diabetes and hypertension, probably as a result of some metabolic derangements emanating from an excess accumulation of visceral fat (28). Current study showed a significant relationship between BMI categories and central obesity, as measured by WC. A progressive increase in central obesity prevalence with rising BMI categories underscores the strong correlation between overall obesity and abdominal fat distribution. Among patients with a normal BMI, 84.0% exhibited a normal WC, while only 16.0% had central obesity. This aligns with the study by Ueno *et al.* which showed that individuals with normal BMI were less likely to have central obesity; but were not entirely exempt from its risks, especially with sedentary lifestyles or poor dietary habits (29).

Among the overweight subjects, 53.2% had central obesity, and 46.8% had a normal WC. This shift from normal to central obesity corresponds to the observation made by Preda *et al.* who stressed that in cases of overweight, subjects tend to accumulate more visceral fat even if they do not fulfil the criteria of being obese based solely on BMI (30). The association becomes more pronounced in the obese category where 94.5% of patients had central obesity, leaving only 5.5% with a normal WC. This overwhelming prevalence of central obesity in obese individuals was supported by Prasad *et al.* who found that BMI was strongly correlated with abdominal fat deposition that increased the risk of metabolic and cardiovascular diseases (31).

The study's results revealed that a lot of people with central obesity had dyslipidemia, which means they had high LDL and low HDL levels, as well as a high TC level. This happens in 83.8% and 84.5% of cases, respectively. These abnormalities are strongly associated with central obesity and its disturbances in lipid metabolism. Visceral fat is very metabolically active and can cause problems with insulin resistance, systemic inflammation, and changes in lipid metabolism. Central obesity usually leads to more visceral fat and these factors can result in atherogenic lipid changes that raise the potential for the risk of cardiovascular diseases (32-34). Another study with similar findings was conducted by Klein *et al.* who proved that subjects with central obesity to have much higher levels of LDL and TC and a much lower HDL level than non-obese people (35). Also, Harnischfeger *et al.* reported through their study the promoting effects of visceral fat on hepatic overproduction of LDL and Triglycerides, as well as inhibition of HDL synthesis. Also, central obesity lowered the activity of lipoprotein lipase, which made it harder for HDL to form and for triglyceride-rich lipoproteins to be cleared out of the body (36).

## Conclusion

A significantly high prevalence of central obesity was visible in our patients. Central obesity increased progressively with a higher BMI. Females appeared more vulnerable than males to this pathology, and its prevalence increased significantly with age. A significantly high association of chronic diseases with central obesity was also stated. All these findings put forward the necessity and relevance of central obesity in the health field, considering central obesity, together with consequential measures of BMI and WC, in a comprehensive risk assessment, as well as targeted interventions.

## Acknowledgement

We thank all the staff of Merjan Medical City who participated in this study.

## Funding

No funding was received.

## Authors' Contribution

All authors contributed to developing the study's framework, design, and planning. QI and NA collected the data. QI and MH wrote the manuscript and provided critical revisions to ensure its intellectual rigor. Each author has endorsed the final version of the manuscript.

## Conflict of Interest

No conflict of interest is declared.

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