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Relationship Between Dietary Diversity and Central Obesity in Adults Aged 18–65 Years: A Cross-Sectional Study in Chongqing, China

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Abstract: Aim: Dietary diversity is considered a key component of a healthy diet, as it ensures the intake of a wide range of nutrients, which help maintain normal metabolic functions. This study aims to explore the relationship between dietary diversity and the prevalence of central obesity in adults aged 18–65 years, as well as the associated factors in the adults aged 18–65 years. Methods: A cross-sectional study was conducted in a health center that included adults aged 18–65 years. Dietary intake information was obtained using the food frequency questionnaire, and physical examination data were obtained from their health examination reports. The dietary diversity score is calculated by adding up the scores for the types of foods consumed. Logistic regression was used to analyze the association between dietary diversity score and central obesity, with adjustment for confounding factors and stratified analysis. Results: Among 833 individuals, central obesity was 144 (17.29%). In the fully adjusted model, total dietary diversity score (OR=0.89, 95% CI: 0.80~0.98) and plant-based dietary diversity score (OR = 0.87, 95% CI: 0.76~0.99) was associated with a reduced risk of central obesity. The higher the DDS, the lower the risk of central obesity. Additionally, stratified analysis revealed that dietary diversity scores among different genders and ages were associated with the risk of central obesity. Conclusions: The results of this study indicate that dietary diversity is a protective factor for central obesity, and adopting a diversified diet may reduce the risk of central obesity in the.

Keywords: Dietary diversity, central obesity, plant-based diet, animal-based diet

INTRODUCTION

Obesity prevalence is continuing to worsen globally and obesity has become one of the most severe public health challenges of the 21st century [1]. According to the WHO's "Global Monitoring Report on Non-communicable Diseases 2025" the global obesity rate has nearly tripled since 1975. The prevalence of obesity varies significantly across different countries and regions. The prevalence of obesity is 60% in high-income countries, 52% in upper-middle-income countries, 27% in lower-middle-income countries, and 21% in low-income countries. Economic development is associated with a higher risk of obesity [2]. The Rafsanjan cohort study found a complex association between the prevalence of metabolic syndrome (with central obesity as a core component) in adults aged 35–70 years and dietary diversity scores [3].

Central obesity, a type of obesity characterized by abnormal fat distribution in abdominal region, is much more adverse to health than general obesity. Researches has shown [4] have shown that visceral fat tissue is highly metabolically active and can secrete various adipokines and inflammatory factors, leading to pathological changes such as insulin resistance, chronic low-grade inflammation, and hyperlipidemia. Numerous epidemiological studies have confirmed that even when body mass index (BMI) is within the normal range, an increase in waist. Circumference can significantly elevate the risk of cardiovascular diseases and all-cause mortality.

Dietary diversity is considered a key feature of a high-quality diet, and the DDS (Dietary Diversity Score) is a commonly used evaluation tool for dietary diversity. The DDS is a key indicator for assessing the dietary quality of individuals or groups, reflecting the degree of dietary diversity by quantifying the number of different food groups consumed over a specified period. Its relationship with health has increasingly attracted the attention of researchers.

The relationship between central obesity and diet also varies across different settings and populations. Studies have shown that DDS scores is negatively and significantly associated with obesity [5-7]. Adults with lower dietary diversity scores were twice as likely to develop central obesity as those with higher dietary diversity scores [8]. The prevalence of central obesity in both men and women decreases with increasing DDS [9]. Traditional dietary patterns may offer protective effects against central obesity in Chinese adults, whereas sugar-oil-rich dietary patterns are detrimental to obesity prevention and control [10]. However, not all studies got the same conclusions. Some other studies have shown that DDS was positively associated with obesity [11-13]. The possible reasons for these controversies may include differences in the definition and scoring of the DDS, variations in the study populations, and differences in the methods used to collect dietary data.

Research indicates [14] that dietary diversity among women in the market is generally poor, necessitating improvements in dietary quality through nutrition education and behavioral interventions. Currently, there is insufficient evidence on the association between dietary diversity and central obesity in adults aged 18–65 years. Validating the effects of DDS on central obesity is crucial for targeted prevention and control of central obesity in adults aged 18–65 years.

METHODS AND STUDY DESIGN

Study Participants

The survey was conducted in the summer (months of 9-12) of 2024, and eligible subjects for routine health examination at the health medical center of a tertiary hospital were recruited. This study was approved by the Ethics Committee of the Second Affiliated Hospital of Chongqing Medical University (2022298). All participants gave their written informed consent.

Questionnaire Survey

The basic information was collected through face-to-face interviews, the questionnaire used in interview included social demography information such as gender, age, occupation, marital status, diabetes, and hypertension, as well as lifestyle information such as physical exercise, smoking, and drinking habits.

Physical Examination

Physical examination indicators, including waist circumference, Height, Weight, were all conducted by qualified personnel with standard process.

Dietary Survey

A dietary survey was conducted using face-to-face interviews with a simplified version of the Food Frequency Questionnaire (FFQ), which included 10 types of foods, Whole grains, vegetables, fruits, legumes, nuts, meat, eggs, fish, dairy products, and fungi and algae [15,16].

DDS Definition

The total DDS was valued according to the studies by Zhang and Du [15,16]. Person who consumes whole grains, vegetables, and fruits at a frequency of "5–6 times daily or weekly" will earn 1 point for each food group, otherwise with 0 points. For fungi and algae, legume products, nuts, meat, eggs, fish, and dairy products, consuming at a frequency of "at least 1–2 times per week or more" will earn 1 point for each, otherwise 0 points. The score range is 0-10.

Animal-based DDS was based on the frequency of 4 animal foods (meat, fish, eggs, and dairy products) intake, with a range of 0–4 points. The Plant-based DDS was based on the frequency of 6 plant foods (whole grains, vegetables, fruits, tofu products, nuts, and fungi/algae) intake, with a range of 0–6 points.

Central Obesity Definition

According to the Chinese National Health Commission's "Guidelines for the Diagnosis and Treatment of Obesity (2024 Edition)" and "Guidelines for Weight Management (2024 Edition)," central obesity is assessed based on waist circumference standards. Men with a waist circumference of ≥ 90 cm and women with a waist circumference of ≥ 85 cm are diagnosed with central obesity. Those who do not meet the waist circumference standards are defined as having normal WC.

Data Analysis

Statistical analysis was performed using SPSS 26.0. Quantitative data were described using median and interquartile range, as well as mean. Intergroup comparisons were performed using Z-tests and t-tests. Qualitative data were expressed as n (%) and group comparisons were performed using the chi-square test.

Logistic regression analysis was performed to calculate the odds ratios (ORs) between Dietary Diversity Score and central obesity, adjusting for potential confounding factors. After adjusting for confounding factors, a multivariate stratified analysis was conducted at a significance level of $\alpha=0.05$.

RESULT

Characteristics of Participants

A total of 833 participants provided complete information. After grouping the DDS scores, Q1 included 214 individuals (25.69%), Q2 included 335 individuals (40.22%), Q3 included 147 individuals (17.65%), and Q4 included 137 individuals (16.45%). Statistically significant differences (*P*<0.05) were observed across the four groups for gender, age, marriage, hypertension, eat breakfast every day, eat late-night snacks every day, smoking, weekly exercise levels, daily water intake, and weekly coffee consumption. While differences in diabetes, length of sleep, alcohol consumption, Weekly consumption of sugary drinks, and BMI showed no statistical significance (*P*>0.05). Participant characteristics are detailed in Table 1.

Table 1: Basic characterization of respondents.

Variables	Total DDS				*P*-*value*
	Q1 (*n* = 214)	**Q2 (*n* = 335)**	**Q3 (*n* = 147)**	**Q4 (*n* = 137)**	
Gender (*n*[%])					<.001
Male	85 (39.72)	125 (37.31)	42 (28.57)	29 (21.17)	
Female	129 (60.28)	210 (62.69)	105 (71.43)	108 (78.83)	
Age group (*n*[%])					<.001
Young people (<35 years old)	105 (49.07)	160 (47.76)	52 (35.37)	37 (27.01)	
Middle-aged/elderly(≥35 years old)	109 (50.93)	175 (52.24)	95 (64.63)	100 (72.99)	
Marriage(*n*[%])					<.001
Married	133 (62.15)	226 (67.46)	118 (80.27)	112 (81.75)	
Single	81 (37.85)	109 (32.54)	29 (19.73)	25 (18.25)	
Diabetes(*n*[%])					0.695
Yes	3 (1.40)	4 (1.19)	1 (0.68)	3 (2.19)	
No	211 (98.60)	331 (98.81)	146 (99.32)	134 (97.81)	
Hypertension(*n*[%])					0.041
Yes	8 (3.74)	3 (0.90)	3 (2.04)	6 (4.38)	
No	206 (96.26)	332 (99.10)	144 (97.96)	131 (95.62)	
Eat breakfast every day(*n*[%])					<.001
Yes	107 (50.00)	172 (51.34)	98 (66.67)	95 (69.34)	
No	107 (50.00)	163 (48.66)	49 (33.33)	42 (30.66)	
Eat late-night snacks every day(*n*[%])					<.001
Yes	73 (34.11)	127 (37.91)	27 (18.37)	39 (28.47)	
No	141 (65.89)	208 (62.09)	120 (81.63)	98 (71.53)	
Length of sleep(*n*[%])					0.086

Adequate (≥7 hours)	139 (64.95)	227 (67.76)	104 (70.75)	106 (77.37)	
Insufficient (<7 hours)	75 (35.05)	108 (32.24)	43 (29.25)	31 (22.63)	
Smoking(*n*[%])					0.012
Yes	34 (15.89)	39 (11.64)	11 (7.48)	8 (5.84)	
No	180 (84.11)	296 (88.36)	136 (92.52)	129 (94.16)	
Alcohol consumption(*n*[%])					0.255
Yes	73 (34.11)	122 (36.42)	47 (31.97)	37 (27.01)	
No	141 (65.89)	213 (63.58)	100 (68.03)	100 (72.99)	
Weekly exercise level(*n*[%])					<.001
Never exercise	126 (58.88)	167 (49.85)	70 (47.62)	42 (30.66)	
Moderate-intensity exercise	45 (21.03)	95 (28.36)	38 (25.85)	60 (43.80)	
Vigorous exercise	43 (20.09)	73 (21.79)	39 (26.53)	35 (25.55)	
Daily water intake(*n*[%])					<.001
<500 ml/day	44 (20.56)	34 (10.15)	10 (6.80)	13 (9.49)	
500-1000 ml/day	104 (48.60)	183 (54.63)	66 (44.90)	46 (33.58)	
1000-1500 ml/day	45 (21.03)	86 (25.67)	47 (31.97)	50 (36.50)	
1500-1700ml/day or more	21 (9.81)	32 (9.55)	24 (16.33)	28 (20.44)	
Weekly consumption of sugary drinks(*n*[%])					0.130
Never/Rarely	99 (46.26)	145 (43.28)	79 (53.74)	64 (46.72)	
Occasionally	96 (44.86)	171 (51.04)	62 (42.18)	68 (49.64)	
Always	19 (8.88)	19 (5.67)	6 (4.08)	5 (3.65)	
Weekly coffee consumption(*n*[%])					0.038
Yes	99 (46.26)	159 (47.46)	51 (34.69)	68 (49.64)	
No	115 (53.74)	176 (52.54)	96 (65.31)	69 (50.36)	
BMI					0.403
Underweight/Normal weight	127 (59.35)	220 (65.67)	98 (66.67)	86 (62.77)	
Overweight/Obesity	87 (40.65)	115 (34.33)	49 (33.33)	51 (37.23)	

Q1: 1st Quartile, Q2: 2st Quartile, Q3: 3st Quartile, Q4: 4st Quartile, DDS: Dietary Diversity Score, BMI: body mass index.

Univariate Analysis of Abdominal Obesity

A total of 833 participants provided complete information, among whom 144 individuals (17.29%) exhibited central obesity. The sample comprised 281 males (33.73%) and 552 females (66.27%). The young people group comprised 354 individuals (42.5%), while the middle-aged/elderly group included 479 participants (57.5%). A univariate analysis of abdominal obesity revealed that statistically significant differences (*P*<0.05) were observed between the two groups in gender, age, marriage, hypertension, length of sleep, smoking, alcohol consumption, and BMI. Detailed results are presented in Table 2.

Table 2: Univariate Analysis of Abdominal Obesity.

Characteristic	Normal WC (*n* = 689)	Central Obesity (*n* = 144)	OR(95%CI)	*P-value*
Gender (*n*[%])				
Male	203 (29.46)	78 (54.17)	1.00	
Female	486 (70.54)	66 (45.83)	0.35 (0.24 ~ 0.51)	<.001
Age group (*n*[%])				
Young people (<35 years old)	306 (44.41)	48 (33.33)	1.00	
Middle-aged/elderly(≥35 years old)	383 (55.59)	96 (66.67)	1.60 (1.10 ~ 2.33)	0.015
Marriage(*n*[%])				
Married	475 (68.94)	114 (79.17)	1.00	
Single	214 (31.06)	30 (20.83)	0.58 (0.38 ~ 0.90)	0.015
Diabetes(*n*[%])				
Yes	10 (1.45)	1 (0.69)	1.00	
No	679 (98.55)	143 (99.31)	2.11 (0.27 ~ 16.58)	0.479
Hypertension(*n*[%])				
Yes	9 (1.31)	11 (7.64)	1.00	
No	680 (98.69)	133 (92.36)	0.16 (0.07 ~ 0.39)	<.001
Eat breakfast every day(*n*[%])				
Yes	381 (55.30)	91 (63.19)	1.00	
No	308 (44.70)	53 (36.81)	0.72 (0.50 ~ 1.04)	0.083
Eat late-night snacks every day(*n*[%])				
Yes	217 (31.49)	49 (34.03)	1.00	
No	472 (68.51)	95 (65.97)	0.89 (0.61 ~ 1.30)	0.553
Length of sleep(n[%])				
Adequate (≥7 hours)	490 (71.12)	86 (59.72)	1.00	
Insufficient (<7 hours)	199 (28.88)	58 (40.28)	1.66 (1.15 ~ 2.41)	0.007
Smoking(*n*[%])				
Yes	61 (8.85)	31 (21.53)	1.00	
No	628 (91.15)	113 (78.47)	0.35 (0.22 ~ 0.57)	<.001
Alcohol consumption(*n*[%])				
Yes	219 (31.79)	60 (41.67)	1.00	

No	470 (68.21)	84 (58.33)	0.65 (0.45 ~ 0.94)	0.023
Weekly exercise level(*n*[%])				
Never exercise	338 (49.06)	67 (46.53)	1.00	
Moderate-intensity exercise	148 (21.48)	42 (29.17)	0.87 (0.56 ~ 1.36)	0.538
Vigorous exercise	203 (29.46)	35 (24.31)	1.43 (0.93 ~ 2.20)	0.103
Daily water intake(*n*[%])				
<500 ml/day	83 (12.05)	18 (12.50)	1.00	
500-1000 ml/day	345 (50.07)	54 (37.50)	0.72 (0.40 ~ 1.30)	0.274
1000-1500 ml/day	178 (25.83)	50 (34.72)	1.30 (0.71 ~ 2.36)	0.397
1500-1700ml/day or more	83 (12.05)	22 (15.28)	1.22 (0.61 ~ 2.44)	0.570
Weekly consumption of sugary drinks(*n*[%])				
Never/Rarely	331 (48.04)	56 (38.89)	1.00	
Occasionally	319 (46.30)	78 (54.17)	1.45 (0.99 ~ 2.11)	0.055
Always	39 (5.66)	10 (6.94)	1.52 (0.72 ~ 3.21)	0.277
Weekly coffee consumption(*n*[%])				
Yes	312 (45.28)	65 (45.14)	1.00	
No	377 (54.72)	79 (54.86)	1.01 (0.70 ~ 1.44)	0.975
BMI				
Underweight/Normal weight	522 (75.76)	9 (6.25)	1.00	
Overweight/Obesity	167 (24.24)	135 (93.75)	46.89 (23.36 ~ 94.11)	<.001

BMI: body mass index, WC: Waist circumference

The Relationship between DDS and Central Obesity

Conduct model analysis on factors showing a significant association with abdominal obesity in the univariate analysis. In Model 1, total dietary patterns (OR = 0.88, 95% CI: 0.80–0.97), animal-based dietary patterns (OR = 0.77, 95% CI: 0.61–0.97), and plant-based dietary patterns (OR = 0.87, 95% CI: 0.76–0.98) were significantly associated with central obesity. In Model 2, after adjusting for age, sex, and marriage, these associations remained significant for total dietary patterns, animal-based dietary patterns, and plant-based dietary patterns. In Model 3, further adjusting for length of sleep, smoking and alcohol consumption, these associations remained significant in both the total dietary intake and plant-based dietary intake. In Model 4, after further adjusting for hypertension, total dietary intake and plant-based dietary intake remained significantly associated with central obesity, acting as protective factors against its occurrence. The relationship between DDS and central obesity is shown in Table 3.

Table 3: Relationship between DDS in the General Population and DDS from Different Protein Sources with Central Obesity.

Variables	OR (95%CI)	*P-value*
Total DDS		
Model 1	0.88(0.80, 0.97)	0.009
Model 2	0.88(0.79, 0.97)	0.008
Model 3	0.89(0.81, 0.99)	0.025
Model 4	0.89(0.80, 0.98)	0.023
Animal-based DDS		
Model 1	0.77(0.61, 0.97)	0.026
Model 2	0.77(0.61, 0.99)	0.035
Model 3	0.82(0.64, 1.04)	0.100
Model 4	0.81(0.63, 1.03)	0.085
Plant-based DDS		
Model 1	0.87(0.76, 0.98)	0.023
Model 2	0.86(0.75, 0.98)	0.019
Model 3	0.87(0.76, 0.99)	0.039
Model 4	0.87(0.76, 0.99)	0.039

OR: Odds Ratio, CI: Confidence Interval, DDS: Dietary Diversity Score; Model1: Crude; Model2: Adjust: Age, Gender, Marriage; Model3: Adjust: Age, Gender, Marriage, Length of sleep, Smoking, Alcohol consumption; Model4: Adjust: Age, Gender, Marriage, Length of sleep, Smoking, Alcohol consumption, Hypertension

Subgroup Analysis

Across total DDS, the risk of central obesity progressively decreased with increasing DDS scores among individuals of different genders and ages. All trend analyses demonstrated statistical significance (P<0.05). In animal-based DDS, women and young adults exhibited progressively lower risks of central obesity with increasing DDS scores. In plant-based DDS, men and middle-aged/elderly groups demonstrated reduced central obesity risks with rising DDS scores. Table 4 presents analysis results for total diets and diets with different protein sources.

Table 4: Relationship between dietary diversity scores across different food groups and central obesity, stratified by gender and age.

Variables	OR (95%CI)	*P-value*	*P* for interaction
Total DDS			
Gender			0.645
Male	0.82(0.69,0.97)	0.020	
Female	0.86(0.74,1.00)	0.049	
Age group			0.458
Young people (<35 years old)	0.84(0.68,0.96)	0.043	

Middle-aged/elderly (≥35 years old)	0.85(0.74,0.97)	0.016	
Animal-based DDS			
Gender			0.153
Male	0.79(0.55,1.15)	0.200	
Female	0.65(0.45,0.95)	0.022	
Age group			0.540
Young people (<35 years old)	0.65(0.43,0.98)	0.038	
Middle-aged/elderly(≥35 years old)	0.78(0.56,1.10)	0.200	
Plant-based DDS			
Gender			0.868
Male	0.77(0.61,0.96)	0.019	
Female	0.88(0.73,1.06)	0.200	
Age group			0.788
Young people (<35 years old)	0.82(0.63,1.06)	0.130	
Middle-aged/elderly(≥35 years old)	0.82(0.69,0.97)	0.019	

DDS: Dietary Diversity Score; Subgroup analysis adjusted for Age, Gender, Marriage, Eat breakfast every day, Eat late-night snacks every day, Length of sleep, Smoking, Alcohol consumption, Weekly exercise level, Daily water intake, Weekly consumption of sugary drinks, Weekly coffee consumption, Diabetes, Hypertension

Sensitivity Analysis

In sensitivity analyses for different DDS, we obtained inconsistent results using Model 4. Dietary diversity scores based on BMI (total diet, animal-based diet, plant-based diet) showed no significant association with general obesity (Table 5).

Table 5: Sensitivity Analysis of DDS for General Obesity

Variables	**OR (95%CI)**	***P-value***
Total DDS	0.99 (0.91 ~ 1.07)	0.771
Animal-based DDS	0.98 (0.73 ~ 1.21)	0.857
Plant-based DDS	0.98 (0.88 ~ 1.10)	0.777

DDS: Dietary Diversity Score; Adjust: Age, Gender, Marriage, Length of sleep, Smoking, Alcohol consumption, Hypertension

DISCUSSION

The results of this study indicate that the Dietary Diversity Score (DDS) for total diet and plant-based diet among adults aged 18–65 years is associated with the risk of central obesity. Previous research [8-9,17] has demonstrated that diet significantly influences central obesity. Low dietary diversity in food intake may be associated with higher body weight, substantially increasing the risk of Abdominal obesity [18-19]. Although dietary diversity analysis does not necessarily account for the “healthiness” of individual foods within a group, most dietary guidelines recommend increasing food variety. This study adopted the

DDS index based on the Chinese Dietary Guidelines and prior research. Differences in the composition of DDS food groups across studies may contribute to inconsistent findings [16,20].

Previous studies have demonstrated a negative correlation between the type of protein intake and obesity [24]. Therefore, we classified and scored dietary patterns based on different protein sources. The findings revealed that dietary patterns derived from various protein sources were associated with the prevalence of central obesity. After adjusting for confounding factors, plant-based protein dietary patterns exhibited statistically significant correlations. A cross-sectional study [21] revealed that in a large Indian sample, the "plant-based foods/animal-based foods" dichotomy was associated with odds ratios for anthropometric factors, such as WC and BMI. Greek study [22] shows that overweight/obesity is linked to higher perceived levels. Adults aged 18–65 years have autonomy over break times, snacking, and physical activity during work, making them particularly susceptible to workplace influences, which make them changes in both physical and psychological stress levels [23]. This demographic represents a high-risk group for central obesity.

Age is another risk factor for central obesity. A 15-year longitudinal study found that gender differences in adult waist circumference are closely associated with aging [26]. This study's multivariate stratified analysis of adults aged 18–65 years revealed that within the total dietary structure, as the Dietary Diversity Score (DDS) increased, the risk of central obesity progressively decreased across different genders and age groups. Previous studies [27-28] similarly demonstrated a negative correlation between dietary diversity and abdominal obesity risk, with gender and age emerging as significant influencing factors for abdominal obesity.

Significant differences in central obesity risk were observed across subgroups based on dietary protein sources. Dietary diversity also exhibited gender-specific associations with central obesity prevalence: among animal-based diets, women's central obesity risk gradually decreased with increasing DDS scores; conversely, among plant-based diets, men's central obesity risk gradually decreased with increasing DDS scores. This may stem from women's tendency to consume less palatable plant foods to maintain body shape [25]. Meanwhile, fish and poultry rich in unsaturated fatty acids may promote the growth of beneficial gut microbiota, thereby reducing central obesity risk [29]. Regarding dietary intake, women should prioritize diversifying high-quality animal protein sources, while men generally exhibit a stronger preference for meat consumption [25]. High dietary diversity provides richer sources of dietary fiber, vitamins, and minerals, supporting metabolic health and thereby reducing central obesity risk. Within plant-based diets, soy products and nuts serve as key sources of protein and healthy fats. Protein is essential for maintaining muscle mass and basal metabolic rate; protein deficiency may lead to muscle loss and reduced basal metabolic rate, subsequently decreasing energy expenditure and increasing obesity risk [30]. Animal diets often contain high levels of saturated fat and cholesterol, which may disrupt gut microbiota, induce adipose tissue inflammation, and promote visceral fat accumulation [38]. Simultaneously, high animal diets frequently result in insufficient dietary fiber intake. Dietary fiber enhances satiety, slows digestion and absorption, aids appetite control, and reduces energy intake. Inadequate fiber intake may lead to overeating, further exacerbating obesity risk [31]. Research also indicates that polyphenols in vegetables may reduce obesity risk [32]. Antioxidants like polyphenols and vitamin C in plants can alleviate chronic inflammation [33], which is closely linked to visceral fat accumulation. For women following plant-based diets, excessive consumption of starchy vegetables like sweet potatoes and potatoes rapidly converts to glucose. If energy expenditure is insufficient, surplus calories are converted into visceral fat deposits via insulin [34].

Young adults aged 18–65 years choosing animal-based diets often exhibit unhealthy lifestyles including insufficient exercise, prolonged sedentary periods, and excessive electronic device use [35]. These factors interact with animal-based diets to collectively elevate central obesity risk. Compared to middle-aged and older adults, young adults typically possess higher basal metabolic rates [36,37] and greater physical activity levels, enabling more efficient energy expenditure. With aging, basal metabolic rates decline, physical activity decreases, and energy expenditure reduces. Even with increased dietary diversity, central obesity risk may inherently remain lower in younger populations, making statistically significant differences difficult to detect. Middle age often brings heightened life and work pressures, potentially altering dietary habits such as accelerated eating and emotional eating. Dietary guidance tailored to different age groups, particularly emphasizing nutritional needs in older adults, require enhancing dietary diversity and nutritional balance. Adjusting dietary patterns to increase high-quality protein intake, combined with regular exercise interventions, can effectively prevent central obesity and promote long-term health.

Dietary recommendations should account for gender differences, enhancing dietary diversity and nutritional balance while specifically addressing the unique needs of adults aged 18–65 years. Optimizing dietary structure—increasing fiber intake while reducing saturated fats and high-glycemic index foods—combined with appropriate exercise interventions, can effectively lower central obesity risk.

Advantages of this study: First, the data were collected from a large tertiary hospital in southwestern China, and various potential confounding factors were adjusted for. Second, the Dietary Quality Assessment Index (DDS) was applied, and the DDS index was further refined according to different protein sources. Finally, a large number of influencing factors were included, and confounding factors were well controlled. Limitations of the study: First, this study is a cross-sectional study and cannot establish causal relationships. Second, the study sample was drawn from a single city in China, limiting its representativeness. Finally, dietary diversity in this study was based on food frequency measurement, which cannot provide quantitative relationships between dietary diversity and outcomes and may be subject to measurement bias.

CONCLUSION

The results of this study indicate that dietary diversity is a protective factor against central obesity, and adopting a diverse diet may reduce the risk of central obesity among adults aged 18–65 years. For this population, dietary management may be more critical than exercise in preventing central obesity. The core objectives of policy development and health education interventions should focus on enhancing health awareness among adults aged 18–65 years, promoting healthy lifestyles and dietary patterns. By enriching dietary diversity while mitigating the negative impacts of poor eating habits and lifestyle choices, the incidence of central obesity can be effectively prevented and reduced. However, further intervention studies are needed to confirm its reliability in both animal and human studies.

Abbreviations: DDS: dietary diversity score, BMI: body mass index, WC: waist circumference

DECLARATIONS

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Author Contributions: MH: Conducted the investigation, data collection, organization, and analysis; performed formal analysis; drafted the manuscript. RB: Performed research work; reviewed and edited the manuscript. ST: Proofread and edited the manuscript. YZ: Managed the project; reviewed and edited the manuscript.

Conflicts of Interest: The authors declare that they have no conflicts of interest.

Ethical Approval: This study was approved by the Ethics Committee of the Second Affiliated Hospital of Chongqing Medical University (approval no. 2022298).

Consent to Participate: Informed consent to participate in the study was obtained from all participants.

Availability of Data and Materials: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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