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Original Article

Prevalence of Obesity and Associated Risk Factors among Rural Adult Population of Puthia Upazilla, Rajshahi.

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Abstract

Introduction: Obesity is a major public health concern in Bangladesh, driven by socioeconomic factors, lifestyle choices, physical activity levels, and demographics. The influence of technology and industrialization has disrupted behavioral patterns among rural residents, leading to increased susceptibility to weight gain and non-communicable diseases. To gain precise insights, a cross-sectional study was conducted to assess the prevalence of obesity and identify specific risk factors among rural adults.

Methods: From September to November 2022, this study was carried out at the Rajshahi Medical College's Department of Community Medicine. Data were gathered by conducting face-to-face interviews with the rural adult population of Puthia Upazilla, Rajshahi, aged 18 to 59.In all, 548 people from Rajshahi's Puthia Upazilla took part in the survey.

Result: In this study, respondents had a mean age of 38.84 (±12) years. About 39.78% were overweight, and 14.23% were obese based on BMI. The mean BMI was 25.07 (±5.17) kg/m². Around 20.9% of males and 27.9% of females had a higher risk based on waist-hip ratio. Approximately 43.6% were highly active, while 36.86% had low physical activity levels. About 1.6% reported taking anti-depressant drugs. Around 31.4% consumed fried food 1 to 3 times weekly, and 35.2% drank milk occasionally. Regarding salt intake, 32.1% added salt daily to their meals. The relationship between physical activity and BMI (p<.001) and between physical activity and waist-hip ratio (p<.001) was statistically significant in the analysis.

Conclusion: This study's findings can inform policymakers about rural obesity rates and related factors. They can then take steps to raise awareness among rural populations about physical activity and healthy eating.

Key words: Obesity, BMI, IPAQ-SF scale, Physical activity, Waist-hip Ratio, SLÁN 2007, MET.

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Introduction

Obesity's worrisome increasing tendency has recently become a significant public health concern in both industrialized and developing nations. Obesity-related health issues and being overweight have a significant impact on people of all ages. In today's world, obesity is becoming more prevalent. Due to its rapid yet covert global rise, obesity has now been classified as pandemic affecting populations worldwide. Obesity is already one of the top 10 health problems facing the world today.[1] Overweight is linked to a number of chronic health disorders, which increases the burden on families and the economy.[2] A higher

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BMI was linked to 4.7 million deaths and 148 million disability-adjusted deaths in 2017, according to the Global Burden of Disease Study.[3] Obesity is a modifiable risk factor for chronic NCDs like CVD, hypertension, T2D, and cardio metabolic abnormalities. It is influenced by factors such as poor diet, lack of exercise, socio-demographic characteristics, economic conditions, and the environment.[4] There are a few examples where genes, endocrine diseases, drugs, or mental disorders are the main causes. BMI, WC, and WHR are common measures in epidemiological surveys to assess obesity. A BMI of 25+ indicates overweight, 30+ indicates obesity, and a healthy BMI falls between 18.5 and 24.9. However, some East Asian countries use lower thresholds for BMI classification.[6] Overweight impacts national and individual health budgets, with limited data on obesity prevalence in Bangladesh. In 2010, WHO reported obesity at 8.4% (BMI 25 kg/m2), increasing from 2.7% to 8.9% among Bangladeshi women in a decade.[7] Data on obesity prevalence among rural populations in Bangladesh is crucial, challenging the notion that only urban residents are more obese. Surveys have revealed the role of factors like eating habits, physical activity, age, marital status, education level, alcohol use, and socioeconomic status in obesity. Rapid urbanization and a shift to packaged foods in rural areas contribute to the increasing risk and burden of obesity.[8] Urbanization is a major factor linked to the increase in overweight and obesity. It involves the transformation from rural to urban settlements, leading to greater availability of unhealthy foods and a sedentary lifestyle in urban area.[9] By examining obesity prevalence and associated factors in rural populations, this study provides valuable insights for developing holistic non-communicable disease prevention strategies, including healthcare facilities, with a top-down approach.

Materials and Methods

This descriptive cross-sectional study was conducted at the Rajshahi Medical College's Department of Community Medicine over two months (November-December 2022). It included 548 adults aged 18-59 from Rajshahi's Puthia Upazilla. Exclusions comprised individuals with edema, wasting syndrome, pregnant women, and those less than two months postpartum. Purposive sampling and a semi-structured questionnaire based on the IPAC-SF WHO were used for data collection.[10] A questionnaire was developed and pretested on 15 rural residents, followed by data collection with informed consent. In-person interviews gathered socio-demographic and clinical data, while weight, height, BMI, and hip/waist circumference were measured using electronic weighing machines. Physical activity levels were assessed using the IPAQ-SF tool, calculating MET-min/week using established formulas.[11] Respondents meeting specific criteria were included: 3 days of vigorous activity (≥20 minutes/day), 5 days of moderate activity and walking (≥30 minutes/day), 5 days of any combination of activities (≥600 MET minutes/week), 3 days of vigorous activity (≥15 minutes/day), 3 days of vigorous activity (≥1500 MET minutes/week), or 7 days of any activity. Inactive respondents didn't meet these requirements. Data were checked, cleaned, and analyzed using IBM SPSS Statistics Version 24.0, with descriptive statistics. Charts and diagrams were created using Microsoft Excel.

Results

There were about 548 willing participants.

Table no 1 -: Socio-demographic characteristics of the respondents (n=548)

Variables	Categories	Frequency	Percentage (%)
Age	18 to 25 years	108	19.7
	26 to 35 years	118	41.2
	36 to 45 years	141	67.0
	46 to 55 years	137	92.0
	More than 55 years	44	100.0
($\bar{x}$ ±SD)=(38.84±12) years,			
Gender	Male	217	39.6
	Female	329	60.0
	Transgender	2	.4
Religion	Muslim	434	79.2
	Hinduism	107	19.5
	Christianity	4	.7
	Buddhism	3	.5
Marital Status	Unmarried	55	10.0
	Married	459	83.8
	Divorced	12	2.2
	Widow/Widower	21	3.8
	Others	1	.2
Education	Illiterate	130	23.7
	Primary	160	29.2
	Secondary	227	41.4
	Higher secondary	31	5.7
Occupation	Service holder	41	7.5
	Business	91	16.6
	Housewife	266	48.5
	Farmer	64	11.7
	Day laborer	44	8.0
	Others	42	7.7

Family structure	Nuclear	332	60.6
	Joint/Extended	216	39.4
Monthly income	Less than 10,000	333	60.8
	11000 to 20,000	146	26.6
	21,000 to 30,000	48	8.8
	31,000 to 40,000	13	2.4
	41,000 to 50,000	7	1.3
	More than 50,000	1	.2

Mean monthly income ($\bar{x}$ ±SD)= (13,810±8910.30tk)

Table 1 displays socio-demographic characteristics of the respondents. Most were aged 46-55 (92%), with a median age of 38.84 years. The majority were Muslims (79.2%), married (83.8%), and had secondary education (41.4%). Housewives (48.5%) and nuclear families (60.6%) were common. Mean monthly income was 13,810±8910.30tk.

Table-2: Distribution of Body Mass Index of the respondents according to WHO general population (n=548)

BMI	Frequency	Percentage (%)
Underweight (<18.5 kg/m$^{2)}$	63	11.49
Ideal (18.5-24.9 kg/m$^{2)}$	189	34.4
Overweight (25- 29.9 kg/m$^{2)}$	218	39.78
Obese (≥ 30 kg/m$^{2)}$	78	14.23

Mean BMI= (25.07±5.17 kg/m^2)

Table 2 shows that among 548 rural adults, 34.4% have an ideal BMI score, 11.49% are underweight, 39.78% are overweight, and 14.23% are obese. The mean BMI is 25.07±5.17 kg/m2.

Table -3: Distribution of waist-hip ratio of the respondents (n=548)

Waist-Hip ratio	Frequency	Percentage (%)
Male : < .90 normal	166	30.2
>.90 at risk	115	20.9
Female : < .85 normal	114	20.8
>.85 at risk	153	27.9

Table 3 shows that about 115(20.9%) male respondents were at risk depending upon waist and hip circumference ratio and 166(30.2%) respondents were within normal range. Among female respondents about 153(27.9%) were at risk and 114(20.8%) were within normal range.

Table -4: Distribution of physical activity of the respondents according to IPAC-SF scale

Physical activity depending upon MET	Frequency	Percentage (%)
Low active (< 600 MET)	202	36.86
Moderate (601-2999 MET)	107	19.52
Highly active (≥3000 MET	239	43.61

Table 4 reveals that approximately 43.6% of respondents are highly active according to the IPAQ-SF scale. About 19.52% are moderately active, and 36.86% fall within the low physical activity level.

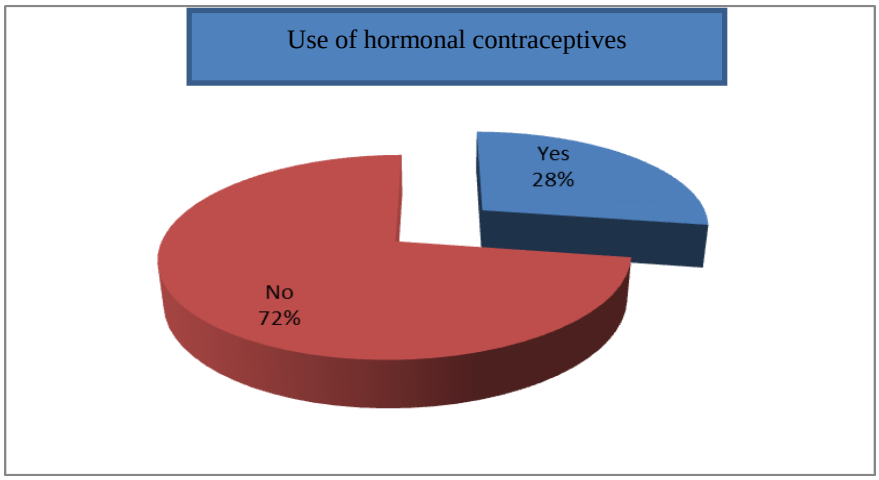

Figure-I: Use of hormonal contraceptives among the female respondents

In Figure I, 72% of females did not use hormonal contraceptives recently or within the past year, while 28% did.

Figure II reveals that 13.5% have hypertension, 4% have diabetes mellitus, 1.8% have cardiovascular disease, 0.4% have chronic kidney disease, 77.7% have no diagnosed chronic disease, and 1.6% have a history of taking antidepressants.

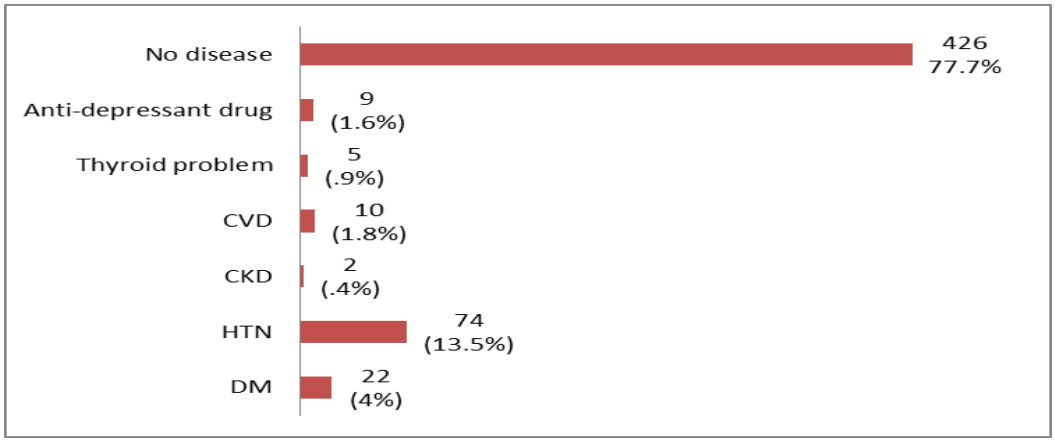

Figure-II: Any diagnosed chronic disease

Table-5: Dietary habit of the respondents according to SLÁN 2007 (n=548)

Dietary habit	Frequency	Percentage (%)
Fried food taking:		
Daily	117	21.4
1 to 3 times a week	172	31.4
Less than once a week	156	28.5
Never	103	18.8
How often drink milk :		
Regular	118	21.5
2 to 3 times a week	129	23.5
Occasional	193	35.2
Never	108	19.7
How often add salt :		
Daily	176	32.1
Sometimes	73	13.3
Rarely	81	14.8
Never	218	39.8
Main meal menu:		
Meat	40	7.3
Fish	318	58.0
Chicken	42	7.7
Vegetables	147	26.8
Others	1	.2

Table 5 shows that 31.4% consume fried food 1-3 times weekly, 28.5% less than once a week, 21.4% daily, and 18.8% never. Regular milk consumption: 21.5%, 23.5% 2-3 times weekly, 35.2% occasionally, and 19.7% never. Adding salt daily: 32.1%, never: 39.8%. Main meals: fish 58%, meat 7.3%, chicken 7.7%, vegetables 26.8%.

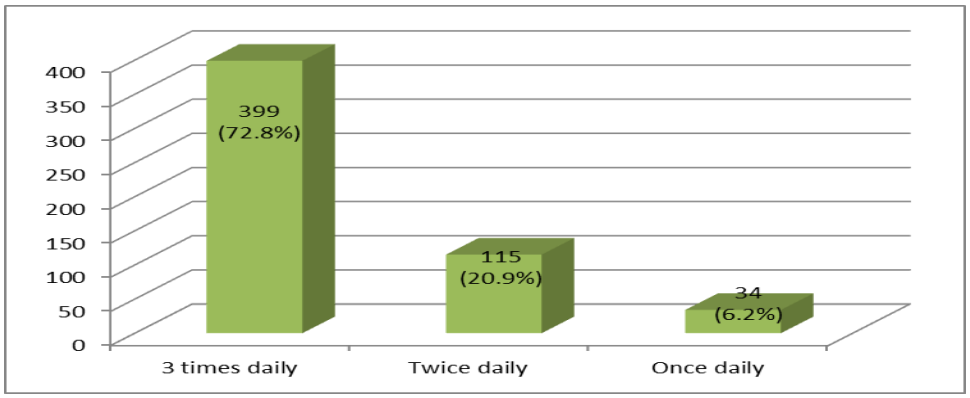

Figure- III: Distribution of major meal of respondents according to SLÁN 2007 (n=548)

In Figure III, the distribution of major meals according to SLÁN 2007 (n=548) is shown. Approximately 72.8% of respondents consume three major meals daily, 20.9% have two major meals, and 6.2% have one major meal.

Table- 6: Relationship between BMI and physical activity of the respondents

Physical Activity of the respondents	BMI of the respondents		Total (%)
	Normal (≤24.9)	Overweight &obese (≥25.0)	
Low to Moderate (≤2999 MET)	102 (33%)	207 (67%)	309 (100%)
High (≥3000 MET)	150 (62.8%)	89 (37.2%)	239 (100%)
Total	252 (46%)	296 (54%)	548 (100%)

$\chi 2 = 48$, df=1, p<.001

Table 6 shows the relationship between physical activity and BMI. Among low physically active respondents (n=309), 67% were overweight/obese, while 33% had normal BMI. Among highly active respondents (n=239), 37.2% were overweight/obese. The relationship was statistically significant (p<.001).

Table 7 shows the relationship between physical activity and waist-hip ratio, with similar trends observed (p<.001).

Table-7: Relationship between physical activity and Waist-Hip Ratio of the respondents

Physical activity of the respondents	Waist-Hip Ratio of the respondents		Total
	Normal Men and Women	At risk Men and Women	
Low to moderate	134	175	309
	(43.4%)	(56.6%)	(100%)
High	146	93	239
	(61.1%)	(38.9%)	(100%)
Total	280	268	548
	(51.1%)	(48.9%)	(100%)

$\chi 2 = 16.9$, df=1, p<.001

Discussion

The study investigated overweight, obesity, and central obesity in a rural Bangladeshi population aged 18-59 years. Among 548 respondents, 137 (92%) were aged 46-55 years, with a mean age of 38.84 (±12) years. Of the rural adult population, 189 (34.4%) had an ideal BMI score, 63 (11.49%) were underweight, 218 (39.78%) were overweight, and 78 (14.23%) were obese. The mean BMI was 25.07 (±5.17 kg/m2).There was an 18.2% overall prevalence of general obesity in rural adult population.[12] About 115(20.9%) male respondents were at risk depending upon waist and hip circumference ratio and 166(30.2%) respondents were within normal range. Among female about 153(27.9%) were at risk and 114(20.8%) were within normal range.In a study it was found that WC based prevalence of abdominal obesity was 39.8% in rural Bangladeshi adults aged 20 years and over.[13] About 239 (43.6 %) respondents is highly active according to analysis of the IPAQ-SF scale. Among the respondents about 107(19.52%) respondents are moderately active and about 202 (36.86%) are within low physical activity level.According to an analysis of the IPAQ-SF scale, 37.9% of participants were physically inactive during the COVID-19 pandemic. Additionally, 23.9% of individuals had high levels of physical activity, while 38.3% of participants reported being moderately active (Physical inactivity and sedentary behaviors in the Bangladeshi population during the COVID-19 pandemic: An online cross-sectional survey, 2020). Regarding presence of any chronic disease about 74(13.5%) respondents are having hypertension, 22(4%) respondents having diabetes mellitus, 10(1.8%) respondents are patients of cardiovascular disease and 2(.4%) respondents are having chronic kidney disease .About 426 (77.7%) respondents do not have any diagnosed chronic disease. A 2016 WHO estimate states that diabetes affects 8% (12.88 million) of Bangladesh's overall population and is responsible for 3% of all fatalities across the board.[14]A study found that the prevalence of obesity and hypertension were 31.57% and 20.27%, respectively.[15] Fish is the main meal menu of about 318(58%) respondents. Since 150 g of fish can provide between 50 and 60 percent of an adult's daily protein needs, fish has a greater nutritional impact in terms of animal protein.[16] This study explores the BMI and physical activity relationship. Among low physically active respondents, 67% were overweight or obese, while 33% had normal BMI. Among highly active villagers, 37.2% were overweight or obese, and 62.8% had normal BMI. Prevalence of overweight: 23.25%, obesity:

6.75%, and overall overweight and obesity: 39.78%.[17] The relationship between physical activity and BMI of the respondents was found statistically significant (p<.001). In people who were not obese, there was a weak correlation between PA and BMI. However, in obese people, BMI was substantially correlated with PA.[18] This study confirms previous findings. Waist-Hip ratio and physical activity were examined. Among 309 low to moderate active respondents, 56.6% were at risk, while 61.1% of 239 highly active respondents were within the normal range. The relationship between physical activity and waist-hip ratio was significant (p<.001).[19] Majority of the respondents of our study were housewives. For Bangladeshi women, the high incidence of general and abdominal obesity is a health problem; as a result, these disorders require public awareness and effective health intervention techniques.[20] In middle-aged rural adults, lack of physical activity increased obesity risk. Strategies to combat obesity in rural areas should prioritize improving physical activity levels. This study highlights the importance of raising awareness about healthy lifestyles, BMI, food habits, and their impact on non-communicable diseases.

Conclusion

This study shows that low to moderate physical activity is linked to overweight and obesity, while highly active individuals have normal BMI. The high prevalence of obesity in rural areas, particularly among housewives, highlights the need for awareness and interventions to address this issue.

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61st batch of MBBS students from Rajshahi Medical College in Rajshahi.

Conflict of interest: None declared

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