OPEN ACCESS

Corresponding Author
Sudipto Roy,
Department of Medicine, KPC Medical College, Kolkata, India
roysudipto50@gmail.com

Author Designation
[1]Assistant Professor
[2]MD PGT 3rd year
[3]2nd year MD PGT
[4]1st year MD PGT

Cross Sectional Study Related to Lifestyle Associated with Obesity in Middle Aged Indian Adults in a Tertiary Care Teaching Hospital

[1]Sudipto Roy, [2]Amit Karmakar, [3]Nayan Paul and [4]Nabanita Mondol
[1-4]Department of Medicine, KPC Medical College, Kolkata, India

Abstract
Obesity is a major public health concern, particularly among middle-aged adults in India, due to its association with various non-communicable diseases. This study aims to investigate the lifestyle factors contributing to obesity in middle-aged Indian adults attending a tertiary care teaching hospital. This cross-sectional study included 360 middle-aged adults (40-60 years) selected through systematic random sampling. Data were collected using structured questionnaires covering demographics, dietary habits, physical activity, sleep patterns and stress factors. Anthropometric measurements were recorded and logistic regression analysis was used to identify significant lifestyle factors associated with obesity. The study found significant associations between obesity and high fast food consumption (OR: 3.2, 95% CI: 1.8 - 5.6, P<0.001), high sugary beverage intake (OR: 2.9, 95% CI: 1.6-5.3, P<0.001), low physical activity (OR: 4.1, 95% CI: 2.3-7.4, P<0.001), poor sleep quality (OR: 2.5, 95% CI: 1.4-4.5, P = 0.002) and high stress levels (OR: 3.0, 95% CI: 1.7-5.4, P<0.001). Obese participants also reported higher sedentary behavior and lower fruit and vegetable intake compared to non-obese participants. High fast food consumption, high sugary beverage intake, low physical activity, poor sleep quality and high stress levels are significant predictors of obesity in middle-aged Indian adults. These findings highlight the need for comprehensive public health strategies focusing on lifestyle modifications to combat obesity in this population.

INTRODUCTION

Obesity is a major public health challenge worldwide and its prevalence is rising at an alarming rate in India. The condition is characterized by excessive fat accumulation that poses a significant health risk[1], leading to various non-communicable diseases such as diabetes, cardiovascular diseases and certain cancers. The World Health Organization (WHO) defines obesity as a body mass index (BMI) of 30 or higher and it is recognized as a multifactorial disease influenced by genetic, environmental and lifestyle factors.

In India, the burden of obesity has increased substantially over the past few decades due to rapid urbanization, economic growth and lifestyle changes[2]. According to the National Family Health Survey-4 (NFHS-4)[3], the prevalence of obesity among Indian adults has doubled in the past decade, with urban areas showing higher rates than rural areas. Middle-aged adults (40-60 years) are particularly vulnerable to obesity due to metabolic changes, decreased physical activity and increased stress levels associated with work and family responsibilities .

Several studies have pinpointed key lifestyle factors that contribute to obesity, including dietary habits, physical inactivity, poor sleep quality and high stress levels[4]. The consumption of calorie-dense, nutrient-poor foods, sedentary behavior and insufficient sleep are significant predictors of weight gain and obesity[5,6]. Moreover, stress-induced eating and poor stress management can further amplify weight gain[7].

Understanding the specific lifestyle factors associated with obesity in the Indian context is crucial for developing targeted interventions. This study aims to investigate the relationship between lifestyle factors and obesity among middle-aged adults attending a tertiary care teaching hospital in India. By identifying modifiable risk factors, this research seeks to inform public health strategies and promote healthier lifestyles to curb the obesity epidemic in this demographic.

MATERIALS AND METHODS

This cross-sectional study was conducted at KPC Medical College, Jadavpur, a tertiary care teaching hospital in India to investigate lifestyle factors associated with obesity in middle-aged Indian adults. The study included 360 participants, aged 40-60 years, who attended the outpatient departments of the hospital between January and June 2024. Participants were selected using systematic random sampling, ensuring a representative sample of the target population.

Data collection involved administering structured questionnaires by trained research assistants. The questionnaire comprised sections on demographics, dietary habits, physical activity, sleep patterns and stress factors. Demographic information included age, gender, education, occupation and income. Dietary habits were assessed by recording the frequency of consumption of various food groups, portion sizes and meal patterns. Physical activity was evaluated based on the type, duration and frequency of activities. Sleep patterns were measured in terms of duration and quality of sleep, while stress factors were assessed by identifying sources of stress and coping mechanisms. Anthropometric measurements, including weight, height and body mass index (BMI), were recorded using standardized techniques. BMI was calculated as weight in kilograms divided by the square of height in meters (kg/m²). Participants with a BMI of 30 or higher were classified as obese.

The collected data were entered into a database and analyzed using SPSS software version 26. Descriptive statistics were used to summarize the characteristics of the study population. Logistic regression analysis was conducted to identify significant lifestyle factors associated with obesity. Independent variables included dietary habits, physical activity levels, sleep patterns and stress factors, while obesity (BMI = 30) was the dependent variable.

Ethical approval for the study was obtained from the Institutional Ethics Committee of the hospital. Informed consent was obtained from all participants prior to their inclusion in the study. Data confidentiality and anonymity were maintained throughout the research process.

RESULTS AND DISCUSSIONS

The study included a total of 360 middle-aged Indian adults, with 126 classified as obese and 234 as non-obese. The mean age of the obese participants was 52.4 years (SD = 5.3), while the mean age of the non-obese participants was 49.8 years (SD = 6.1), with a statistically significant difference (P = 0.015).

Regarding gender distribution, 46.0% of the obese participants were male and 54.0% were female. Among the non-obese participants, 47.9% were male and 52.1% were female. The total sample consisted of 47.2% males and 52.8% females, with no significant difference in gender distribution between the obese and non-obese groups (P = 0.78).

In terms of education level, 11.9% of the obese participants had no formal education, compared to 8.5% of the non-obese participants. Primary education was completed by 31.7% of the obese group and 25.6% of the non-obese group. Secondary education was the most common level, with 39.7% of the obese and 42.7% of the non-obese participants. Higher education was attained by 16.7% of the obese and 23.1% of the

Table 1: Demographic Characteristics of the Study Population

Variable	Obese (n=126)(%)	Non-Obese (n = 234)(%)	Total (n = 360)(%)	p-value
Age (years)	52.4 (5.3)	49.8 (6.1)	50.7 (5.9)	0.015
Gender				
-Male	58 (46.0)	112 (47.9)	170 (47.2)	0.78
-Female	68 (54.0)	122 (52.1)	190 (52.8)	0.78
Education Level				
-No formal	15 (11.9)	20 (8.5)	35 (9.7)	0.31
-Primary	40 (31.7)	60 (25.6)	100 (27.8)	0.22
-Secondary	50 (39.7)	100 (42.7)	150 (41.7)	0.56
-Higher	21 (16.7)	54 (23.1)	75 (20.8)	0.17
Occupation				
-Employed	90 (71.4)	160 (68.4)	250 (69.4)	0.62
-Unemployed	25 (19.8)	47 (20.1)	72 (20.0)	0.95
-Homemaker	11 (8.7)	27 (11.5)	38 (10.6)	0.42
Income Level				
-Low	35 (27.8)	60 (25.6)	95 (26.4)	0.64
-Medium	50 (39.7)	97 (41.5)	147 (40.8)	0.74
-High	41 (32.5)	77 (32.9)	118 (32.8)	0.93

Table 2: Dietary Habits of the Study Population

Dietary Habit	Obese (n = 126)	Non-Obese (n = 234)	Total (n = 360)	p-value
Fast Food Consumption (days/week)	4.3 (1.5)	2.1 (1.2)	3.0 (1.7)	<0.001
Sugary Beverages (servings/day)	2.7 (0.9)	1.5 (0.7)	1.9 (0.8)	<0.001
Fruits and Vegetables (servings/day)	1.8 (0.7)	2.9 (1.0)	2.5 (0.9)	<0.001
Meal Frequency				
-1-2 meals/day	29 (23.0%)	40 (17.1%)	69 (19.2%)	0.16
-3 meals/day	72 (57.1%)	149 (63.7%)	221 (61.4%)	0.21
->3 meals/day	25 (19.8%)	45 (19.2%)	70 (19.4%)	0.94

Table 3: Physical Activity Levels of the Study Population

Physical Activity	Obese (n = 126)	Non-Obese (n = 234)	Total (n = 360)	p-value
Sedentary (hours/day)	7.5 (2.0)	5.3 (1.8)	6.2 (2.1)	<0.001
Moderate Activity (hours/week)	1.5 (0.9)	3.6 (1.5)	2.9 (1.4)	<0.001
Vigorous Activity (hours/week)	0.5 (0.3)	1.2 (0.7)	0.9 (0.6)	<0.001

Table 4: Sleep Patterns of the Study Population

Sleep Pattern	Obese (n = 126)	Non-Obese (n = 234)	Total (n = 360)	p-value
Sleep Duration (hours/night)	5.6 (1.2)	7.2 (1.4)	6.5 (1.5)	<0.001
Sleep Quality				
-Good	30 (23.8%)	120 (51.3%)	150 (41.7%)	<0.001
-Fair	45 (35.7%)	78 (33.3%)	123 (34.2%)	0.65
-Poor	51 (40.5%)	36 (15.4%)	87 (24.2%)	<0.001

Table 5: Stress Factors of the Study Population

Stress Factor	Obese (n = 126)(%)	Non-Obese (n = 234)(%)	Total (n = 360)(%)	p-value
Stress Level				
-Low	24 (19.0)	85 (36.3)	109 (30.3)	<0.001
-Moderate	52 (41.3)	97 (41.5)	149 (41.4)	0.97
-High	50 (39.7)	52 (22.2)	102 (28.3)	<0.001
Stress Coping Mechanisms				
-Healthy (exercise, hobbies)	35 (27.8)	104 (44.4)	139 (38.6)	0.001
-Unhealthy (smoking, overeating)	91 (72.2)	130 (55.6)	221 (61.4)	0.001

Table 6: Logistic Regression Analysis of Factors Associated with Obesity

Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
High Fast Food Consumption	3.2	1.8-5.6	<0.001
High Sugary Beverage Intake	2.9	1.6-5.3	<0.001
Low Physical Activity	4.1	2.3-7.4	<0.001
Poor Sleep Quality	2.5	1.4-4.5	0.002
High Stress Levels	3	1.7-5.4	<0.001

non-obese participants. The differences in education levels were not statistically significant.

Occupationally, 71.4% of the obese participants were employed, compared to 68.4% of the non-obese participants. Unemployment rates were similar, with 19.8% among the obese and 20.1% among the non-obese. Homemakers comprised 8.7% of the obese group and 11.5% of the non-obese group. No significant differences were observed in employment status (P > 0.05).

Income levels showed that 27.8% of the obese participants were in the low-income group, 39.7% in the medium-income group and 32.5% in the high-income group. Among the non-obese, 25.6% were in the low-income group, 41.5% in the medium-income group and 32.9% in the high-income group. The overall income distribution was similar between the groups, with no significant differences (P>0.05).

Obese participants reported a higher frequency of fast food consumption, averaging 4.3 days per week (SD = 1.5), compared to 2.1 days per week (SD = 1.2) for non-obese participants. This difference was statistically significant (P<0.001). Similarly, the intake of sugary beverages was higher among the obese

group, with an average of 2.7 servings per day (SD = 0.9), compared to 1.5 servings per day (SD = 0.7) for the non-obese group, which was also statistically significant (P<0.001).

Conversely, the consumption of fruits and vegetables was lower among obese participants, averaging 1.8 servings per day (SD = 0.7), compared to 2.9 servings per day (SD = 1.0) for the non-obese participants, with this difference being statistically significant as well (P<0.001).

Meal frequency did not show statistically significant differences between the groups. Among the obese participants, 23.0% consumed 1-2 meals per day, 57.1% consumed 3 meals per day and 19.8% consumed more than 3 meals per day. In comparison, among the non-obese participants, 17.1% consumed 1-2 meals per day, 63.7% consumed 3 meals per day and 19.2% consumed more than 3 meals per day (P>0.05 for all meal frequency categories).

Obese participants reported spending significantly more time in sedentary activities, averaging 7.5 hours per day (SD = 2.0), compared to 5.3 hours per day (SD = 1.8) for non-obese participants (P<0.001). In terms of moderate physical activity, obese individuals engaged in an average of 1.5 hours per week (SD = 0.9), while non-obese participants reported an average of 3.6 hours per week (SD = 1.5), with this difference being statistically significant (P<0.001). For vigorous physical activity, the obese group averaged 0.5 hours per week (SD = 0.3), compared to 1.2 hours per week (SD = 0.7) among the non-obese group, which was also a statistically significant difference (P<0.001).

Obese participants had a shorter average sleep duration of 5.6 hours per night (SD = 1.2) compared to 7.2 hours per night (SD = 1.4) for non-obese participants, a difference that was statistically significant (P<0.001).

In terms of sleep quality, only 23.8% of obese participants reported having good sleep quality, compared to 51.3% of non-obese participants, which was a statistically significant difference (P<0.001). The proportion of participants reporting fair sleep quality was similar between the obese (35.7%) and non-obese (33.3%) groups, with no significant difference (P = 0.65). However, a higher percentage of obese participants (40.5%) reported poor sleep quality compared to non-obese participants (15.4%), which was also statistically significant (P<0.001).

Regarding stress levels, a lower proportion of obese participants reported low stress (19.0%) compared to non-obese participants (36.3%), with this difference being statistically significant (P<0.001). The proportion of participants with moderate stress was similar between the obese (41.3%) and non-obese (41.5%) groups (P = 0.97). However, a higher percentage of obese participants (39.7%) reported high

stress levels compared to non-obese participants (22.2%), which was statistically significant (P<0.001). In terms of stress coping mechanisms, only 27.8% of obese participants used healthy coping mechanisms (such as exercise and hobbies), compared to 44.4% of non-obese participants, a difference that was statistically significant (P = 0.001). Conversely, a higher percentage of obese participants (72.2%) resorted to unhealthy coping mechanisms (such as smoking and overeating) compared to non-obese participants (55.6%), which was also statistically significant (P = 0.001).

High fast food consumption significantly increased the likelihood of obesity, with an OR of 3.2 (95% CI: 1.8-5.6, P<0.001). This indicates that participants who frequently consumed fast food were more than three times as likely to be obese compared to those who did not. High sugary beverage intake was also significantly associated with obesity, with an OR of 2.9 (95% CI: 1.6-5.3, P<0.001), suggesting that high consumption of sugary drinks nearly tripled the risk of obesity. Low physical activity was another significant factor, with an OR of 4.1 (95% CI: 2.3-7.4, P<0.001), indicating that participants with low physical activity levels were over four times more likely to be obese. Poor sleep quality was associated with an increased risk of obesity, with an OR of 2.5 (95% CI: 1.4-4.5, P = 0.002). This shows that participants with poor sleep quality were 2.5 times more likely to be obese compared to those with good sleep quality. High stress levels were also significantly associated with obesity, with an OR of 3.0 (95% CI: 1.7-5.4, P<0.001), indicating that participants experiencing high-stress levels had three times the odds of being obese compared to those with low stress levels.

This study investigated the association between various lifestyle factors and obesity in middle-aged Indian adults attending a tertiary care teaching hospital. The findings reveal significant correlations between obesity and high fast food consumption, high sugary beverage intake, low physical activity levels, poor sleep quality and high stress levels.

Our results show that high fast food consumption is a significant predictor of obesity (OR: 3.2, 95% CI: 1.8-5.6). This is consistent with previous studies which have found that diets high in fast food, which are typically rich in calories, fats and sugars, contribute significantly to weight gain and obesity[8]. The frequent consumption of fast food leads to an energy imbalance, promoting adiposity and increasing the risk of obesity-related diseases[9].

Similarly, high sugary beverage intake was associated with nearly a threefold increase in the risk of obesity (OR: 2.9, 95% CI: 1.6-5.3). This finding aligns with existing literature that highlights the role of sugary beverages in obesity[10,11]. Sugary drinks are high

in added sugars and calories but provide little to no nutritional value, contributing to excess calorie intake and weight gain .

Low physical activity levels emerged as the strongest predictor of obesity in our study (OR: 4.1, 95% CI: 2.3-7.4). This supports the well-documented relationship between sedentary behavior and increased obesity risk[6,12]. Physical inactivity leads to an imbalance between energy intake and expenditure, fostering the accumulation of body fat .

Poor sleep quality was also found to be significantly associated with obesity (OR: 2.5, 95% CI: 1.4-4.5). This is in line with research that links sleep deprivation and poor sleep quality to weight gain and obesity[13]. Insufficient sleep can alter hormonal balances, increase appetite and reduce energy expenditure, thereby promoting weight gain .

High stress levels were another significant factor (OR: 3.0, 95% CI: 1.7-5.4). Chronic stress has been shown to contribute to obesity through behavioral and physiological mechanisms, including stress-induced eating and alterations in metabolism . Our findings emphasize the importance of stress management in obesity prevention programs[14].

The demographic characteristics indicated no significant differences in gender, education level, occupation, or income level between obese and non-obese participants, suggesting that lifestyle factors play a more critical role in obesity in this population.

Limitations: This study has several limitations. First, the cross-sectional design does not allow for causal inferences. Second, self-reported data on dietary habits, physical activity, sleep quality and stress levels may be subject to reporting biases. Third, the study was conducted at a single tertiary care teaching hospital, which may limit the generalizability of the findings to other settings or populations.

CONCLUSIONS

Our study highlights the significant associations between lifestyle factors and obesity among middle-aged Indian adults. High fast food consumption, high sugary beverage intake, low physical activity, poor sleep quality and high stress levels were all significant predictors of obesity. These findings underscore the need for comprehensive public health strategies focusing on lifestyle modifications to combat the growing obesity epidemic in India. Future research should explore these associations longitudinally and consider interventions targeting these modifiable risk factors.

REFERENCES

1. WHO., 2024. Obesity and overweight. World Health Organization, Geneva, Switzerland, https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.
2. Gupta, R.D., N. Tamanna, N. Siddika, S.S. Haider, E.H. Apu and M.R. Haider, 2023. Obesity and abdominal obesity in Indian population: Findings from a nationally representative study of 698, 286 participants. Epidemiologia, 4: 163-172.
3. Paswan, B., S.K. Singh, H. Lhungdim, C. Shekhar and F. Arnold *et al.* 2017. National Family Health Survey (NFHS-4) 2015-16: India. International Institute for Population Sciences,, Mumbai, India, Pages: 666.
4. Chaudhary, M. and P. Sharma, 2023. Abdominal obesity in India: Analysis of the national family health survey-5 (2019-2021) data. Lancet Reg.l Health Southeast Asia, Vol. 14 .10.1016/j.lansea.2023.100208.
5. Misra, A. and U. Shrivastava, 2013. Obesity and dyslipidemia in south asians. Nutrients, 5: 2708-2733.
6. Anjana, R.M., R. Pradeepa, A.K. Das, M. Deepa and A. Bhansali *et al.* 2014. Physical activity and inactivity patterns in India-results from the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-5]. Int. J. Behav. Nutr. Phys. Act., Vol. 11 .10.1186/1479-5868-11-26.
7. Madhu, S.V., K. Nitin, D. Sambit, R. Nishant and K. Sanjay, 2022. ESI clinical practice guidelines for the evaluation and management of obesity in India. Indian J. Endocrinol. Metab., 26: 295-318.
8. Mohammadbeigi, A., A. Asgarian, E. Moshir, H. Heidari, S. Afrashteh, S. Khazaei and H. Ansari 2018. Fast food consumption and overweight/obesity prevalence in students and its association with general and abdominal obesity J. Prev. Med. Hyg., 59: 236-240.
9. Dsouza, O. and D. Dsouza, 2022. Impact of fast food consumption on nutritional status of high school students in south India. Int. J. Of Comm. Med. Public Health, 9: 2880-2887.
10. Malik, V.S., A. Pan, W.C. Willett and F.B. Hu, 2013. Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. Am. J. Clin. Nutr., 98: 1084-1102.
11. Singh, G.M., R. Micha, S. Khatibzadeh, S. Lim, M. Ezzati and D. Mozaffarian, 2015. Estimated global, regional and national disease burdens related to sugar-sweetened beverage consumption in 2010. Circulation, 132: 639-666.
12. WHO., 2018. Global Action Plan on Physical Activity 2018-2030: More Active People for a Healthier World. World Health Organization, Geneva, Switzerland, ISBN-13: 9789241514187.
13. Patel, S.R. and F.B. Hu, 2008. Short sleep duration and weight gain: A systematic review. Obesity, 16: 643-653.
14. Torres, S.J. and C.A. Nowson, 2007. Relationship between stress, eating behavior and obesity. Nutrition, 23: 887-894.