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Research Article

Obesity and Markers of Visceral Fat among Reproductive-Age Women of city of North India

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ABSTRACT

Background: Obesity is a major contributor to non-communicable diseases worldwide, including in India. It is observed to be more prevalent among females, and several factors are believed to play a role in its development.
Aim: To estimate prevalence of obesity and distribution of visceral fat and to assess indicators of visceral fat among reproductive age group females.
Methods: An observational study was conducted from March to May 2024. A total of 440 married females visiting a health camp were included in the study. They were assessed using ainterviewer-administered semi-structured questionnaire and anthropometric examination.
Results: The mean age of study participants was found to be 29.37±5.23 years. 327 (74.32%) of the study participants were found obese with BMI > 25Kg/m^2, 19.10% of them had high visceral fat and almost two thirds (64.70%) of them had high body fat percentage. Increasing age, gravida and parity were found to be significantly associated with obesity and visceral fat.
Conclusion: Obesity is among most prevalent non-communicable conditions among reproductive age group females. Though various indicators are known to be associated with this, the relationship of fat distribution with indicators like age, gravida and parity needs to be explored further.

Keywords*: Obesity, visceral fat, Reproductive age group, females, non-communicable diseases.*

INTRODUCTION

We are witnessing an epidemic of non-communicable diseases with diet- and lifestyle-related health issues becoming increasingly common. Among others, obesity isone such condition, which has impacted a large portion of the global population.[1,2] It also acts as a major risk factor for several other health problems, including diabetes, heart disease, and high blood pressure.[3]

A concerning rise in the number of overweight and obese women is being seen across many low- and middle-income countries. In India, lifestyle-related diseases have been steadily increasing as well. While obesity is growing across all age groups and genders, it is notably more prevalent among women.[4,5]This trend is largely linked to demographic transitions and widespread lifestyle changes occurring globally.[5]

Distribution of fat deposition also plays an important role in conditions like obesity.[6]There are certain schools of thoughts which say that upper body or visceral obesity has high risk of conditions like dyslipidaemia, hypertension, diabetes etc.[7-9]Given the importance of maintaining a healthy BMI, it is essential to understand the extent of the issue across different segments of society and among women of various age groups. Additionally, exploring any potential links between visceral fat content and various factors contributing towards obesity is equally important.

Since obesity, as a lifestyle disease, is influenced by a wide range of factors, the specific associations between these factors have been relatively underexplored across different genders and age groups. Moreover, there is a lack of

sufficient research on the relationship between obesity and various indicators of visceral fat, particularly among women of reproductive age in India.

Therefore, a study was planned to be conducted among beneficiaries of a health camp organized in the study setting, with the objectives of determining the prevalence of obesity and distribution of visceral fat within the selected sample population and evaluating various indicators of visceral fat among women of reproductive age.

METHODOLOGY

Type of study: Cross sectional Study

Study setting: A health camp at an urban colony of Central government employees having occupant families from various parts of the country.

Study Population: Adult female homemakers residing at a Central government employees' colony.

Sample Size: Sample size was calculated by using the formula for cross-sectional studies ($N = Z_{1-\alpha/2}^2(pq)/d^2$) where, $Z_{1-\alpha/2}$ = Is standard normal variate (at 5% type 1 error (P<0.05) it is 1.96. p is considered as prevalence of obesity among the study group of interest; q is taken as 100-p and d is the absolute error or precision as decided by the researcher. Here prevalence was considered as the proportion of participants found to be obese (55%) from the study by R B Singh et al.[10]

Sampling Strategy: Adult female homemakers who attended a central medical camp organized for the benefit of residents by a nearest hospital were approached to be a part of the study. Consenting participants satisfying the inclusion and exclusion criteria were enrolled till sample size was achieved.

Inclusion Criteria: All adult homemakers residing in the colony who consented to be a part of health camp were included in the study.

Exclusion Criteria: All those female residents who were working, having known co-morbid conditions and/or were not willing to participate were not included in the study.

Study Tool: The study tool had two parts. First was assessment with a pre-tested, semi structured, interviewer-administered questionnaire, and the second was examination of the attendees. The examination included anthropometric examination and body fat analysis.

Attendees were asked to undergo basic anthropometric measurements including height and weight. The weight was measured using digital weighing scale (SECA 874U digital scale) and height was measured using stadiometer (SECA 213 Stadiometer) and BMI was calculated. Body Fat Analysis was done for each participant using digital body fat analyzer (Omron – Karada HBF-375 Body Fat Analyzer).

Ethical Consideration: Approval to conduct the study was taken from Institutional ethics committee of nearest teaching hospital of the locality. A written informed consent was taken from all participants included in the study. The data was entered in MS-excel and was analyzedusing SPSS Ver 21.0. Statistical tests like chi-square/fisher's exact test and unpaired t-test were used to check any significant association. A p value of less than 0.05 was considered significant.

RESULTS

The study included 440 female participants. Mean age of study participants was found to be 29.37 ± 5.23 years. Maximum number of participants (116, 26.36%) reported their native state to be Uttar Pradesh. Many also belonged to Maharashtra, Bihar, Uttarakhand, West Bengal and Jammu & Kashmir. Majority (250, 56.9%) of them had their age between 18 to 30 years followed by of age category 30–40 years (173, 39.5%).

Majority (332, 75.5%) of the study participants completed their higher education. Majority (233, 52.8%) of the study participants were non-vegetarian. Among all study participants, 327 (74.32%) had BMI more than 23 kg/m^2. Also, 84 participants (19.1%) were found to have high visceral fat estimations.

Table 1: Sociodemographic profile and visceral fat status of study participants (N=440).

Sl No	Variable	Visceral fat		p value
		High	Normal	
01.	Age Group			P=0.017
	18–30 years	38 (45.24%)	212 (59.55%)	

Sl No	Variable	Visceral fat		p value
	30 years and more	46 (54.76%)	144 (40.45%)	
02.	Diet			**P=0.899**
	Veg	39 (46.43%)	168 (47.19%)	
	Non-veg	45 (53.57%)	188 (52.81%)	
03.	Education			**P=0.529**
	Up to Secondary	23 (27.38%)	86 (24.16%)	
	Intermediate and above	61 (72.62%)	270 (75.84%)	

Among participants who were found to have significantly high visceral fat distribution, majority belonged to older population (30 years and above) as compared to participants with normal visceral fat distribution where majority (59.55%) belonged to the age group of 18 to 30 years (p=0.017). Dietary preferences also seemed to affect visceral fat distribution with most vegetarians (47.19%) having normal visceral fat while majority of the non-vegetarians (53.57%) had high visceral fat distribution, however this association was found to be non-significant (p=0.899). The distribution of participants as per their education status and visceral fat distribution was also observed to be non-significant (p=0.529). (Table 1)

Table 2: Anthropometric/menstrual profile and visceral fat status of study participants (N=440).

Sl No.	Variable	Visceral Fat		Remarks
		Normal	**High**	
01.	Age (Mean±SD, years)	26.72±4.18	30.51±5.16	**t:7.12, p<0.001**
02.	Gravida (Mean±SD)	1.96±1.17	2.24±1.02	**t:2.01, p=0.04**
03.	Parity (Mean±SD)	1.57±0.81	1.82±0.75	**t:2.68, p=0.007**

Assessing certain factors of the study participants, particularly age, their gravida and parity status, it was observed that participants with high visceral fat content were older in age (30.51±5.16 years vs 26.72±4.18 years), had high gravida (2.24±1.02 vs 1.96±1.17) as well as parity status (1.82±0.75 vs 1.57±0.81). All these differences of mean were found to be significant with p values less than 0.05. (Table 2)

DISCUSSION

Obesity has emerged as one of the most significant non-communicable conditions globally, and its rising burden among women of reproductive age warrants particular attention.[1,2] The present study was conducted among married female homemakers residing at a central government employees' colony and aimed to estimate the prevalence of obesity and assess indicators of visceral fat in this population.

In the present study, more than two-thirds (74.32%) of participants were found to have a BMI >25 kg/m^2, and 70.78% had a BMI >23 kg/m^2 using Asian cutoff criteria. These findings are consistent with national surveillance data from the NFHS-5 (2019–21), which documented a rising prevalence of overweight and obesity among women of reproductive age across India, particularly in urban settings.[11] A nationwide cross-sectional study by Ganie et al. (2023) reported that obesity prevalence among reproductive-age women reached 40% using revised Asian Indian consensus guidelines — underscoring that Asian-specific BMI cutoffs more accurately capture the adiposity burden in this population.[12] Furthermore, a longitudinal analysis of NFHS rounds from 2005 to 2021 by Singh et al. (2023) showed a significant rise in overweight/obesity among urban women of reproductive age, from 23% in 2005–06 to 33% in 2019–21, reflecting

the impact of urban lifestyle transitions.[13] The urban setting of the present study — a central government colony with families from diverse regions — is consistent with these findings.

Similar high prevalence figures were also reported by R B Singh et al.,[10] where 55% of women were found obese, with the highest proportion (67%) from Kolkata, and by SangitaGirdhar et al.,[14] who similarly reported increasing obesity prevalence with age. In the present study, the age group of 30–40 years had significantly higher obesity prevalence compared to the 18–30 years group ($p<0.05$), which aligns with these prior reports and is corroborated by national-level data. Analysis of NFHS-5 data by Chakrabarty and Let (2024) demonstrated significant spatial clustering of overweight and obesity among women, with older age consistently emerging as a key determinant.[15] A large nationally representative study of 698,286 Indian participants confirmed that older age and female gender independently increased the odds of both general and abdominal obesity.[16]

Education was found to be significantly associated with obesity ($p<0.05$) in the present study, with the majority of participants having normal BMI being graduates and above, consistent with the results reported by S Girdhar et al.[14] However, this association is complex — at the national level, higher education has been associated with increased obesity risk, possibly mediated through sedentary occupations and dietary transitions accompanying socioeconomic advancement.[16]

Mean systolic and diastolic blood pressure were significantly elevated among obese participants compared to those with normal BMI ($p<0.05$), supporting the multifactorial causation theory of non-communicable diseases and consistent with findings from the epidemiological study by Girdhar et al. among North Indian housewives, where obesity was strongly associated with hypertension.[14]

In the present study, mean gravida and parity were significantly higher among women with BMI >23 kg/m^2 compared to those with normal BMI ($p<0.05$), consistent with HajarAdib Rad et al.[17] Among women with high visceral fat, mean age (30.51±5.16 vs. 26.72±4.18 years), gravida (2.24±1.02 vs. 1.96±1.17), and parity (1.82±0.75 vs. 1.57±0.81) were all significantly elevated (all $p<0.05$). These observations are corroborated by several international studies. The Women's Health Initiative study (2024), involving 10,184 postmenopausal women, found that higher parity was significantly associated with greater visceral adipose tissue (VAT) levels.[18] The FINRISK national population study similarly demonstrated that multiparous women (≥3 deliveries) had significantly higher visceral obesity than other parity groups, with odds ratio of 1.36 (95% CI: 1.16–1.60).[19] A prospective CARDIA study further provided direct evidence that childbearing may increase VAT independent of overall body fat accumulation, with visceral adipose tissue being more metabolically active and associated with elevated cardiometabolic risk.[20] The biological basis for this association may lie in hormonal changes during and after pregnancy — including shifts in estrogen, progesterone, and adipokine levels — that promote central fat deposition with increasing parity and age.

Though the study has well defined methodology, still it has got some limitations. Being cross-sectional study negates the chances of establishment of causation, the sample size though scientifically calculated but still not very large, hence affecting generalisability of the study findings. Inherent biases of cross-sectional study might have also affected the study findnigs.

CONCLUSION

Obesity is among the most prevalent non-communicable conditions affecting women of reproductive age in India, and the findings of the present study are consistent with this national and global trend. Increasing age, gravida, and parity were found to be significantly associated with both obesity and visceral fat accumulation, highlighting the cumulative metabolic burden that reproductive events may impose on women's body composition over time. Future research should prioritize multicentric studies with larger and more diverse sample populations to establish robust associations between obesity, visceral fat distribution and reproductive history. Community-level screening programs targeting married women in the 30 to 40-year age group, particularly those with higher parity should be considered as a strategy for early identification and interventionof related non-communicable diseases in this vulnerable population.

Conflict of Interest: None
Source of Finding: None

REFERENCES

1. Garcez A, Dias-da-Costa JS, Souza de Bairros F, AnselmoOlinto MT. Body Mass Index and Prevalence of Obesity in Brazilian Adult Women: Temporal Comparison of Repeated Population-Based Cross-Sectional Surveys. J Obes. 2024 Oct 29;2024:9950895.
2. Cappellini MD, Musallam KM and Taher AT: Iron deficiency anaemia revisited. J Intern Med. 2020;287:153–170.
3. Gregg EW and Shaw JE: Global health effects of overweight and obesity. N Engl J Med. 2017;377: 80–81.
4. Ribot B, Ruiz-Díez F, Abajo S, March G, et al. Prevalence of anaemia, risk of haemoconcentration and risk factors during the three trimesters of pregnancy. Nutr Hosp. 2018;35:123–130.

5. Habib MA, Raynes-Greenow C, Soofi SB, et al. Prevalence and determinants of iron deficiency anemia among non-pregnant women of reproductive age in Pakistan. Asia Pac J ClinNutr. 2018;27:195–203.
6. Jensen MD. Role of body fat distribution and the metabolic complications of obesity.J ClinEndocrinolMetab. 2008 Nov;93(11 Suppl 1):S57-63.
7. Kissebah AH, Alfarsi S, Adams PW, Wynn V. Role of insulin resistance in adipose tissue and liver in the pathogenesis of endogenous hypertriglyceridaemia in man. Diabetologia. 1976 Dec;12(6):563-71.
8. Cassano PA, Segal MR, Vokonas PS, Weiss ST. Body fat distribution, blood pressure, and hypertension. A prospective cohort study of men in the normative aging study. Ann Epidemiol. 1990 Oct;1(1):33-48.
9. Seidell JC, Cigolini M, Deslypere JP, Charzewska J, Ellsinger BM, Cruz A. Body fat distribution in relation to serum lipids and blood pressure in 38-year-old European men: the European fat distribution study. Atherosclerosis. 1991 Feb;86(2-3):251-60.
10. Singh RB, Ghosh S, Beegom R, et al. Prevalence and determinants of central obesity and age-specific waist:hip ratio of people in five cities: the Indian Women's Health Study. J Cardiovasc Risk. 1998 Apr;5(2):73–7.
11. National Family Health Survey-5. 2019–21.INDIA Fact Sheet. Available from: http://rchiips.org/nfhs/NFS-5_FCTS/India.pdf
12. Ganie MA, Chowdhury S, Suri V, et al. Prevalence, regional variations, and predictors of overweight, obesity, and hypertension among healthy reproductive-age Indian women: nationwide cross-sectional PCOS Task Force Study. JMIR Public Health Surveill. 2023;9:e43199.
13. Singh A, Let S, Tiwari S, Chakrabarty M. Spatiotemporal variations and determinants of overweight/obesity among women of reproductive age in urban India during 2005–2021. BMC Public Health. 2023;23:1943.
14. Girdhar S, Sharma S, Mahajan A, Arora M, Jaret P. An epidemiological study of overweight and obesity among women in an urban area of North India.Int J Community Med Public Health. 2016;3(3):714–718.
15. Chakrabarty M, Let S. Spatial clustering of overweight/obesity among women in India: insights from the latest National Family Health Survey. PLoS ONE. 2024;19(7):e0305205.
16. Let S, Chakrabarty M. Obesity and abdominal obesity in Indian population: findings from a nationally representative study of 698,286 participants. Epidemiologia. 2023;4(2):161–176.
17. Adib Rad H, Sefidgar SAA, Tamadoni A, et al. Obesity and iron-deficiency anemia in women of reproductive age in northern Iran. J Educ Health Promot. 2019 Jun 27;8:115.
18. WHI Study Group. The association between reproductive history and abdominal adipose tissue among postmenopausal women: results from the Women's Health Initiative. Hum Reprod. 2024.
19. Männistö S, Laatikainen T, Helakorpi S, et al. Ten-year change in the association between obesity and parity: results from the National FINRISK Population Study. Obes Facts. 2010;3(6):345–351.
20. Gunderson EP, Sternfeld B, Wellons MF, et al. Childbearing may increase visceral adipose tissue independent of overall increase in body fat. Obesity (Silver Spring). 2008;16(5):1078–1084.