# Prevalence Of Abdominal Obesity Among Healthy Individuals Aged 18–30 Years In Pune Using Waist Circumference: A Cross-Sectional Study

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**Abstract**

Background: Abdominal obesity is a key predictor of metabolic disorders and cardiovascular diseases, often overlooked in young adults. Early identification through waist circumference (WC) is a simple, cost-effective screening method to prevent future complications.

Objective: To find the prevalence of abdominal obesity among healthy individuals aged 18–30 years using waist circumference in Pune.

Methods: A cross-sectional study was conducted on 370 participants aged 18–30 years in Pune. WC was measured using standardized ACSM guidelines. Data was analyzed using descriptive statistics.

Results: Among 370 participants, 195 were females and 175 males. WC within normal limits. Only 4% of males and 5% of females were found to have high WC, indicating low abdominal obesity prevalence in this age group.

Conclusion: Abdominal obesity was low among participants aged 18–30 in Pune. However, given its strong association with future metabolic complications, periodic screening and lifestyle interventions should be encouraged even among young adults.

Keywords: Abdominal obesity, Waist circumference, Young adults, Cross-sectional study, Central obesity.

Introduction

All over the world, disease patterns are changing quickly. This change is drawing attention from doctors and health experts. New health problems like obesity, heart disease, and diabetes are becoming more common [1]. Abdominal obesity, also known as visceral obesity, is strongly linked to several health problems like type 2 diabetes, heart disease, some types of cancer, and even early death [2]. Since abdominal obesity is an important warning sign of these problems, it can help in identifying people at risk of such diseases. [3]

Studies show that abdominal fat can cause harmful changes in the body, including inflammation and a higher risk of blood clots. These problems are often linked to insulin resistance and are part of a group of health issues called metabolic syndrome. The amount of fat around the organs (called visceral fat) and in the liver is believed to be the main link between abdominal obesity and metabolic syndrome. Even if a person's BMI is normal, having a large waist can still mean they are at risk of heart and metabolic diseases. [4]

People with abdominal obesity are more likely to develop heart disease and other lifestyle-related diseases. This makes it a key risk factor in communities [5]. Modern lifestyles—due to urbanization and modernization—have led to unhealthy habits. Less physical activity and eating high-calorie foods with little nutrition are major reasons for the rise in childhood obesity in developing countries. [6]. Metabolic syndrome is linked to inflammation in the body. Visceral fat (fat around the organs) plays a big role in this. It causes imbalances in hormones released by fat tissue, insulin resistance, problems with blood vessels, and increases the risk of fat building up in the arteries. When these are combined with other common risk factors like high blood pressure, abnormal cholesterol levels, and smoking, the risk of heart and metabolic diseases goes up significantly. [7]

The most common and simple way to measure abdominal obesity is by checking waist circumference (WC). A large waistline is a strong sign of diseases like type 2 diabetes, heart disease, cancer, and higher risk of early death. [2]According to the World Health Organization (WHO), a waist size of more than 80 cm in women and more than 94 cm in men is considered abdominal or central obesity. [5]. Measuring waist size is a simple method to detect early signs of diseases like high blood pressure, diabetes, high cholesterol, joint pain, lower back pain, and high uric acid levels. [8]. Even trained health workers or patients themselves can take accurate waist measurements if they are taught the right way to do it. [6]

**Waist Circumference Measurement:**

· With the subject standing, arms at the sides, feet together, and abdomen relaxed.

· A horizontal measure is taken at the narrowest part of the torso (above the umbilicus and below the xiphoid process)

· The tape should rest gently on your skin without being pulled to   tightly.

· Take the measurement on the exhale.

· Note the measurement in cm

**FIG NO: 1**

Midpoint between the xiphoid process and the umbilicus



**FIG NO: 2**

Measurement taken  at midpoint

**FIG NO : 3**

**Waist circumference measurement**

**WAIST CIRCUMFERENCE CLASSIFICATION (according to ACSM Guidelines)[9]**

| Risk category | Men | Women |
|---|---|---|
| Very low | <80cm(31.5 in) | <70cm(<28.5 in) |
| Low | 80-99(31.5-39.0) | 70-89(28.5-35.0) |
| High | 100-120(39.0-47.0) | 90-110(35.5-43.0) |
| Very High | >120(>47.0) | >110(>43.5) |

Methodology

Type of study : Observational, cross sectional study

Sample Population: Between the age group of 18 to 30 years both male and female in pune

Sample Size: 370

| INCLUSION CRITERIA | EXCLUSION CRITERIA |
|---|---|
| ●    Age group 18 -30 years | ●    Subjects with recent condition like _ |
| ●    Both males and females | 1.    Abdominal surgeries |
|  | 2.    Cardiac condition |
|  | 3.    Pregnancy |

Procedure:

After Ethical committee approval

Participation was screened based on the inclusion and exclusion criteria.

They were briefed about the study procedure and the  informed consent was taken.

With the subject standing arms at the side, feet together, and abdomen relaxed.

A horizontal measurement is taken at the end of xiphoid process, mark a dot. then, mark another dot at the center of umbilicus.

Measure the waist circumference at the midpoint between these two dots.

The tape should rest gently on your skin without being pulled tightly.

Take the measurement on exhale.

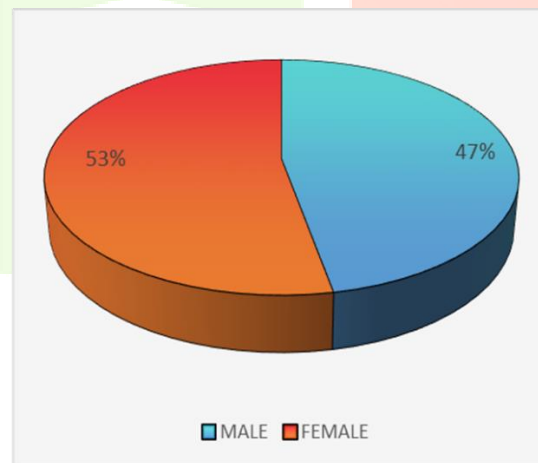Note the measurement in centimeter.

**Outcome measures**

(according to ACSM Guidelines)(9)

| Risk category | Men | Women |
|---|---|---|
| Very low | <80cm(31.5 in) | <70cm(<28.5 in) |
| Low | 80-99(31.5-39.0) | 70-89(28.5-35.0) |
| High | 100-120(39.0-47.0) | 90-110(35.5-43.0) |
| Very High | >120(>47.0) | >110(>43.5) |

## STATISTICAL ANALYSIS AND INTERPRETATION

The chart shows the total number of participants which is 370.In which female are 195 which is  53% ,and the male are 175 which is 47%

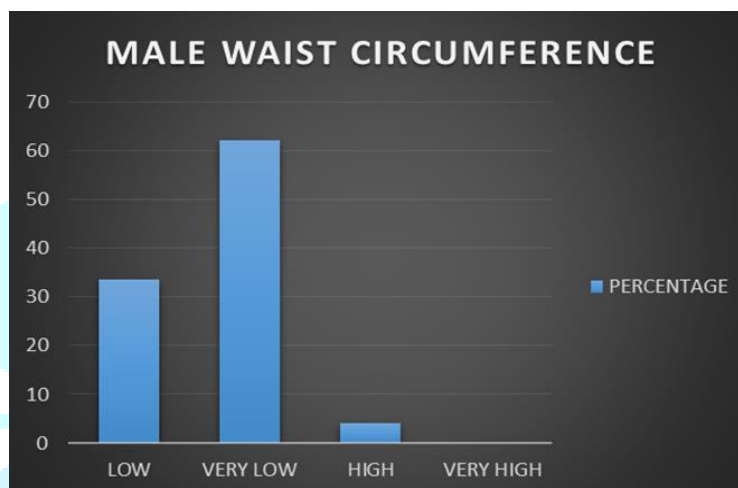| GENDER | PERCENTAGE | NUMBER |
|---|---|---|
| MALE | 47% | 175 |
| FEMALE | 53% | 195 |



## MALE WAIST CIRCUMFERENCE

The  chart shows the waist circumference interpretation of male. The number of  male under low waist circumference are 59 which is 34%. The number of male under very low waist circumference are109 which is 62 % and the number of male under high waist circumference are 7 which is 4%.

Table No :2

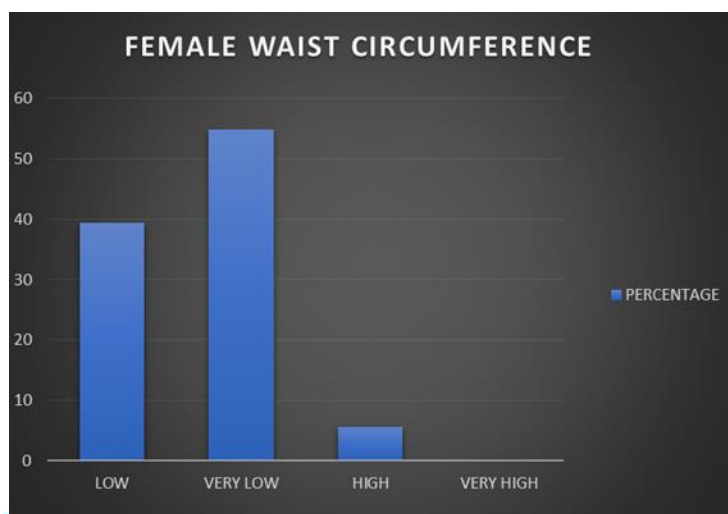| MALE(175) | NUMBER | PERCENTAGE |
|---|---|---|
| LOW | 59 | 34% |
| VERY LOW | 109 | 62% |
| HIGH | 7 | 4% |
| VERY HIGH | 0 | 0 |

Graph No :2



**FEMALE WAIST CIRCUMFERENCE**

The chart shows the waist circumference interpretation of female. The number of female under low waist circumference are 77 which is 39%. The number of female under very low waist circumference are 109 which is 54% and the number of female under high waist circumference are 11 which is 5 %.

Table No:3

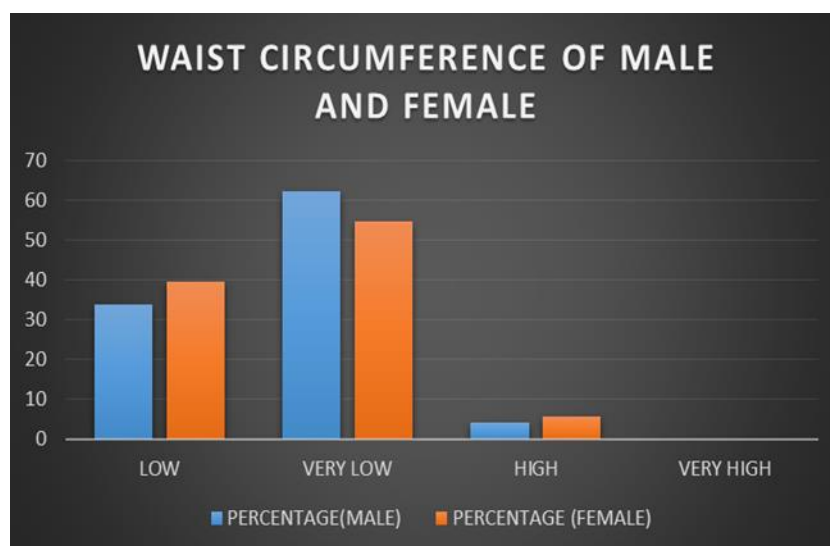| FEMALE(195) | NUMBER | PERCENTAGE |
|---|---|---|
| LOW | 77 | 39% |
| VERY LOW | 107 | 54% |
| HIGH | 11 | 5% |

Graph No:3



## WAIST CIRCUMFERENCE

The number of male under low waist circumference are 59 which is 34%. The number of male under very low waist circumference are109 which is 62 % and the number of male under high waist circumference are 7 which is 4%.

The number of female under low waist circumference are 77 which is 39%. The number of female under very low waist circumference are 109 which is 54% and the number of female under high waist circumference are 11 which is 5 %.

Table No:4

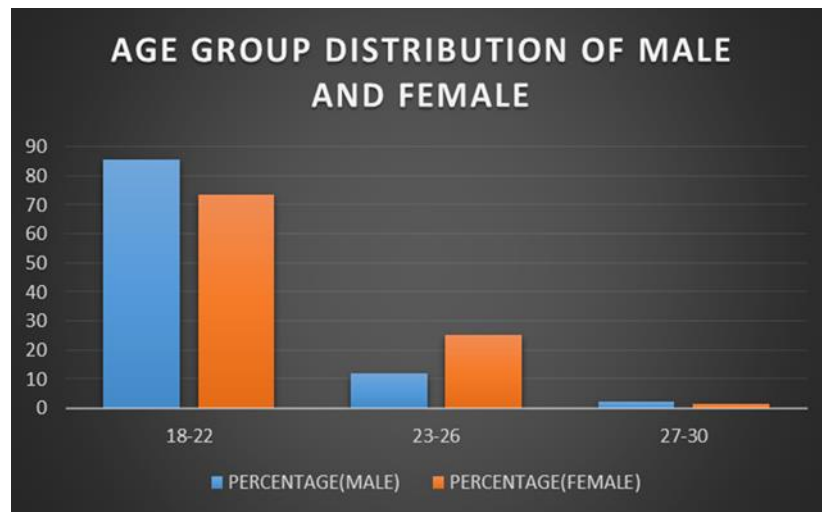| WC | MALE | FEMALE | PERCENTAGE(MALE) | PERCENTAGE (FEMALE) |
|---|---|---|---|---|
| LOW | 59 | 77 | 34% | 39% |
| VERY LOW | 109 | 107 | 62% | 54% |
| HIGH | 7 | 11 | 4% | 5% |
| VERY HIGH | 0 | 0 | 0 | 0 |

Graph No:4



**AGE GROUP**

The following  chart shows the classification based on age group. In male the number of people under the age group of 18-22 are 150 which is 86%. The number of people  under the age group of 23-26 are 21 which is 12 % and the number of people under the age group of 27-30 are 4  which is 2%.

In female the number of people under the age group of 18-22 are 143 which is 73%. The number of people under the age group of 23-26 are 49 which is 25 % and the number of people under the age group of 27-30 are 3 which is 1.5%

Table No:5

| AGE GROUP | MALE | FEMALE | PERCENTAGE(MALE) | PERCENTAGE(FEMALE) |
|---|---|---|---|---|
| 18-22 | 150 | 143 | 86% | 73% |
| 23-26 | 21 | 49 | 12% | 25% |
| 27-30 | 4 | 3 | 2% | 1.5% |

Graph No:5



Result

1)      The study on the prevalence of abdominal obesity among healthy individuals aged 18 to 30 years in Pune revealed important differences between male and female participants in terms of waist circumference, and age distribution.

**Male Participants:**

2)      waist circumference, the findings indicate that most males had relatively low abdominal fat. Specifically, 62 % of male participants had a **very low waist circumference**, which suggests that a large majority of males in this study had healthy abdominal measurements.

3)      Additionally, 34% of the male participants had a low waist circumference, indicating an absence of significant abdominal obesity. Only 4% of males fell into the high waist circumference category, suggesting a relatively low prevalence of central obesity among the male participants.

Female Participants:
.
4)      waist circumference, the findings for females showed a similar trend to the males in that the majority had relatively healthy abdominal measurements. While 54% of females had very low waist circumference, a slightly lower percentage 39% fell into the low waist circumference category. Additionally, only 5% of females had a high waist circumference.

**Age Distribution**:

5)      The following  chart shows the classification based on age group. In male the number of people under the age group of 18-22 are 150 which is 86%. The number of people  under the age group of 23-26 are 21 which is 12 % and the number of people under the age group of 27-30 are 4  which is 2%.

6)      In female the number of people under the age group of 18-22 are 143 which is 73%. The number of people  under the age group of 23-26 are 49 which is 25 % and the number of people under the age group of 27-30 are 3 which is 1.5%

**Discussion**

A cross-sectional investigation was conducted in Pune, India, to ascertain the prevalence of abdominal obesity in a cohort of healthy individuals aged 18 to 30 years, utilizing waist circumference as the primary anthropometric measure. The study population comprised 370 participants, with a gender distribution of 195 females (52%) and 175 males (47%).

The findings of this study indicated a higher prevalence of abdominal obesity among female participants (5%) compared to male participants (4%) within the specified age range. Although representing a relatively small proportion of the study population, these observations underscore the early manifestation of abdominal fat accumulation, which may serve as a predictive indicator for future metabolic dys- regulation in the absence of appropriate intervention.

The outcomes of this investigation provide noteworthy insights into patterns of abdominal fat distribution during early adulthood, a recognized major risk factor for the development of metabolic and cardiovascular pathologies.

Waist circumference is a well-established anthropometric measurement employed in the assessment of abdominal obesity, a critical component of metabolic syndrome. Specifically, waist circumference allows for the evaluation of central adiposity, which exhibits a more robust correlation with unfavorable health sequelae.

In a study by Chaudhary and Sharma et al., a considerably higher prevalence of abdominal obesity was reported, with 40% of women and 12% of men identified as abdominally obese. These findings indicate that approximately 5 to 6 out of every 10 women exhibited abdominal obesity, with a stronger association observed between abdominal obesity and older age groups in women [10].

The present study, conducted on a cohort of 370 young adults (195 females and 175 males), revealed a relatively high prevalence of abdominal obesity, with 5% of female participants and 4% of male participants exceeding the established waist circumference thresholds. In contrast, a separate investigation by Chaudhary and Sharma et al. reported a substantially higher prevalence of abdominal obesity, with 40% of women and 12% of men classified as abdominally obese.

This disparity highlights a notable difference in the prevalence rates observed between the two studies. Furthermore, the findings of Chaudhary and Sharma et al. suggest a considerably greater burden of abdominal obesity, particularly among women, with approximately 50-60% exhibiting this condition, and indicate a stronger association with increasing age within the female population.

In Ashish Goel , Paula Goel , Saurabh Goel  et al  The Prevalence of Metabolic Syndrome and Its Association With Waist Circumference in MiddleAged Individuals From Urban Mumbai The overall prevalence of metabolic syndrome with women exhibiting a significantly higher prevalence at 38% compared to men at 26% [11]

our study suggests that abdominal obesity is just beginning to emerge in young adults, with a minimal gender difference.

In contrast, the Goel et al. study shows that by middle age, these differences become more pronounced, with women more likely to develop metabolic syndrome, likely due to factors like hormonal changes, lifestyle, and increasing waist circumference.

This comparison highlights the progressive nature of metabolic and obesity-related conditions over time, emphasizing the need for early prevention in youth to mitigate risks in middle age.

Physiologically, central obesity plays a crucial role in Metaboli Syndrome by contributing to insulin resistance, which in turn leads to dyslipidemia, hypertension, and hyperglycemia. Central obesity is characterized by the accumulation of fat in the abdominal region, which is more metabolically active than subcutaneous fat [12]

Sonya Jagdesan in 2015,The prevalence of obesity was higher in girls than boys, in adolescents This new trend can be attributed to increasing accessibility and affordability of both junk foods andmodes of motorized transportation resulting in an increased consumption of energy-dense foods coupled with decreased physical activity [13]

Various studies done in India from 2002-2012 indicate a rising trend in the prevalence of overweight and obesity in children and adolescents [3-11]. This may have major implications towards increasing prevalence of non-communicable disease (NCD) like diabetes, hypertension and cardiovascular disease in early adulthood [14]

The age group 18-22 had comparatively more waist circumference than the other age group this difference may be because of more junk food consumption.

## Conclusion

According to study the waist circumference of female population in the  age group 18-22  was found to be in low risk category

According to study the waist circumference of male population in the  age group 18-22  was found to be in low risk category

## Acknowledgements

## REFRENCES

1) Saurabh Naranbhai Panchal, Akash Virendrabhai Agrawal, Nilesh Thakor, Prevalence and determinants of obesity and overweight among college students of Gujarat, India: a cross sectional study, Int Surg J. 2019 Dec;6(12): 4522-4526.

2) Murali Venkatrao, Raghuram Nagarathna, Vijaya Majumdar, Suchitra S. Patil , Sunanda Rathi , and Hongasandra Nagendra 'Prevalence of Obesity in India and Its Neurological Implications: A Multifactor Analysis of a Nationwide Cross-Sectional Study' 2020 Jul; 27(3-4): 153–161.

3) Satyam Singh Jayant , Rahul Gupta , Ashu Rastogi MD, ,Kanhaiya Agrawal , Naresh Sachdeva , Sant Ram , Pinaki Dutta , Sanjay Kumar Bhadada , Anil Bhansal Abdominal obesity and incident cardio-metabolic disorders in Asian-Indians: A 10-years prospective cohort study Diabetes & Metabolic Syndrome: Clinical Research & Reviews Volume 16, Issue 2, February 2022, 102418

4) Jean-Pierre Despres Abdominal Obesity and Cardiovascular Disease: Is Inflammation the Missing Link? Canadian Journal of Cardiology Volume 28, Issue 6, P642- 652, November-December, 2012 .

5) Vishnu Prasad R, Joy Bazroy, Zile Singh, Prevalence of overweight and obesity among adolescent students in Pondicherry, South India, International Journal of Nutrition, Pharmacology, Neurological Diseases: 20 nov-2015, 6(2):72

6) Rajesh K. Chudasama, T. K. M. Eshwar1, Dhara Thakrar, Subhasini T. Eshwar, Prevalence and Comparison of Obesity, Overweight, and Thinness by Different Growth Standards among Affluent Schoolchildren (8–18 Years) in Rajkot, Journal of Mahatma Gandhi Institute of Medical Sciences, , December 12, 2017, Volume 22.

7) S.A. Ritchie, J.M.C. Connell The link between abdominal obesity, metabolic syndrome and cardiovascular disease - Nutrition, Metabolism and Cardiovascular Diseases volume 17, Issue 4, P319-326, May 2007

8). Silke Feller, Heiner Boeing, Tobias Pischon Body Mass Index, Waist Circumference, and the Risk of Type 2 Diabetes Mellitus Deutsches Ärzteblatt International ,Dtsch Arztebl Int 2010;107(26)

9).Samuel Klein , David B. Allison, Steven B. Heyshfeild, David E. Kelley, Rudolph L. Leibel , Cathy Nonas, Richard Kahn ,Waist Cirumferene and Cardiometabolic Risk Diabetes Care, VOLUME 30, NUMBER 6, JUNE 2007

10). Ross Arena,Deborah Riebe,Paul D. Thompson ACSM'S Guidelines for Exercise Testing and Prescription NINTH EDITION,pg 67

11). Monika chaudhary and Priyanshu Sharma  Abdominal obesity in India: analysis of the National Family Health Survey-5 (2019–2021) data  The Lancet Regional Health- Southeast Asia 2023;14: 100208 Published Online 12 May 2023

12). Ashish Goel , Paula Goel , Saurabh Goel The Prevalence of Metabolic Syndrome and Its Association With Waist Circumference in MiddleAged Individuals From Urban Mumbai Cureus 16(9): e69669. DOI 10.7759/cureus.69669

13).Supreeya Swarup; Intisar Ahmed; Yulia Grigorova; Roman Zeltser " Metabolic Syndrome"  national library of medicine March 7, 2024.

14). Soniya Jagadesan, Ranjani harish, Priya Miranda, Ranjit Unni krishnan Prevalence of Overweight and Obesity Among School Children and Adolescents in Chennai, Indian peadiatrics volume  51 july 15, 2014

15).Partha Chakraborty, Subrata Dey, Ranabir Pal, Sumit Kar, Forhad Akhtar Zaman, Shrayan Pal, Obesity in Kolkata children: Magnitude in relationship to hypertension Journal of Natural Science, Biology and Medicine, January 2011,Vol 2 ,Issue 1