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ABDOMINAL OBESITY AND ITS ASSOCIATED RISK FACTORS - AN UPDATE

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Abstract

Background: India has a serious Abdominal Obesity (AO) concern with a frequency of 24.8%, particularly among metropolitan especially in women. Generalised obesity (GO) & AO, both of which are associated with greater rates of mortality & morbidity. In India, AO is more prevalent than GO (24.5%), & it has been associated to a number of health hazards, including the metabolic syndrome, insulin resistance, & cardiovascular diseases (CVD), high blood pressure & PCOS. In contrast to GO, WHO emphasises AO as a superior CVD risk indicator & suggests additional steps like WHR for risk identification. Saturated & trans-fat-rich unhealthy diets are a factor in AO. Management of obesity benefits from dietary adjustments & insulin sensitizers, taxing fats & sugary drinks can be potential solutions for public health. In order to reduce the risk of CVD, physicians must create customised action plans. **Conclusion:** In comparison to general obesity, abdominal obesity is associated with a greater death rate & a better prognosis for cardiovascular illnesses & metabolic problems.

Keywords: Abdominal Obesity, Metabolic Risk, Cardiovascular Diseases

1. INTRODUCTION

As reported by the WHO, obesity is becoming increasingly prevalent worldwide, with the occurrence nearly tripling from 4.8% in 1975 to 18% in 2020 (1). In India, obesity has become a major public health concern, especially in urban areas & among women, with a prevalence of 24.8% among females, according to the National Family Health Survey-V (NFHS-V) data from May 26th, 2022 (2). Obesity can be categorized into Generalized Obesity (GO) & Abdominal Obesity (AO), both of which are associated with higher mortality & morbidity rates (3). While AO is characterised by fat buildup around the waist & is assessed using the Waist Circumference (WC) & Waist to Hip Ratio (WHR), GO is assessed using the Body Mass Index (BMI) (4). AO is more prevalent in India compared to GO, with a prevalence of 24.5%

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compared to 21% (5). It is associated with various health risks, including metabolic syndrome, insulin resistance, dyslipidemia, & cardiovascular diseases (CVD) (6). It has also been linked to hypertension & Polycystic Ovary Syndrome (PCOS) in women (7), (8). The WHO emphasizes that AO is a better indicator of CVD risk compared to Generalized Obesity & recommends incorporating additional indicators like WHR to identify individuals at higher risk (9). Unhealthy dietary habits, such as diets high in saturated fats, Trans fats, & cholesterol, can contribute to AO (10). Lifestyle modifications & certain medications, like insulin-sensitizing agents, can help manage obesity & its associated health risks (11). Public health strategies to combat AO include increasing taxes on sugar-sweetened beverages & edible fats. Intentional weight loss is crucial in lowering CVD risk, & clinicians can implement action plans to identify & address obesity-related cardiovascular risks, considering the available resources in different countries (12).

2. LITERATURE

Obesity

Obesity is characterized by the excessive accumulation of fat, which poses potential health risks. Globally, overweight and obesity cause more deaths than underweight. There are two main categories of obesity: GO and AO. Both types are linked to higher rates of mortality and morbidity, as stated by the WHO (3).

Generalized obesity

Adults with GO are frequently classified using the BMI, which calculates weight in proportion to height. The BMI, originally the Quetelet Index, aids in determining a person's weight status, including whether they are underweight, normal weight, overweight, or obese. It is computed as follows: kg/m2, which is the product of a person's weight in kilogrammes and square of their height in metres. A BMI more than or equal to 25 or 30, respectively, is considered overweight or obese by the WHO. In contrast to these criteria, a BMI of 25.O or greater being considered obese for Indian population postulated by Misra A., et al and WHO Asia Pacific guidelines (1, 13).

Abdominal obesity

AO is characterised by a buildup of fat in the abdomen, which gives the person a pear-shaped look. AO is determined by anthropometric measures, specifically WC. Men are said to have AO if their WC is 90 cm or higher, while women are said to have AO if their WC is 80 cm or higher. A WHR of 0.88 or higher for males and 0.81 or higher for women is required to be classified as having abdominal, central, or visceral obesity, according to WHR (4).

South Asian more susceptible for AO

Asians often have 3% to 5% more body fat compared to whites and blacks. Due to their smaller body size, Asians also often have a BMI that is 2 to 3 units lower than that of whites for a given level of body fat. The traditional obesity cut-off points may not be appropriate for Asians in general, and South Asians in particular, as a result of these variances. The WHO suggests

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alternative cutoff thresholds for obesity in Asians, considering a BMI exceeding 25 to be obese, as compared to 30 for other ethnicities, to solve this issue. (9). Asian Indians are more likely than other communities to have AO and metabolic syndrome, and they are more likely than other populations to acquire diabetes and dyslipidemia at lower BMI and WC levels. South Asians show differences in fat distribution, with higher intra-abdominal visceral adipose tissue and excess deep subcutaneous abdominal fat, which impacts insulin resistance and CVD risk. Asian Indians exhibit a twofold increase in hepatic fat accumulation, which is linked to higher insulin resistance and a potential indicator for diabetes. Asian Indians also have lower levels of skeletal muscle mass, which may be due to genetic predispositions, low levels of physical exercise, and low-protein diets. Further study is required to fully comprehend the consequences of this. Further research is required to better understand how Asian Indians with type 2 diabetes (DM) accumulate intra-myocellular triglycerides (TG) (12,9).

Abdominal obesity versus generalized obesity

In India, AO has a higher prevalence of 24.5% compared to GO, which stands at 21% (5). AO is known to be linked with atherogenic risk factors associated with insulin resistance and has been identified as a robust predictor of CVD, independent of GO levels (14). The WHO Expert Consultation (WEC) on obesity highlighted the importance of abdominal fat accumulation, which can vary independently of total body fat and BMI (9). Additionally, it is positively related to hypertension and metabolic diseases. The anthropometric indices of AO also correlate with dyslipidaemia (15).

Since BMI is widely acknowledged to have limitations as a predictor of obesity and adiposity, researchers are looking into other anthropometric measurements to help assess and predict cardiovascular risk. Some of these measures include WC, WHR, bio impedance, etc. But, the global implementation of newer, more expensive methodologies is hindered by resource disparities in various locations (16, 17). A consensus statement underscores the importance of waist circumference as a vital sign in clinical practice, highlighting its role in assessing abdominal obesity (18).

Epidemiology of Obesity in India

Urban India:

The New Delhi based Cohort Study reported an even higher prevalence, with 54% of men and 66% of women classified as obese. Using WC cut-offs among Asian adults, approximately 70% exhibited central obesity. Furthermore, according to findings from the Chennai Urban Population Study, around 50.9% of men and 49.8% of women experienced abdominal obesity (19)

Rural India:

According to a study done in rural Tamil Nadu, 32.8% of males and 38.2% of women had a BMI of 23 or above. This shift in the epidemiological landscape has also led to increased rates of hypertension (19).

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National Family Health Survey (NFHS):

The incidence of overweight and obesity has changed noticeably in both males and females. In round IV, there was a relative increase of 55% among females, from 23.4% in round III to 36.2%. In round IV, the frequency for males jumped from 21.0% to 38.4%, producing a relative shift that was over 84% higher. Except for Rajasthan, the northern, northern, western, and southern regions of India all had higher rates of overweight and obesity. One in four Indians are now obese, with the frequency among females reaching 24.8%, according to the NHFS-V's latest statistics as of May 26th, 2022 (2).

An analysis by A. Minhas found that 24% of men and 22.9% of women are obese (20). In recent decades, obesity has become increasingly prevalent, particularly among the younger population. Obesity is linked to a number of disease risk, such as metabolic syndrome, insulin resistance, and changes in lipid metabolism. The majority of deaths associated with high BMI are linked to Cardiovascular Disease (CVD). (21).

Epidemiology of Abdominal Obesity in India

The prevalence of overweight and obesity has changed significantly for both men and women. In comparison to NHFS III, the proportion of females grew from 23.4% to 36.2% in round IV. Males saw a relative change that was almost 84% larger than females, going from 21.0% in NHFS round III to 38.4% in round IV, according to Chaudhary, M. et al (2). Tamil Nadu had the greatest frequency of AO among women (24.4%), followed by Maharashtra (18.1%) and Jharkhand (4.9%). For males, the rankings were 19.8%, 15.9%, and 5.3%, respectively. In addition, the research showed a significant difference in the prevalence of abdominal obesity (AO) between urban regions (44.3%) and rural areas (13.0%) (5).

Women more susceptible for abdominal obesity

In India, metropolitan regions and higher socioeconomic categories have greater rates of obesity than rural areas, especially among women, according to data from the NFHS-3 (5). The New Delhi Cohort Study, based in the capital city of India, revealed even higher prevalence rates, classifying 54% of men and 66% of women as obese. When Asian adults' WC cut-offs were used, around 70% of the individuals displayed central obesity (19). Females typically have a desirable body fat level between 25% and 30%, whereas adult men typically have one between 15% and 20%. It is interesting that, according to the WHO, women typically have more body fat than men do at the same BMI. The study also found that AO was significantly more common in women than in men, and this finding may be explained by the fact that women often had greater body fat percentages than males (22, 23).

Pathogenicity of Obesity:

Adipose tissue grows unevenly in obese people compared to other tissues, which causes it to produce more free fatty acids (FFA) and less insulin to prevent lipolysis. Tumour necrosis factor-alpha, interleukin-6, interleukin-4, leptin, plasminogen activator inhibitor-1, angiotensinogen, etc. are examples of proinflammatory adipokines that are produced by adipose tissue and are linked to metabolic and cardiovascular problems of obesity. Adiponectin

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and interleukin-4 are two examples of the anti-inflammatory and anti-atherosclerotic adipokines that are also produced by adipose tissue (24,25). According to Barroso, T. A. et al. (2017), the metabolic change caused by AO makes Metabolic Syndrome (MS) more prevalent (26).

Inflammation in Obesity

Atherosclerosis, insulin resistance, and coronary artery disease are just a few of the conditions that obesity, also known as chronic-low grade inflammation or "metabolic inflammation," is associated with developing (27). Adipose tissue plays a variety of metabolic tasks and is thought of as a complicated secretory organ. It influences the calorie expenditure, appetite, insulin sensitivity, bone metabolism, reproductive and endocrine systems, inflammation, and immunology in addition to serving as a TG reservoir. In comparison to a high BMI alone, visceral adiposity in particular reveals a robust connection with an increased risk of CVD and DM (28,29). The precise biochemical and physiological causes of the increased connection with visceral obesity, however, are yet unknown. According to one tenable idea, visceral fat has direct access to the portal circulation, allowing the substances it generates to have an instantaneous impact on the liver. Adipokines, a class of proteins produced and secreted by fat cells called adipocytes, are crucial for inflammation. Some of these adipokines such as Tumour Necrosis Factor (TNF), leptin, Interleukin (IL-6) and adiponectin. More than 50 different adipokines are known, and they are mostly characterised by how they affect inflammation. Different individuals secrete various forms of adipokines depending on their BMI; obese individuals favour producing pro-inflammatory adipokines from their adipose tissue, whereas lean individuals produce anti-inflammatory adipokines. Adipokines that are connected to the stimulation of inflammation include TNFs, IL-6, leptin, angiotensin II, visfatin, and resistin (30,31). Transforming growth factor-beta (TGF) is one of the anti-inflammatory adipokines, on the other hand. Adiponectin, IL-1Ra, IL-4, 10, 13& IL-1Ra(32).

Role of Genetics:

In defining body fat distribution (FD) and its effect on obesity-related issues, genetic factors are a crucial component. In comparison to subcutaneous fat, visceral fat, which is stored in the abdomen, is linked to a greater risk of metabolic and CVD. Numerous genes and locations have been found in genetic research, including genome-wide association studies (GWAS), that may control FD. These genes, which also differ in expression in distinct fat depots and are linked to features related to obesity, include TBX15, HOXC13, RSPO3, and CPEB4. Developmental genes have an impact on FD as well, with visceral and subcutaneous adipose tissue exhibiting different patterns of gene expression. Epigenetic modifications, such as DNA methylation, may also contribute to FD regulation. Understanding the function of these genes and their role in FD could lead to better insights into the complex etiology of obesity-related complications and potentially new treatment strategies (33).

A meta-analysis of 32 genome-wide association studies with up to 77,167 people was undertaken by the researchers, and they then followed up on 16 loci in 29 additional studies with up to 113,636 participants. They discovered 13 novel loci such as RSPO3, TBX15-

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WARS2, VEGFA, etc. and verified the existence of a known WHR signal. Interestingly, seven of these loci had considerable sexual dimorphism, with women seeing a larger impact on WHR than males. These results highlight significant gene-by-sex interactions and show the possibility of numerous genetic variables controlling body fat distribution (34).

Abdominal Obesity as a Better Indicator of Disease Risk than Generalized Obesity:

In a comprehensive report released by the WHO in 2008, it was highlighted that waist WC and WHR are more reliable indicators of CVD risk compared to traditional measures like BMI. The WHO Expert Consultation (WEC) on obesity emphasized the significance of assessing abdominal fat accumulation independently of total body fat and BMI to identify individuals at higher risk of obesity-related health issues associated with excess abdominal fat. Heart attacks, strokes, and early mortality have all been found to be highly associated with AO, as determined by WHR and WC. However, measurements of generalised obesity like BMI did not substantially correlate with these disorders. However, WHR revealed as a more potent independent risk factor when compared to BMI in the case of women, whose BMI demonstrated an elevated risk of CVD-related disorders. The study emphasized that WC and WHR should be vital components of the global strategy and action plan for addressing non-communicable diseases (NCDs). Although BMI is a commonly used metric, it may not effectively predict FD or differentiate between lean mass and fat mass, according to observations. BMI must be used in conjunction with other anthropometric measurements of the FD to effectively predict the risk of acquiring cardiovascular diseases (9).

Role of Abdominal Obesity in CVD

One significant metabolic alteration associated with AO is the glycaemic disorder, linked to an elevated risk of CVD. Due to the accumulation of adipose tissue and the accompanying release of free fatty acids, which are then swiftly transported to the liver, more TG and Very Low-Density Lipoprotein (VLDL) are produced. As a result, this issue can be connected to an increased risk of developing CVD that is specifically associated to AO. Several studies have associated AO with elevated TG levels (26, 25, 29, 35, 36).

Role of Abdominal Obesity in DM and Insulin Resistance:

The presence of prediabetes is closely related to AO symptoms. Due to insulin resistance, a condition where the body's cells become less receptive to insulin—a hormone necessary for controlling blood sugar levels by promoting glucose absorption into cells—this form of obesity plays a critical role in the onset and progression of DM. Due to the accumulation of glucose in the circulation, diabetes is characterised by increased blood sugar levels (15, 35). Visceral obesity is closely associated with hyperinsulinemia, insulin resistance, hyperlipidemia, and hypertension, all of which play a part in the development of atherosclerosis. Visceral obesity is essentially a subtype of metabolic obesity. Diabetes dramatically increases the risk of peripheral vascular disease, cerebrovascular illness, and coronary heart disease in people (6, 37).

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Role of Abdominal Obesity in Hypertension:

AO decreases the capacity of adipose tissue to retain fat, which results in a protracted proinflammatory reaction that aids in the emergence of insulin resistance. By encouraging the production of nitric oxide in vascular endothelial cells under physiologically normal circumstances, insulin aids in the dilation of blood arteries. This makes it easier for nutrients to go through the body and keeps the body's dynamic glucose balance in check. However, when there is insulin resistance, the islets' sensitivity declines, which causes a rise in vasoconstrictor factors. This may cause aberrant vasoconstriction and pathological vascular sclerosis. In addition, there is an imbalance in the functioning of the sympathetic nervous system and the renin-angiotensin-aldosterone system, which results in the growth of endothelium and smooth muscle cells, an increase in peripheral vascular resistance, salt and water retention, and ultimately a rise in blood pressure (15). The study by Sarathy, H., et al. looked specifically at racial differences in order to examine the connection between AO and chronic renal disease (38). .

Role of Abdominal Obesity in Dyslipidemia:

Central obesity is strongly associated with atherogenic dyslipidemia, which includes high TG, low HDL-C levels and elevated apolipoprotein B (ApoB). Each of these lipid disorders contributes to the development of fatty deposits in the arteries on its own. Insulin resistance develops in adipocytes as a result of structural and functional changes, which increase TG levels and decrease HDL cholesterol. This is especially true of the enlarged visceral adipose tissue that is linked with it. The development of atherosclerosis, a disorder marked by plaque building inside the arteries, is greatly influenced by this insulin resistance. A study discovered a substantial correlation between central obesity, as assessed by WC, and LDL-C levels. In the central obesity group compared to the non-central obesity group, the chance of having high LDL-C values was 3.1 times greater (39,8).

Role of Abdominal Obesity in PCOS:

In women of reproductive age, PCOS is a prevalent endocrine condition that is linked to visceral obesity, cardiovascular issues, insulin resistance (IR), and an inflammatory response (40). Studies have shown that the incidence of PCOS is higher in the obese group, and higher WHR has been associated with PCOS patients with insulin resistance. Various forms of dyslipidemia are observed in PCOS patients, with lower serum HDL and higher plasma levels of TG, LDL, and Total Cholesterol (TC) being common outcomes (41). Women who have PCOS are more likely to experience AO and metabolic syndrome, which can result in hypertension, lipid abnormalities, and IR and raise the risk of D,M, and CVD in later life. Lifestyle modifications, such as healthier eating habits, regular physical activity, and weight control, are fundamental in managing PCOS and its associated metabolic risks. Insulin-sensitizing agents, like metformin, can also be beneficial in managing PCOS (11,7).

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Role of Abdominal Obesity in Cancer:

Studies have shown a positive association between AO, measured by WC or WHR, and the likelihood of developing lung cancer. In order to prevent and manage lung cancer, it may be crucial to address obesity as a modifiable risk factor (42). Independent of BMI, higher WC has been linked to higher mortality from all causes, cardiovascular disease, and cancer in US women. Abdominal obesity may independently contribute to adverse health outcomes through mechanisms like chronic inflammation and insulin resistance, making it an important indicator of long-term health (43). Hepatocellular carcinoma, meningioma, gastric cancer, and ovarian cancer were added to the list of obesity-associated tumours by the International Agency for Research on Cancer (IARC) in 2016 . Obesity may contribute to the growth of gastric and esophageal cancers, according to some evidence (44,45). AO has been associated with an increased risk of breast cancer. Increased Risk: AO has been linked to an increased risk of breast cancer, especially in postmenopausal women. Hormones and inflammatory agents are released by excess abdominal fat, which may promote the development of cancerous cells. Hormonal Imbalance: Imbalances in hormones like oestrogen and insulin are associated with AO. These hormonal changes may have a role in both the development and spread of breast cancer. Aggressive Tumour Characteristics: According to research, women who are abdominally obese may develop tumours that are more aggressive in nature, with characteristics including greater size, higher grade, and a higher likelihood of lymph node involvement. Negative Prognosis: Breast cancer patients' prognosis have been found to be worse when they had AO. It is linked to a greater chance of the disease returning, a worse overall survival rate, and a decreased response to therapy. Treatment Difficulty: AO can make breast cancer treatments more difficult. It might affect the precision of diagnostic tests like mammography and increase the technical difficulty of surgical procedures. Additionally, having too much abdominal fat might impact how chemotherapy medications are metabolised and distributed, thereby reducing their efficacy (46,47,48,49).

Preventive Measures:

Unhealthy dietary habits, such as consuming diets high in saturated fats, trans fats, and cholesterol, can lead to inflammation and atherosclerosis, potentially resulting in abdominal obesity. Researchers advise adopting a healthier diet to lower inflammation and reduce the risk of CVD. Regularly consuming fast food, which contains unhealthy fats and sugars, increases the risk of heart disease and stroke, both of which are linked to AO. Additionally, psychosocial stress is linked to unhealthy eating habits, with women showing high consumption of refined grains and relatively low intake of fruits. Both stress and grain intake have been linked to an increased risk of AO, according to longitudinal research. These findings suggest that stress-related dietary alterations may eventually contribute to the development of abdominal obesity (10,50).

Public Health Strategy to Combat Abdominal Obesity:

Public health nutrition solutions include raising prices on edible fats and sugar-sweetened drinks (SSBs) to fight AO and diabetes. The detrimental consequences of the nutrition shift can

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be minimised by strategically regulating the price of unhealthy foods. According to US studies, price hikes of 10%, 15%, and 20% on SSBs were linked to less people buying juice drinks. Over the ten-year period from 2014 to 2023, it is predicted that imposing a 20% soda tax in India will reduce obesity by 3% (averting the occurrence of 11.2 million new cases) and diabetes prevalence by 1.6% (averting the occurrence of 400,000 new cases). Similar to this, it is estimated that a 20% tax on palm oil purchases in India over a certain time period will stop around 363,000 deaths from CVD (a reduction in cardiovascular mortality of 1.3%). These results call for a reformulation of existing strategies to address taxes as a method to reduce NCD (12).

Importance of Weight Management:

Evidence suggests that intentional weight loss, particularly significant weight reduction, can lower the risk of CVD in individuals with overweight or obesity. However, in order to lose weight permanently, both the patient and their healthcare professionals must remain committed (17,50,51).

Action Plan for Clinicians:

The article ends with an action plan for physicians that offers suggestions for how to recognise and mitigate the risks of obesity-related CVD. The plan takes into account varying resources and support available in different countries. The goal is to improve patient care and outcomes by addressing the complex interplay between obesity and cardiovascular health (17).

3. SUMMARY OF STUDIES

S no.	Study	Significant findings
1	Schleinitz, D. et al. (2014)	Through genetic studies, including GWAS, specific genes like TBX15, HOXC13, RSPO3, and CPEB4 have been identified, which regulates FD & influencing obesity-related traits.
2	Pradeepa R., et al. (2015)	In India, obesity was found to be more prevalent in urban areas and among women.
3	Sarathy, H., et al. (2016)	Despite good health indices, AO in young adults is linked to albuminuria, and can help in avoiding kidney diseases at an early stage.
4	Yang, Y., et al. (2016)	This meta-analysis reviews the potential link between abdominal obesity & lung cancer risk, suggesting a positive association.
5	Gulati, S., Misra, A. (2017)	This study concluded a positive correlation between AO & DM in Asian Indians.
6	Barroso, T. A., et al. (2017)	The release of free fatty acids from adipose tissue, which results in elevated TG and the production of VLDL, directly linked to obesity-related complications.
7	Misra, A., et al. (2017)	Factors such as abdominal fat deposition & low lean mass can lead to insulin resistance.
8	Zhang, C., et al. (2018)	This study provides a long-term view of the risks associated with AO, including all-cause, cardiovascular, & cancer mortality.
9	Berawi, K. N. et al.	Atherogenic dyslipidemia, which is characterised by raised TG, decreased

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	(2018)	HDL-C, and increased ApoB, sdLDL, and sHDL particles, is closely correlated with AO.
10	Sangrós, F. J., et al. (2018)	Abdominal obesity causes a persistent proinflammatory response, leading to insulin resistance, imbalanced vascular functions, & elevated blood pressure.
11	Ross, R., et al. (2020)	This consensus statement emphasizes the importance of WC as a vital sign in clinical practice, highlighting its role in assessing AO.
12	Bhattacharya, K. et al. (2021)	WHR demonstrated advantages over other anthropometric indices in assessing IR in PCOS, with better sensitivity & specificity than BMI.
13	Piqueras, P. et al. (2021)	BMI's limitations as an indicator of obesity have prompted researchers to explore various anthropometric measures for assessing CVD risk, including WC, WHR, & bio impedance.
14	Lopez-Jimenez, F. et al. (2022)	This study discussed obesity as a complex chronic disease recognized by WOF & WHF, with increased visceral fat linking it to CV risk through multiple mechanisms.
15	Sakiz, D. et al. (2022)	PCOS is positively correlated with development of AO.
16	Sharma, P et al. (2023)	Abdominal obesity has a notable impact on dyslipidaemia and inflamation.
17	Somnuk et al. (2023)	The cohort study indicates the association with disrupted lipid & glucose metabolisms
18	Sheikh, A. (2023)	PCOS-afflicted women are more likely to experience AO and metabolic syndrome, which raises their risk of DM and cardiovascular disease.
19	Kim, M. et al. (2022)	Psychosocial stress was associated with unhealthy eating habits, with high refined grain consumption & lower fruit intake in women, which longitudinally increased the risk of AO.
20	Chung GKK. et al. (2022)	Abdominal obesity is associated with an increased risk of breast cancer, aggressive tumor characteristics, poor prognosis, and treatment challenges
21	Farias G. et al. (2020)	Visceral fat has direct access to the liver allows its produced compounds, including various pro-inflammatory adipokines, to have an immediate impact on inflammation (TNF, IL-6, leptin, visfatin, resistin).
22	Vella CA. et al. (2017)	Lean individuals tend to secrete more anti-inflammatory adipokines like TGF and adiponectin than abdominal obese.

4. PROBLEMS IDENTIFIED

The definition & measurement of obesity vary among different populations, leading to inconsistencies in identifying & setting appropriate cut-off points (12); (9). Obesity, both generalized & abdominal, is on the rise globally, particularly in urban areas & among certain groups like South Asians (1). Women show a high prevalence of AO, likely due to a higher concentration of body fat in females (26). BMI alone may not fully capture obesity/adiposity, highlighting the need for additional anthropometric measures to improve disease risk assessment (17). Further research is required to underst & the role of AO in cardiovascular disease, DM, insulin resistance, hypertension, & dyslipidemia (26, 6, 15). AO is also associated with PCOS, potentially impacting cardiovascular health in women (11).

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5. SOLUTIONS FOUND

The WHO has recommended different obesity cut-off points for Asians, defining a BMI above 25 as obese, while other populations use a BMI above 30. Anthropometric measures like WC & WHR are considered better indicators of disease risk than BMI alone (9,18). Lifestyle changes, such as adopting healthier eating practises, engaging in regular physical exercise, and maintaining a healthy weight, are essential for treating obesity and the metabolic problems that go along with it. Insulin-sensitizing agents like metformin can be beneficial in improving insulin sensitivity & regulating menstrual cycles in women with PCOS (11,12,17,50,51).

6. CONCLUSION

Abdominal obesity is a significant public health concern, linked to higher mortality & morbidity rates. The definition & measurement of obesity, as well as the determination of appropriate cut-off points, vary among different populations. It has shown to be a more accurate predictor of cardiovascular diseases, diabetes meletus, insulin resistance, hypertension, & dyslipidemia compared to generalised obesity. To enhance disease risk assessment, additional anthropometric measures like waist circumference & waist to hip ratio are recommended, especially in conditions like polycystic ovary syndrome. Lifestyle changes & the use of insulin-sensitizing agents can aid in managing obesity and its associated metabolic risks. To fully comprehend the pathophysiology of abdominal obesity and its consequences for numerous health disorders, additional study is necessary.

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