

# Increasing Burden of Abdominal Obesity in Females and its Aftermaths

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## ABSTRACT:

Obesity is now recognized as one of the major public health issues all over the world. In Pakistan, it is a “silent epidemic” striking significantly because we are still struggling with health and economic burdens of malnutrition, infectious diseases and high infant mortality rates. In epidemiological studies age, sex and ethnic background all have to be taken into consideration, particularly when determining the health risk with obesity. Females are more vulnerable to be affected by obesity related health issues. Body Mass Index (BMI) is a surrogate measure of assessing obesity in terms of height and weight. It does not give any insight into regional body fat distribution. BMI is not a reliable measurement of body composition in individuals particularly in females having high body fat, rather more specifically it is excess abdominal fatness, quantified by waist circumference measurement, which is a better considered measure for assessing abdominal obesity in females.

**Keywords:** Abdominal obesity, Body mass index, Waist circumference, Over weight

## INTRODUCTION:

Obesity is now recognized as one of the major public health issues all over the world. WHO called urgent action to halt global obesity epidemic which is now labeled as “GLOBESITY”. Overweight and obesity is defined as abnormal excessive accumulation of fat within the body that impairs the body functions.<sup>1</sup> South Asian countries are currently affected by obesity epidemic which is a leading cause of various chronic non communicable diseases, their associated mortality and loss of life due to premature deaths.<sup>2</sup> The prevalence of overweight and obesity in Pakistan taking Asian-specific cut off levels reported approximately 25% of adult population as overweight and about 10.3% as obese.<sup>3</sup> Amongst various methods available for assessment of obesity, body mass index (BMI) is the most commonly used method of assessment of overweight and obesity because of its general application and feasibility.<sup>4</sup>

However, it tends to underestimate the prevalence of both conditions. BMI calculates obesity level in terms of height and weight of an individual and does not differentiate between body fat content, muscles and bone mass.<sup>5</sup> It may lead to misclassification of level of obesity as it is not necessary that overweight person has increased body fat as excessive weight. It can be due to increase muscle mass as in athletes or it can be due to increase body fat. It is just a mathematical calculation and not a direct estimation of adiposity.<sup>6</sup> It is an index for weight excess, rather than body fat composition.<sup>7</sup> Racial and ethnic disparities exist in distribution of body fat among different populations and ethnic subgroups.<sup>8</sup> There is different relationship between BMI and body fat distribution among different population and these disparities being more pronounced among women.<sup>9</sup> In Europeans, BMI of 30kg/m<sup>2</sup> corresponds to 25% of body fat in males and 30% of body fat in females<sup>10</sup>, while in South Asians of same gender, age and BMI have increased body fat percent and less muscle mass along with increased risk of cardio metabolic disorders. Evidence has supported the fact that these changes are more pronounced in females as compared to males.<sup>11, 12</sup> The disparities associated gender and ethnicity with regards to obesity assessment should be kept in consideration and instead of uniform BMI cut off population specific assessment of obesity indices based on distribution of body fat should be purposed.<sup>13</sup> Keeping in view BMI related error in measurement of obesity and its associated health risks, researchers are considering for some better tool for measuring the obesity. Since obesity has now become a serious public health issue, accurate level of estimation of obesity has become extremely important because of major health issues associated with excessive body fat. In the past two decades, visceral or abdominal obesity, as reflected anthropometrically by an increased waist circumference, has also emerged as an important predictor of risk of obesity-related diseases. Moreover, as discussed in a review<sup>5</sup> addressing anthropometric indices recommended waist circumference over other indices, as it is simpler to measure and interpret and correlates well with visceral fat measured by computed tomography. Yet, waist

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circumference is also highly correlated with BMI and thus reflects general, and abdominal, obesity.<sup>14</sup>

**MATERIALS AND METHODS:**

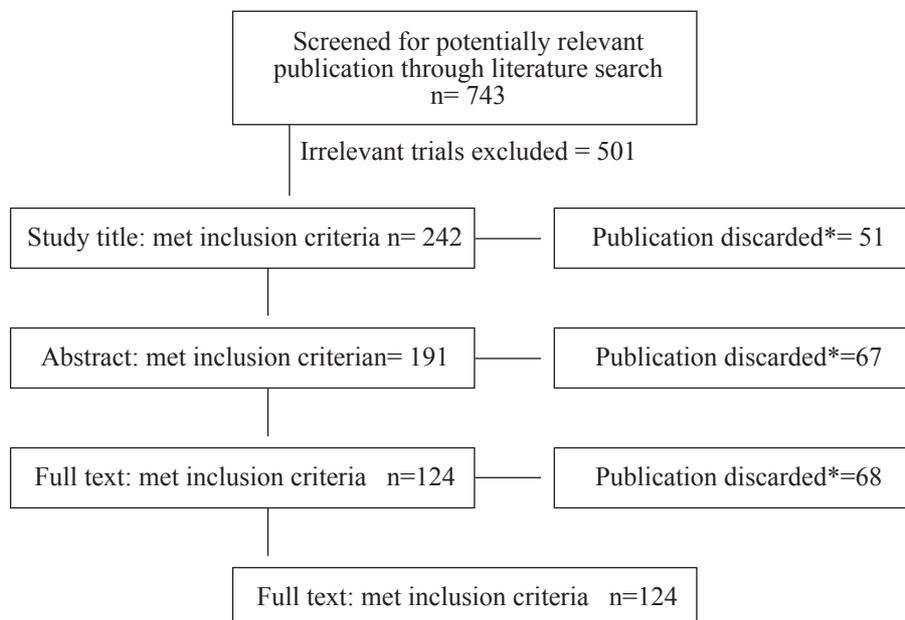
Articles were identified by using multiple electronic databases like Pub Med /MEDLINE /EMBASE Science direct, Google.com and Google scholar from the year 2001 to February 2016. Literature search was done by using key words, terminologies and phrases of obesity, overweight, abdominal obesity, waist circumference, body mass index, anthropometric indices. This review was done according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA).

**Inclusion Criteria:** (1) Studies published in a peer-

reviewed journal(2) Studies using measured or self-reported body mass index (BMI), waist circumference (WC) waist hip ratio (WHR), body fat and Triceps Skin fold thickness (TSF)(3) Studies that must have examined the association between abdominal fat and its associated health hazards particularly in females(4) Study that can be case report, case series, abstract, original article or systematic review or meta-analysis(5) Study that must have been published within the last 15 years.

**Exclusion Criteria:** Studies that used categorizations of measures of obesity indices including Body Mass Index (BMI), waist circumference (WC) or waist hip ratio (WHR) different from the WHO or another internationally comparable classification.

Figure 1  
Flow of study identification, inclusion and exclusion



\* Papers which have not used standard (WHO criteria) categories of BMI classification, obesity indices and other measures of body fat composition. Papers not from peer reviewed journals and not fulfilling the eligibility criteria.

**LITERATURE REVIEW:**

Obesity is an epidemic of the 21<sup>st</sup> century and major causative factor for many other metabolic disorders. According to a global estimate by the World Health Organization (WHO), in 2005 there were about 1.6 billion overweight persons aged 15 years and above and among them at least 400 million adults were obese. World Health Organization uses BMI calculated as kg/m<sup>2</sup>, and it defines obesity as BMI above 30 and overweight, as BMI s above 25. The Indo-Asian specific definition of obesity is set as, BMI above 27 and overweight, BMI above 23. The revision of definition of obesity taking in account the racial differences has resulted in increase prevalence. According to that approximately 1.7 billion people are classified as overweight. The WHO further projects that by 2020, approximately 2-3 billion adults will be overweight and more than 700 million will be obese.<sup>15</sup> World Health

Organization (WHO) estimated that globally obesity prevalence has doubled since 1980; with over all increased prevalence in females as compared to males. Between 1980 and 2013, obesity prevalence in males have increased from 28.8 to 36.9%, while in females have increased from 29.8% to 38%.<sup>16</sup> Obesity prevalence is unacceptably high among Asian women.<sup>17</sup> Obesity in this age group not only predispose them to various reproductive health issues but also increases the risk of chronic health issues in later years.<sup>18</sup> National Nutrition survey of Pakistan 2011 reported that 19.4% of women of reproductive age were overweight and 9.5% of women of reproductive age were obese (15.7% from urban areas compared to 6.5% from rural areas).<sup>19</sup> There is dearth of literature in this regard in our part of world. Moreover, there is limited data available regarding screening modalities for obesity diagnosis and its associated health risks.<sup>20</sup>

### Why abdominal obesity?

Abdominal obesity or central obesity is the accumulation of abdominal fat resulting in an increase in waist size. There is abnormal deposition of fat in abdominal areas with resultant health consequences such as cardiovascular diseases, type 2 diabetes and cancers. It is recognized as a major health issue among the adults both in developed and developing countries.<sup>21</sup> In general, women tend to have higher rates of abdominal obesity than men, which become more prominent with ageing especially after the menopause.<sup>22</sup> Furthermore, South Asian women in particular experience a severe form of abdominal obesity at normal BMI leading to devastating consequences.<sup>23</sup>

Waist circumference is measured by standard WHO STEPS Protocol. The WHO STEPS is a standardized instrument that allows the collection, analysis and dissemination of data regarding risk factor surveillance for non communicable disease in standardized manner. As per this protocol waist circumference is measured by placing measuring tape approximately at mid of upper border of iliac crest and lower margin of last palpable rib.<sup>24</sup>

According to Asian cut offs waist circumference of < 80 cm for females and < 90cm for males is considered as normal.<sup>25</sup> According to data of National Action Plan –Non Communicable diseases (NAP-NCD) First Round of Surveillance, 34.2% males and 60% females in the urban areas and 35.7% males and 55.5% females in the rural areas are reported to have central obesity.<sup>26</sup> This is a grave trend since central obesity is a more important risk factor for chronic non communicable diseases than overall adiposity as measured by BMI in studies on the Pakistani population.<sup>27</sup> In females, gynecoid type of obesity is more common among which fat is deposited at hips, thigh and buttocks.<sup>28</sup> Waist circumference is considered as better tool for abdominal fat assessment specially for the gynecoid type of obesity.<sup>29</sup> Moreover, evidence has supported the fact that it is the the best anthropometric index in predicting a chronic disease risk and related health conditions.<sup>30</sup>

### Abdominal Obesity and reproductive abnormalities:

Reproductive abnormalities are relatively common in women with abdominal obesity, of which the most common abnormality encountered is polycystic ovarian syndrome (PCOS). South Asian women are more vulnerable to this disease that manifests at a younger age when compared with their counterparts in the West.<sup>31</sup> They are also found to have higher fasting insulin concentrations and lower insulin sensitivity than Caucasian women.<sup>32</sup> Polycystic ovarian syndrome (PCOS) is closely associated with abdominal obesity in South Asian women who also have more severe symptoms associated than white Europeans.<sup>33</sup> Obese women are particularly vulnerable to adverse effects of pregnancy including 3 to 10 times the risk of pre-eclampsia, gestational diabetes mellitus, difficulties in labour and delivery, higher rates of caesarean delivery and other peri-natal morbidity and mortality.<sup>34</sup> Obesity has a significant adverse impact on reproductive

outcome. It influences not only the chances of conception but also the response to infertility treatment and increases the risk of miscarriage and pregnancy complications.<sup>35</sup> When fertility is a problem, the primary goal of treatment is to normalize serum androgens and restore reproductive function, which can be achieved by reducing insulin resistance through a decrease in weight and abdominal fat.<sup>36, 37</sup> Studies of weight loss through lifestyle modification have indicated that improvements in fertility rate, hormonal profiles, menstrual regularity, ovulation, and conception occur with modest weight loss (5% of initial body weight) along with parallel improvement in anthropometric indices.<sup>38, 39</sup>

**Cancers:** After the heart disease cancer is ranked as second leading cause of death in developing countries.<sup>40</sup> Current estimates of association of obesity with risk of cancer has documented that 5% of all cancers among postmenopausal women are attributable to being overweight and that 4% to obesity.<sup>41</sup> Evidence has shown the association of obesity with cancer.<sup>42</sup> Increase amount of adipose tissue in obese females lead to release of several hormones like factors adipokines which are pro inflammatory in nature and promotes the cancer development. Common obesity related malignancy include cancer of breast, endometrial, colon and esophageal, kidney.<sup>43,44</sup> Obesity is one of the modifiable risk factor that predispose females to development of cancer Throughout the life span there is particular time period referred as "windows of susceptibility" during which various contributing factors can predispose female body towards the development of cancer among all these factors obesity has significant influence in cancer predisposition.<sup>45</sup> In Pakistan, the data for cancer prevalence in females is in accordance with the trend found worldwide that is breast cancer was reported to be the most prevalent cancer among females specially those having BMI beyond normal limits.<sup>46</sup> Obese females are most vulnerable and have poor prognosis.<sup>47</sup> The most probable underlying mechanism involved in the development of breast cancer due to obesity is hormonal changes such as elevated estrogen levels. Another possible mechanism may be insulin resistance and leading to increase level of circulating insulin that may lead to stimulation of cancers cells.<sup>48,49</sup>

**Cardiovascular disorders:** Evidence has reported that for cardiovascular risk stratification and evaluation of various metabolic disorders it is recommended to measure both BMI and WC together.<sup>50</sup> Previous researches have reported the WC to be modestly stronger predictors of cardiovascular disease risk than BMI.<sup>51, 52</sup> Women are more prone to the health hazards associated with overweight and obesity as compared to their males. Risk associated with obesity is proportional to degree of waist circumference. Women with waist circumference >80 cm have three times more mortality rate as compared to women with < 80 cm. Obesity increases the level of triglycerides and lower the level of HDL promotes the narrowing of small arterioles which lead to coronary artery disease, and associated health risk.<sup>53</sup>

**Obesity and mental health:** Despite of overall increase

in obesity throughout the world, obese people are still facing low acceptance and negative attitude.<sup>54</sup> Females are more vulnerable group to be effected by negative attitudes and disapproval from friends and relatives, they have to face social constrains like criticism, taunting remarks from strangers and discrimination from their normal weight peers.<sup>55</sup> They are also stigmatized and bullied for their physical appearance. Paradoxically such people eat more due to stress and guilt and vicious circle of eating and weight gain continue. Research have proved that on various psychological assessment scales, obese people score very less ranging from sadness, weeping tendencies and severe depression, anxiety, mood swings, insomnia, eating disorders including bulimia and anorexia nervosa.<sup>56</sup>

**Prevention:** Obesity has now become a global epidemic, yet significant reduction in mortality associated with this disease is possible, with millions of lives can be saved and uncountable disabilities can be reduced through primary prevention of risk factors, early diagnosis and prompt treatment. In an era of over consumption of food and obesity, healthy food habits are essential in keeping away a huge variety of chronic diseases. The portion size in pre-packaged, ready-to-eat and restaurant foods is increasing. Many people cannot accurately estimate portion size, and this leads to an underestimation of intake. Life style intervention involving modification in diet and physical activity can be successful in achieving weight loss in severely obese females. There is dire need to create public health awareness by organizing awareness lectures in order to make general public sensitized about deleterious effects of obesity, targeting the important demographical groups, like women, adolescent and children. Young generation should be addressed to make them aware about benefits of healthy life style and importance of primary prevention in development of chronic diseases. Education programs should be arranged in educational institution. The environments in which people live are complex and their individual and combined elements have a marked effect on people's behaviors and dietary intakes. Individuals interact in a variety of micro-environments or settings such as schools, workplaces, homes, restaurants and fast food outlets. These in turn are influenced by the broader macro-environments or sectors such as the food industry, all levels of government, and society's attitudes and beliefs.

There is dire need of integration of all concerned stakeholders including health, public, private, health, education to integrate in order to make effective strategies to halt this problem. Fiscal food policies should be implemented by Government. Food prices have a marked influence on food buying behavior and consequently nutrient intakes. Governments should promote the healthy eating behavior by controlling the prices of natural food products. Nutrition 'signposting' programs should be implemented. Nutrition 'signposts' are signals (such as logos) at point of choice which indicate to the consumer that a food meets certain nutrition standards. Full nutrition information panels should be on food products. Nutrition

information panels appear to facilitate the food choices of those who are trying to reduce their fat intake, greater impact among women, higher educated people and those with established beliefs and knowledge about diet-disease relationships.

In Pakistan, it is a "silent epidemic," striking significantly because we are still struggling with the health and economic burdens of malnutrition, stunting, infectious disease, and high childhood mortality rates. One paradox of this so-called "nutrition transition" is that even as obesity rates rise, underweight persists, sometimes within the same household. We are currently facing a dual burden-the infectious diseases that accompany malnutrition and, increasingly, the debilitating chronic diseases linked to obesity and Western lifestyles. Given the huge costs of obesity, prevention is key. Slowing the increases in obesity and turning around the epidemic will take large-scale, multifaceted efforts, within individuals and across the nation, to improve people's food choices and increase physical activity. Pakistan needs to develop a national strategy to control obesity in its population by implementing the recommendations of the WHO global strategy on diet, physical activity and health. The implementation program should integrate all stakeholders like health department, print and electronic media, nongovernmental organizations, and private sector. Community based primary prevention programs and clinical trial with more resources and manpower should be introduced with aim of achieving maximum benefit with cost effectiveness.

#### CONCLUSION:

The evidence for the adverse effects of obesity on women's health is overwhelming and indisputable. Obesity, especially abdominal obesity, is central to the reproductive health problems and is strongly related to development of cardio-metabolic risk factors in women. Therefore, more attention should be paid to abdominal obesity both in clinical practice and in epidemiological studies. Moreover, the disparities associated gender and ethnicity with regards to obesity assessment should be kept in consideration and instead of uniform BMI cut off population specific assessment of obesity indices based on distribution of body fat should be purposed.

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