SYMPOSIUM OBESITY AND REPRODUCTIVE HEALTH

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Impact of obesity on women's health
Impacto de la obesidad en la salud de la mujer

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ABSTRACT

Throughout history, obesity has been perceived in different ways, sometimes as a symbol of health and prosperity, and sometimes as a disease. Nowadays, there is consensus in considering it as a chronic disease characterized by excessive fat accumulation and linked to cardiovascular diseases, diabetes and pregnancy complications. It is most commonly diagnosed by means of the Body Mass Index (BMI). BMI often does not accurately reflect the problem. For this reason, other methods such as Bioelectrical Impedance Analysis (BIA) and Dual Energy X-ray Absorptiometry (DXA) have been proposed. Anthropometric parameters such as skinfold thickness and mid-arm circumference are also used. Obesity is a global public health problem whose prevalence has been increasing in recent decades. In Peru, it is estimated that two-thirds of women of reproductive age have a BMI ≥ 25. There are genetic and environmental factors involved in the development of obesity. The metabolic changes associated with obesity are reviewed, including hyperinsulinemia and hyperandrogenism, increased leptin and other pro-inflammatory adipokines, and decreased adiponectin. Obese women have a higher risk of developing insulin resistance, type 2 diabetes mellitus, dyslipidemia, coronary heart disease and high blood pressure. The prevalence of menstrual irregularities due to anovulation and infertility increases, with a lower rate of live births in in vitro fertilization (IVF) treatments, and an increase in the abortion rate. Postmenopausal women tend to gain weight, due to hormonal changes and less physical activity, with a preferential increase in visceral fat. In obese women, the risk of breast, endometrial and ovarian cancer increases. Obese pregnant women have a higher risk of developing gestational diabetes and preeclampsia, fetal macrosomia and congenital anomalies. It is important to prevent obesity with early education programs regarding the short- and long-term medical consequences of obesity, and the promotion of healthy lifestyles. Treatment includes diet and exercise, and medical and surgical management options.

Keywords: Obesity, Menopause, Cancer, Pregnancy complications, Infertility (source: MeSH NLM).

RESUMEN

La obesidad a través de la historia ha sido percibida de diferentes formas, a veces considerada como un símbolo de salud y prosperidad, y otras, como una enfermedad. Actualmente, existe consenso en considerarla como una enfermedad crónica caracterizada por la acumulación excesiva de grasa y vinculada a enfermedades cardiovasculares, diabetes y complicaciones en el embarazo. Su diagnóstico más común se realiza mediante el índice de masa corporal (IMC). Este IMC muchas veces no refleja con exactitud el problema. Por esta razón, se ha planteado otros métodos como el análisis de impedancia bioeléctrica (BIA) y la absorciometría de rayos X de energía dual (DXA). También se emplean parámetros antropométricos como el grosor del pliegue cutáneo y la circunferencia del brazo medio. La obesidad es un problema global de salud pública cuya prevalencia ha ido aumentando en las últimas décadas. En el Perú se calcula que las dos terceras partes de las mujeres en edad reproductiva tienen un IMC ≥ 25. Existen factores genéticos y ambientales involucrados en el desarrollo de obesidad. Se revisan los cambios metabólicos asociados a la obesidad, que incluyen hiperinsulinemia e hiperandrogenismo, aumento de leptina y otras adipokinas pro-inflamatorias, y disminución de adiponectina. Las mujeres obesas presentan mayor riesgo de desarrollar resistencia a la insulina, diabetes mellitus tipo 2, dislipidemia, enfermedad coronaria e hipertensión arterial. Aumenta la prevalencia de irregularidades menstruales por anovulación e infertilidad, con menor tasa de nacidos vivos en los tratamientos de fertilización in vitro (FIV), y un incremento en la tasa de abortos. La mujer postmenopáusica tiende a subir de peso, por los cambios hormonales y la menor actividad física, con aumento preferente de la grasa visceral. En mujeres obesas aumenta el riesgo de cáncer de mama, de endometrio y de ovario. Las gestantes obesas tienen un mayor riesgo de desarrollar diabetes gestacional y preeclampsia, y se incrementan los casos de macrosomía fetal anomalías congénitas. Es importante prevenir la obesidad con programas de eeducación temprana respecto a las consecuencias médicas de la obesidad a corto y largo plazo, y la promoción de estilos de vida saludables. El tratamiento incluye dieta y ejercicios, y las opciones de manejo médico y quirúrgico.

Palabras clave: Obesidad, Menopausia, Cáncer, Complicaciones del embarazo, Infertilidad (fuente: DeCS BIREME).

History

Throughout history, perceptions of the female body have varied considerably, and obesity has been viewed very differently depending on the era and culture. In many ancient societies, especially in Africa, the Middle East, and certain regions of Europe, a larger figure was associated with health, fertility, and beauty. A clear example of this symbolism is found in the so-called "prehistoric Venuses," figures of women carved in stone, ivory, or bone, dating back to between 30,000 and 20,000 BC (Figure 1). These sculptural representations, which emphasized wide hips, large breasts, and prominent bellies, likely reflected an idealization of fertility and abundance[1]. In these cultures, a fuller body was not only linked to beauty, but also to the ability to produce offspring and ensure the survival of the tribe. Obesity, therefore, was considered a symbol of fertility and prosperity.

Other cultures throughout different eras also displayed similar characteristics. During the European Renaissance, for example, painters such as Peter Paul Rubens celebrated the more robust female figure, depicting it as a manifestation of wealth and well-being. These artistic representations reflected a vision of beauty that associated abundance with high social status and health. This symbolism remains alive in contemporary times, as evidenced by the work of Colombian artist Fernando Botero, known for his depictions of corpulent and voluminous figures. Botero's works, in which full and rounded bodies are recurrent, celebrate abundance, comfort, and sensuality (Figure 2). Through his unique style, Botero challenges conventional notions of beauty, championing an alternative vision in which obesity is a positive aesthetic element, a symbol of prosperity and vitality[2].

Today, the perception of the female body has changed significantly. Although there are exceptions, obesity has acquired a negative connotation, strongly associated with new beauty standards. From a health perspective, obesity is primarily perceived as a public health problem, considered a chronic disease by the scientific community. The global rise in obesity has been closely linked to factors such as changes in diet, urbanization, and sedentary lifestyles, which have contributed to a significant increase in obesity cases[3]. While it was once associated with beauty and prosperity, it is now linked to elevated risks of cardiovascular disease, diabetes, and other health problems. Growing scientific understanding of the metabolic, genetic, and social factors that influence obesity has changed the way it is addressed, seeking to eliminate the stigma associated with the condition and promoting a more inclusive and comprehensive approach to its prevention and treatment[4].

Definition and classification

According to the WHO, obesity is defined as a chronic disease characterized by excessive accumulation of fat in the body, which is associated with negative health consequences. Few chronic diseases have advanced as alarmingly in most countries in recent decades as obesity, which represents a cause for concern for health authorities due to its harmful physical, psychological, and social consequences[5].

The most widely used way to classify a person's nutritional status, and therefore obesity, is

Figure 1. Venus of Willendorf. Upper Paleolithic, Ukraine (years 27 500 - 25 000 BC).

Figure 2. Sewing workshop (year 2000), Fernando Botero.

through the use of the body mass index (BMI). BMI is an indicator calculated from a simple mathematical formula: weight (in kg) divided by height (in meters) squared. The WHO has standardized its use for classifying obesity (Table 1).

The main advantage of using BMI lies in its simplicity. It is a practical, easy-to-calculate, inexpensive method, and therefore widely applicable in clinical practice and epidemiological studies. Furthermore, it has demonstrated good correlation with other indicators that directly measure adiposity percentage, such as electrical bioimpedance or DEXA, in most populations[6,7]. It obviously has limitations, such as its low sensitivity for detecting excessive adiposity in certain populations and its inability to differentiate between fat and lean mass[8]. Even so, it remains a valuable and very useful tool at the population level.

Currently, there are alternative methods that have been researched and validated in recent medical literature for diagnosing obesity. Among the most widely used are those that use body composition, which can be determined by:

• Bioelectrical Impedance Analysis (BIA): This method measures the body's resistance to the passage of a very low-voltage electric current to assess body composition. It provides information on fat distribution and muscle mass. It is accessible, low-cost, and safe, which is why it has gained popularity primarily in the field of nutrition[9].

• Dual-energy X-ray absorptiometry (DXA): A method that uses X-rays at two energy levels that pass through the body. Its main use is in measuring bone mineral density and diagnosing osteoporosis; however, it can also determine body composition (Figure 3). It is less accessible, more expensive, and exposes to radiation, but it has demonstrated high accuracy.

Once lean mass is calculated, standardized indicators for diagnosing and classifying obesity can be calculated, such as the following:

• Body Fat Percentage (BF%): This is calculated by dividing fat mass by total body mass and expressing the value as a percentage. Its use has been proposed as a more direct method for defining overweight and obesity, with specific thresholds that vary by age and sex, and even with adjustments based on obesity-related comorbidities, such as metabolic syndrome[10].

• Fat Mass Index (FMI): Calculated by dividing fat mass by height (in meters) squared. This method measures only body fat, which can provide a more accurate classification of obesity, especially in populations with significant variations in lean mass[11].

Other methods used are based on non-traditional anthropometric parameters, which seek to approximate the calculation of body composition with the accessibility and cost-effectiveness advantages of BMI. Some of these are:

Skinfold thickness: This technique measures subcutaneous fat in various body regions, such as the triceps, subscapularis, and abdomen. It is accessible and inexpensive, but requires technical skill to obtain accurate and consistent measurements[12]. There are equations that use these measurements to estimate body density and body fat percentage. Its accuracy is reduced in severely obese individuals due to the difficulty in measuring large skinfolds and the variability in the ratio of subcutaneous to total fat.

Mid-upper arm circumference: This is primarily useful in populations where more complex methods are not feasible. Studies have shown that it can correlate well with skinfold thickness and serve as a surrogate in certain contexts, such as in pregnant women[13]. It is easy to measure and requires no specialized equipment or training.

TABLE 1. CLASSIFICATION OF OBESITY (WHO).

Classification	Body mass index (Kg/m2)	Risk of comorbidities
Underweight	Less than 18,5	Low (but risk of other clinical problems increased)
Normal range	18,5 - 24,9	Average
Overweight (preobese)	25 – 29,9	Increased
Mild obesity (class 1)	30 – 34,9	Moderate
Moderate obesity (class 2)	35 – 39,9	Severe
Severe obesity (class 3)	40 – 44,9	Very severe

FIGURE 3. DETERMINATION OF BODY COMPOSITION BY ELECTRIC BIOIMPEDANCE (LEFT) AND DXA (RIGHT).

These methods offer alternatives to BMI, each with its own advantages and limitations. The choice of method may depend on the clinical context, resource availability, and the need for accuracy in assessing body composition and obesity-related risks[14,15].

EPIDEMIOLOGY

PREVALENCE OF OBESITY

According to the World Health Organization (WHO), the prevalence of obesity has doubled since 1980. In 2022, more than 1.9 billion adults were estimated to be overweight, and of these, more than 650 million were obese. In 2024, the CDC published an article on trends in overweight, obesity, and underweight worldwide. The results were shocking: The age-standardized prevalence of obesity in adults increased between 1990 and 2022 in 188 countries for women. Obesity currently accounts for approximately 4 million deaths annually, or 7.1% of all causes of mortality[16,17]. It is estimated that 40% of women are overweight and 15% are obese. We can therefore state that we are facing a new global epidemic (Figure 4).

The same study designed a digital tool that allows the collected data to be viewed and separated by country and sex. In Peru, the prevalence of obesity increased from 12.8% in 1990 to 32.5% in 2022 among women (Figure 5), thus increasing by almost 20 percentage points and currently affecting almost a third of the female population[17]. The same increase has been observed in men, but to a lesser extent, increasing from 8.8% to 18.5%.

PREVALENCE IN WOMEN OF REPRODUCTIVE AGE

There is a global trend of increasing obesity and overweight among women of reproductive age, which inevitably leads to an increase in the prevalence of obesity in pregnant women. According to data from the CDC, in 2020, 27.2% of women were overweight before pregnancy, and 30% were obese[18].

In Latin America, this is a growing issue of concern due to demographic and epidemiological changes that have affected lifestyles in the region. According to the ELANS study, which covered eight Latin American countries, 58.7% of women of childbearing age were overweight or obese[19]. In Brazil, a study based on the 2013 National Health Survey found that 55.2% of women aged 18 to 49 were overweight, with 33.26% classified as overweight and 21.94% as obese[20]. These data underscore the high prevalence of these conditions in the region and the need for effective public health policies to address this problem.

The situation in our country is becoming increasingly worrying. According to the ELANS study, women in Peru and Ecuador are twice as likely to be obese compared to other countries in the region. Furthermore, the latest National Demographic and Family Health Survey (ENDES) published in 2023 showed that overweight and obesity are the most prevalent form of malnutrition in women of childbearing age (WRA) between the ages of 15 and 49. In total, 37.2% of WRAs have an overweight BMI (25-29.9 kg/m2) and 27.9% reach the obese range (>=30 kg/m2). In total, their combined percentage is 65.1%[21].

FIGURE 4. NCD RISK FACTOR COLLABORATION. ESTIMATION OF PREVALENCE OF OBESITY IN ADULT WOMEN[17].

Obesity BMI ≥ 30 kg/m². Women

Key
< 5%
5-10%
10-20%
20-30%
≥ 30%
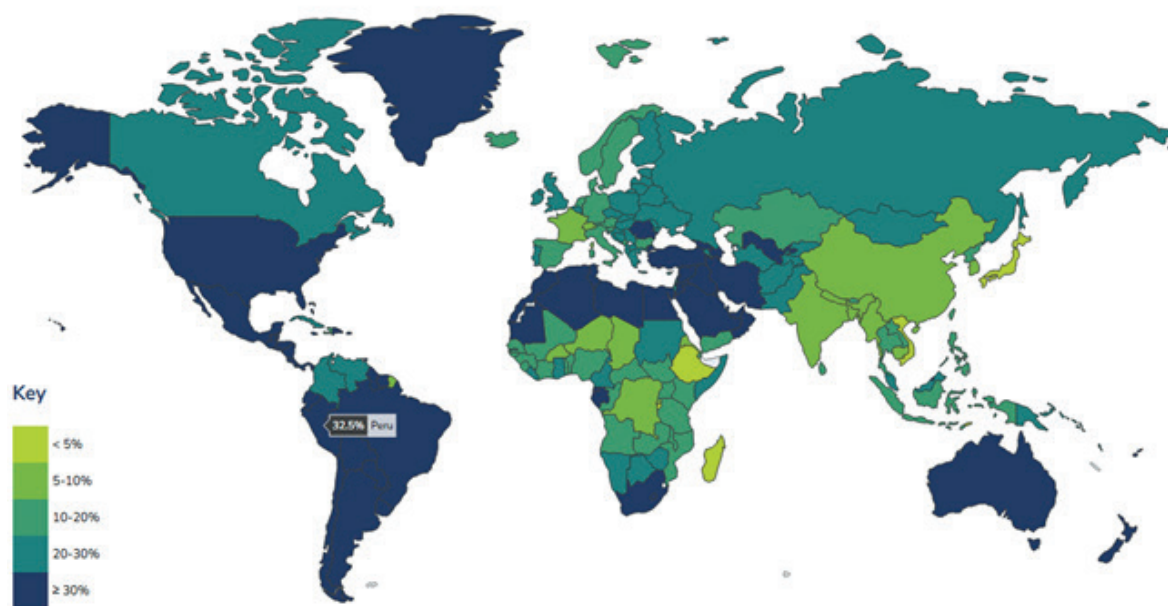
FIGURE 5. ADAPTED FROM NCD RISK FACTOR COLLABORATION. ESTIMATION OF PREVALENCE OF OBESITY IN ADULT WOMEN FROM PERU FROM 1990 TO 2022[17].
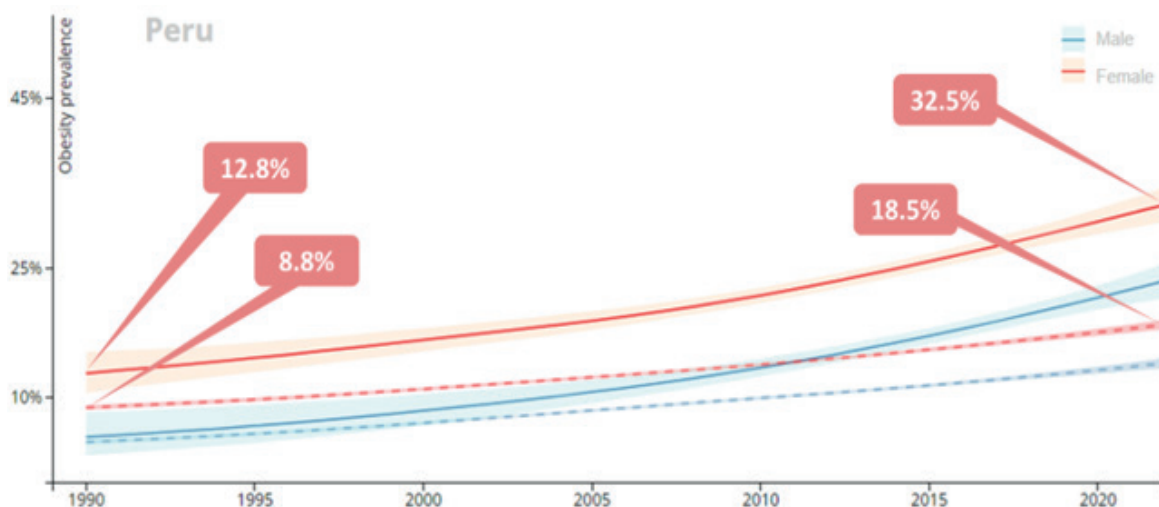
These figures are higher than those found nine years earlier in the 2014 ENDES, where the prevalence of overweight and obesity was 34.8% and 20.9%, respectively[22].

IMPACT ON PUBLIC HEALTH

Obesity during pregnancy represents a significant public health challenge due to its association with maternal and neonatal complications, as well as increased healthcare costs. Women with obesity have a higher risk of gestational diabetes, hypertension, and preeclampsia, which increases maternal and perinatal morbidity. Furthermore, maternal obesity is associated with a higher likelihood of cesarean delivery and postoperative complications, which places greater demands on hospital resources and prolongs hospital stays for both mothers and newborns[23]. From a public health perspective, gestational obesity is also linked to a transgenerational impact, as children of obese mothers have a higher risk of developing childhood obesity and metabolic diseases in adulthood, thus perpetuating the cycle of obesity and its comorbidities[24].

Public health strategies focused on the prevention and management of gestational obesity include promoting healthy lifestyles before and during pregnancy, with interventions aimed at improving nutrition and increasing physical activity. Educational programs and specialized prenatal care have proven effective in reducing excessive gestational weight gain and decreasing obstetric complications[25]. However, socioeconomic inequalities and limited access to quality health services remain significant barriers to the prevention and management of gestational obesity, highlighting the need for policy strategies that promote a comprehensive approach based on equity and primary health care[26].

Metabolic changes associated with obesity

There are genetic, environmental and socio-economic factors involved in the development of obesity. There is an increase in the production of insulin and lipids, with alterations in liver function with consequent insulin resistance and hyperinsulinemia. Insulin potentiates the effects of LH, with a consequent increase in ovarian androgen production. Likewise, insulin induces greater pituitary production of LH by increasing the sensitivity of gonadotropes to GnRH, and decreases hepatic and ovarian production of insulin-like growth factor 1 binding protein (IGF1-BP). This causes an increase in circulating levels of IGF 1, which acts on theca cells, increasing the production of androgens and reducing growth hormone[27,28].

In obese women, circulating levels of sex hormone binding globulin (SHBG) are decreased. Hepatic production of SHBG is reduced mainly due to high levels of insulin and androgens. Therefore, circulating levels of free androgens increase[29].

Adipose tissue is considered an endocrine organ, and secretes hormones called adipokines, such as leptin, adiponectin, tumor necrosis factor alpha (TNF-α), resistin, interleukin-6 (IL-6), among others. In obese people, pro-inflammatory adipokines, such as leptin, increase and anti-inflammatory adipokines, such as adiponectins, decrease. The amount of leptin released is directly proportional to the mass of adipose tissue.

All of these metabolic changes cause obese women to present a subclinical and chronic inflammatory state, which predisposes them to certain diseases that we will mention below.

Risks of female obesity

It has been recognized that obesity increases health risks, quality of life and mortality. Childhood and adolescent obesity has increased worldwide, recognizing that obesity generally persists into adulthood. The atherosclerosis process begins at an early age and can progress, especially if there are other cardiovascular risk factors[30]. Obesity is associated with low self-esteem, depression and anxiety.

Obesity is associated with a higher risk of cancer, diabetes, cardiometabolic diseases, polycystic ovary syndrome, menstrual irregularities and infertility. Likewise, obstetric complications increase significantly. In perimenopausal women, vasomotor symptoms are exacerbated and BMI tends to increase in postmenopause.

Obesity in men is associated with a higher probability of prostate, colon and rectal cancer. In women, the risk of breast cancer increases; it has been reported that women with severe obesity develop breast cancer at younger ages than those with a family history of cancer but with a normal weight[31]. Obesity also increases the likelihood of endometrial cancer and ovarian cancer.

Anovulation and menstrual irregularities are more frequent in obese women, and directly correlates with the degree of obesity, especially with subcutaneous abdominal fat[32]. A recent meta-analysis found that overweight and obesity increases the risk of infertility by 60%[33]. Likewise, it is observed a lower ovarian response to ovulation inducers, lower oocyte quality, lower endometrial receptivity, lower live birth rate in in vitro fertilization (IVF) treatments, and an increase in the abortion rate[34].

Postmenopausal women tend to gain weight due to hormonal changes and less physical activity, with a preferential increase in visceral fat, which favors insulin resistance, and a greater risk of diabetes mellitus, dyslipidemia, high blood pressure, cardiovascular problems, arthritis and early mortality[35-37].

Obese pregnant women have a higher risk of developing gestational diabetes and preeclampsia, shoulder dystocia, and cesarean section. Likewise, the risk of fetal macrosomia and fetus with congenital anomalies increases[38].

In this symposium the impact of obesity on reproductive medicine, pregnancy, cancer and menopause will be reviewed in detail.

MANAGEMENT OF FEMALE OBESITY

Obesity is considered a public health problem. It is important to make this problem visible, its impact on women's health, and the need to design and implement appropriate resources and strategies with a multidisciplinary approach in preventive aspects, detection and treatment, at different levels of care[39]. Prevention policies should include early education regarding the short- and long-term medical consequences of obesity, promotion of healthy lifestyles, and medical and surgical management options[34].

Modifying lifestyles, with diet and exercise, achieves modest results in weight loss, but they are the first line of treatment for cases of overweight and mild and moderate obesity. Pharmacotherapy is an alternative for those cases that do not respond to diet and exercise, especially cases of moderate and severe obesity; includes the use of metformin, orlistat (selective fat absorption inhibitor) and glucagon-like peptide 1 (GLP-1) analogues such as liraglutide (reduces appetite). Bariatric surgery could be an option if the BMI is greater than 40, or if co-morbidities exist and the BMI is greater than 35, or if other attempts to lose weight have failed[38]. After surgery, the metabolic profile improves and overall mortality is significantly reduced; however, it is a procedure that is not free of postoperative complications (pulmonary, hemorrhage, venous thrombosis, infections, anastomotic dehiscence, etc.), or long-term complications (vitamin deficiencies, anemia, osteopenia, etc.). It is recommended to postpone pregnancy one to two years after surgery, although this time must be balanced with the risk of reduced ovarian reserve[38,39].

CONCLUSIONS

Obesity is a public health problem that affects developed and developing countries. In Peru, overweight and obesity have increased in recent years, and it is estimated that two-thirds of women of reproductive age have a BMI ≥ 25. There are genetic, environmental and socio-economic factors involved in the development of obesity. Obese women present a subclinical and chronic inflammatory state, which predisposes them to a higher risk of cancer (breast, endometrium, ovary), type 2 diabetes mellitus, hyperinsulinemia, dyslipidemia, high blood pressure, heart disease, polycystic ovary syndrome, menstrual irregularities and infertility. Obese pregnant women have a higher risk of developing gestational diabetes and preeclampsia, increasing the risk of fetal macrosomia and fetuses with congenital anomalies. Preventive management includes early education regarding the short- and long-term medical consequences of obesity, and the promotion of healthy lifestyles. Treatment includes diet and exercise, and medical and surgical management options.

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