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IMPACT OF OBESITY ON FERTILITY AND HORMONAL BALANCE

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Abstract

Obesity is a multi-factorial condition which is significantly rising worldwide. Obesity itself is a causative agent of many other diseases in both men and women such as cardiovascular disease, diabetes mellitus, hypertension, etc. Obesity is not gender or age specific, it can occur at any time period of life. Obesity is linked with physiological, hormonal, and reproductive dysfunction in both men and women. It can be genetic but mostly it occurs due to the laziness of people. People who sit idle and prefer to do nothing are most likely to get obese and such people develop many other diseases as obesity is the mother of other diseases. Alongside adulthood obesity, childhood obesity poses serious long-term health risks. Obesity is the accumulation of extra fats in body due to less physical activity and less expenditure of energy. Obesity also depends on dietary factors, the food we consume. Packed and processed food is the main cause of obesity. Besides these, high calorie food also plays its role in gaining weight. A diet focused on vegetables, whole grains, fruit, legumes, oil seeds, small blue fish and yoghurt can potentially prevent and cure most chronic degenerative diseases of the modern era. Obesity is main reason of reproductive dysfunction nowadays. Being overweight as a female can be harmful, as it could be the reason of miscarriage and infertility. Mostly fatty women are less likely to conceive, if she gets pregnant then obesity can create complexities for both mother and fetus. Poly cystic Ovarian Syndrome (PCOS) is also the outcome of obesity. In men, obesity can cause impaired semen quality. To avoid obesity or excessive adipose tissues in body, one should take healthy and balanced diet with mild exercise,

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meditation and stretching. To get rid of obesity and its side effects, people are turning to herbal medications despite of bariatric surgery. These approaches improve energy expenditure, hormonal balance and metabolic function.

INTRODUCTION

Obesity is a medical condition which describes the state of having an unhealthy excess of body fat which may negatively affect one's health. In general, it is calculated using the Body Mass Index (BMI), which is calculated by dividing a person's weight in kilograms (kg) by the square of the person's height in meters (m) ((kg/m²)) (Organization, 2021). Hormones are secreted by the endocrine glands and are said to travel through the blood vessels. Their travels are precise and they steer the different organs and limbs in accordance with bodily needs such as contraction, relaxation, tissue formation, digestion, and discharge of waste
(Hall, 2020). Fertility is an individual's natural ability to become a parent or to father or produce offspring in other words. It is an indication of reproductive efficiency in both males and females. In Simple Terms:

- Fertility for women entails the capability to get pregnant and deliver a baby.
- Fertility for men means that he is able to generate adequate quantities of good-quality spermatozoa that can fertilize an ovum (Organization).

Obesity as Global issue:

The increasing incidence of obesity in the modern era has become a global health concern, affecting many aspects of human welfare (Zheng et al., 2024). A complex chronic illness process, obesity is brought on by a combination of variables such as stress, low physical activity, high energy-dense diet, and genetic predisposition (Okunogbe et al., 2021). About 40% of adults worldwide are now overweight or obese, a startling increase in the number of people with these conditions over the previous few decades (Yong et al., 2023). It is anticipated that the prevalence of obesity will rise in the future. In 2020 and 2022, there was a further rise following the COVID-19 epidemic (Koceva et al., 2024).

Body Composition and Gender Specificity in Body Fat Distribution:

The primary energy storage and transport organ, adipose tissue, is crucial to the control of energy balance. When the body accumulates too much energy as fat, obesity results (Yong et al., 2023). The World Health Organization (WHO) defines overweight as having a body mass index (BMI; normal range is 18.5 to 24.9), which is equal to or greater than 25 kg/m2. When a person's BMI is 30 kg/m2 or above, they are classified as obese; when it is 40 kg/m2 or higher, they are classified as morbidly obese (Ahmad & Haque, 2022).

Effect of childhood obesity on human body:

Although it is not a problem unique to any one country, childhood obesity is one of the most significant public health issues (Mazur et al., 2022). 39 million children under the age of five were overweight or obese worldwide in 2020 (Taylor et al., 2024). Atherosclerotic cerebrovascular illnesses, colorectal malignancies, diabetes, coronary heart disease, gout, and hip fractures are only a few of the long-term health consequences of childhood obesity (Pourghazi et al., 2023).

Children who are overweight or obese can experience immediate and long-term psychological health repercussions, such as depression and low self-esteem. Notably, among children who suffer from severe obesity, mental health issues are the most frequently cited health risk (Haqq et al., 2021). Drug therapy and bariatric surgery have demonstrated some promising outcomes in recent years in terms of significant and long-lasting weight loss, and they help clinicians have access to a wider range of therapeutic options (Maffeis et al., 2023).

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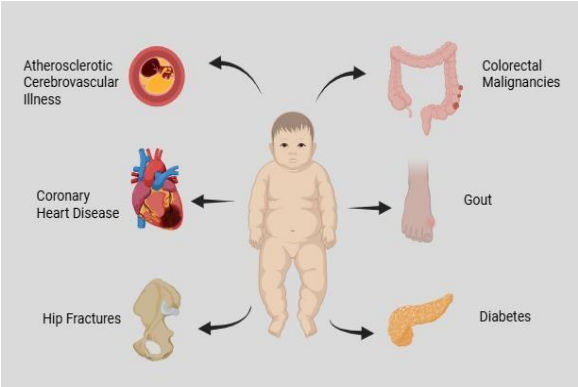
Figure: Diseases caused by obesity in infants.



Effect of obesity on conception: Anovulation and menstruation dysfunction are more common in overweight women, which may be due to hormonal changes such increased secretion of androgens, luteinizing hormone, and gonadotropin-releasing hormone (Páez et al., 2020). Rich Edwards an colleagues discovered aU-shaped correlation between BMI and ovulatory abnormalities, with obesity accounting for 25% of these diseases in the US population (Langley-Evans et al., 2022). We evaluated the separate and combined associations of preconception BMI and early-pregnancy BMI in women and men with fecundability, subfertility (defined as the time to pregnancy or, in the event of not conceiving, the duration of actively pursuing pregnancy of more than 12 months or use of assisted reproductive technology), and miscarriage in a population- based prospective cohort study that included 3604 women and their partners from preconception onward (Boxem et al., 2024).

Relation between obesity and miscarriage: Numerous studies suggest that obesity may increase the risk of miscarriage because it can have detrimental effects on the embryo, the endometrium, or both. The health of the mother and fetus is seriously threatened by maternal obesity (Lourenço & Guedes- Martins, 2025).

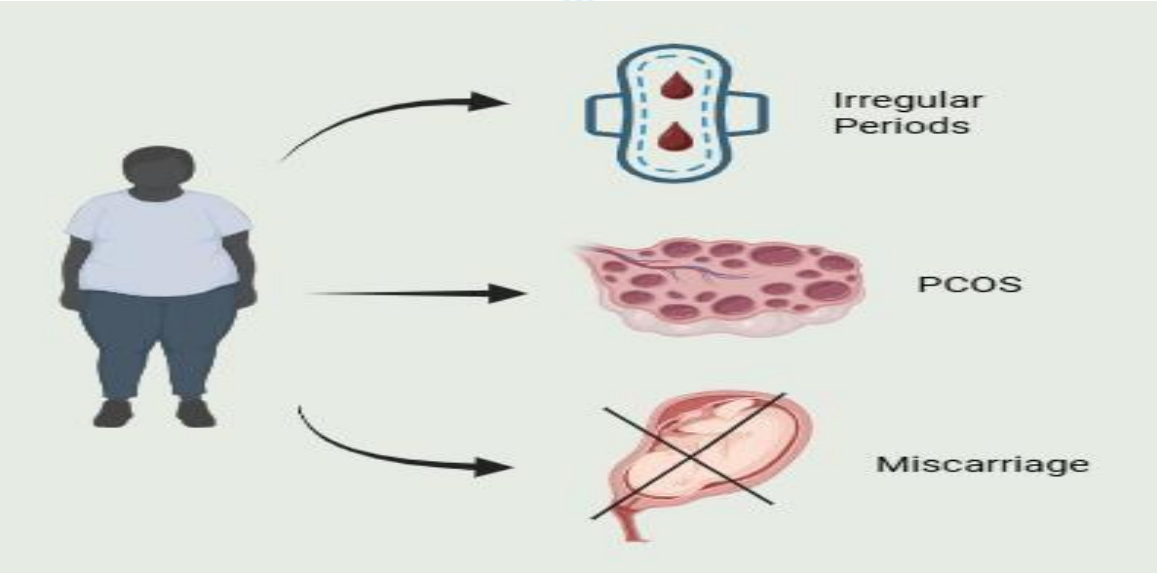


Figure: Effect of obesity on Females.

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Relationship between obesity and hypothalamic pituitary axis:

The foundation of many regulatory processes in the female reproductive physiology, particularly in ovulation and fertilization, is thehypothalamic-pituitary-ovarian-axis (Bakhtiyari & Khoormizi, 2025). Insulin, a known trigger for enhanced ovarian androgen synthesis, is frequently seen in larger concentrations in the bloodstream of obese women. Because of the extra adipose tissue in the periphery, these androgens aromatize to estrogen at high rates, which affects the generation of gonadotropin and causes negative feedback on the HPO axis (Broughton & Moley, 2017).

Relationship between obesity and infertility:

Previous research has demonstrated that more than 40% of women who experience recurrent miscarriages, infertility, and menstruation abnormalities are overweight or obese (Amiri & Tehrani, 2020). Pregnancy-related hypertension diseases, such as preeclampsia, gestational diabetes, fetal development abnormalities, and congenital birth defects, are among the disorders that obesity causes and can raise the risk of health problems for both the mother and the fetus (Duah & Seifer, 2025).

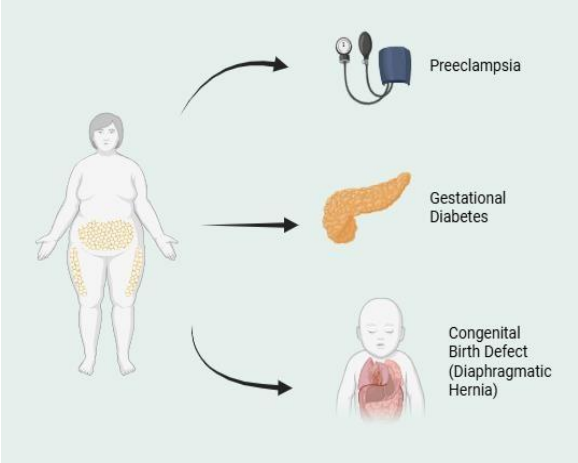

Figure: Effect of obesity during pregnancy.

Effect of Adipokines on fertility in females:

Excess adipose tissue actually contributes to the excessive secretion of leptin, insulin, and adipokines, which have detrimental effects on follicular development and maturation at both the central and peripheral levels, even though it also inhibits the secretion and bioavailability of sex hormones (Marinelli et al., 2022). The pathophysiology of infertility is linked to the changed adipokines levels associated with obesity, specifically the rise in leptin and fall in adiponectin. These modifications may compromise endometrial receptivity, interfere with ovarian function, and upset the hormonal balance required for ovulation (Zheng et al., 2024).

Effect of Adipokines in males:

Adipocyte hypertrophy and hyperplasia, which are linked to obesity, alter men's endocrine control, mainly through adipokine release. Men who are obese may have hypogonadism, a multifactorial clinical syndrome marked by androgen insufficiency and impaired gonadal activity (Mazza et al., 2024). Hypogonadotropic congenital syndrome insufficient gonadotropin-releasing hormone (GnRH) secretion or action is the hallmark of hypogonadism (CHH), a rare condition that causes infertility, delayed puberty, and a lack of sex hormones. Few studies have examined how patients with CHH who have significantly lower testosterone levels and higher degrees of obesity affect their adipocytokine levels and, in turn, their glucolipid metabolism (Zhang et al., 2025). Additionally, given the effect of

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inflammatory indicators on semen quality, childhood and pubertal obesity may decrease subsequent fertility (Calcaterra et al., 2025).

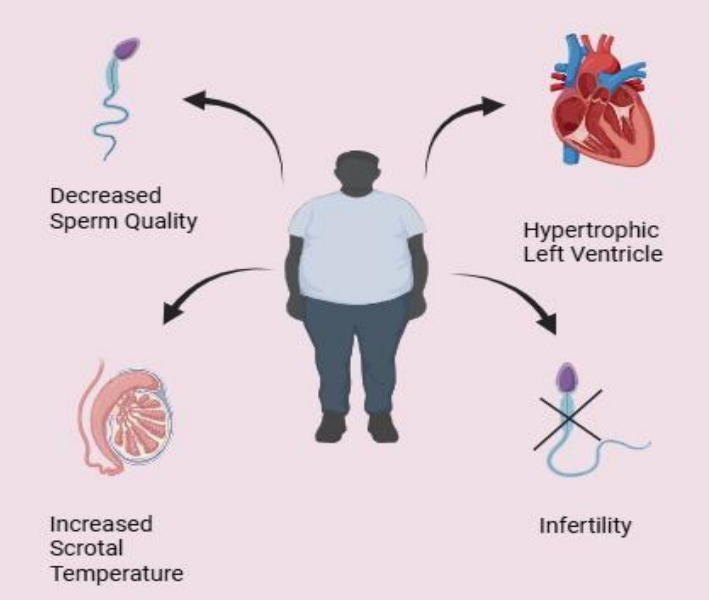

Figure: Effect of obesity on males.

Impact of obesity on female reproductive health: Over 40% of females who are of reproductive age suffer from obesity, a very common chronic illness. Based on metabolic health and underlying pathophysiology, obesity can be classified into various phenotypes and severity levels (Schon et al., 2024). It has been established that estrogen helps shield women from the danger of a variety of non-communicable disorders (NCDs) (Feskens et al., 2022). The systemic metabolism is significantly altered by estrogen loss after menopause, which also increases central obesity, reduces insulin sensitivity, and increases inflammation, all of which put postmenopausal women at risk for type 2 diabetes, heart disease, and cancer (Bailey et al., 2022).

Herbal medications to treat obesity: Historically, there attacks and strokes in people who had a history of cardiovascular illness (Chan et al., 2025). So, people started using herbal medications to get rid of obesity. In many civilizations around the world, herbal medicine items have been used as the main liver fibrosis, diabetes mellitus, and obesity (Hawash et al., 2024). Additionally, there is evidence that herbal therapy is safe and effective for treating obesity when compared to conventional medications, placebos, and appetite regulation (Ghasemzadeh Rahbardar et al., 2025).

Effect of Volitional physical activity on human body:

Numerous chemical reactions are involved in energy metabolism, which enables us to obtain nutrients from our diet, use those dietary substrates, and produce the energy needed to power cellular functions (Sanchez et al., 2024). Physical inactivity is therefore a crucial modifiable risk factor that may prevent or lessen harmful metabolic alterations after menopause, as increasing physical activity is an effective method to guard against metabolic dysfunction following ovarian hormone loss in humans (Marsh et al., 2023).

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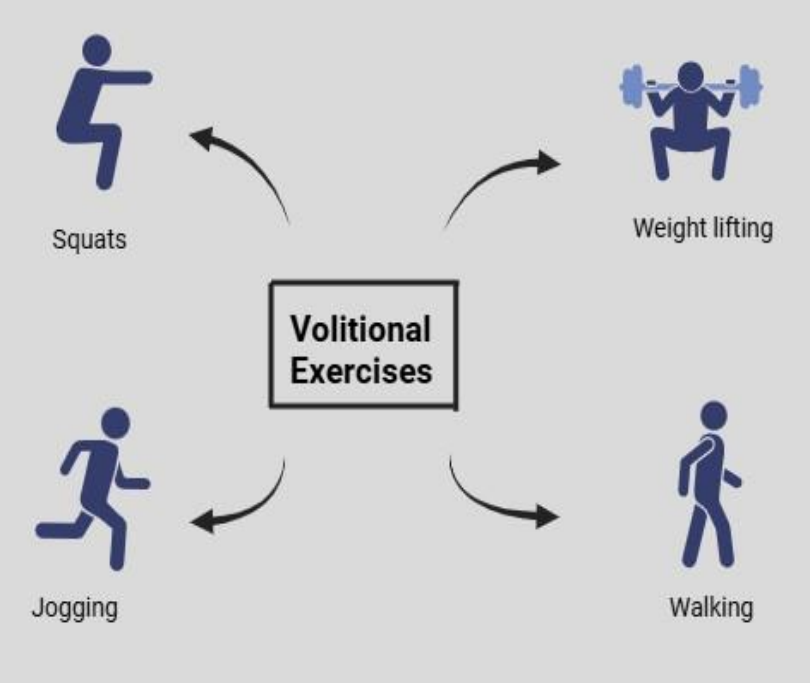

Figure: Examples of volitional activities. Effect of diet on human health

Numerous studies in human physiology conducted in the last few decades have shown that there is gender variation in a number of hormonal pathways, medical indices, and nutritional preferences (Feraco et al., 2024). In reality, women are more likely to choose healthier diets, whereas males tend to favor high-calorie foods, frequently for their own sake (Lombardo et al., 2024). Since the 1950s, the ideal diet for both human health and the health of the planet have been thoroughly defined. The majority of chronic degenerative diseases in the modern period may be prevented and even cured by a diet high in vegetables, whole grains, fruit, legumes, oilseeds,small blue fish, and yoghurt (Lombardo et al., 2020).

Conclusion:

Obesity is a growing global health concern which is linked with physiological, hormonal, and reproductive dysfunction in both men and women. Its impact extends beyond physical appearance as it can affect fertility, metabolic health and hormonal regulation by involving different mechanisms such as adipokines, insulin resistance and disruption of hypothalamic pituitary gonadal axis. Obesity also contributes to different conditions like infertility, miscarriage risk and menstrual irregularities. In women, obesity can also cause a condition called PCOS (Polycystic Ovarian Syndrome) which affect the reproductive age of females. In men, obesity can cause hypogonadism and impaired semen quality. To avoid obesity or excessive adipose tissues in body, one should take healthy and balanced diet with mild exercise, meditation and stretching. These approaches improve energy expenditure, hormonal balance and metabolic function, especially at the time of menopause. These techniques can also prevent us from many diseases which can be fatal for us. So, we should treat obesity by changing our behavior, lifestyle and diet to live a healthy, long and beneficial life. Alongside adulthood obesity, childhood obesity poses serious long-term health risks. To get rid of obesity and its side effects, people are turning to herbal medications despite of bariatric surgery. Traditional herbal medicine offers safer and more effective treatment because of its bioactive ingredients. An integrated, personalized is still required for treatment and prevention.

Frontier in Medical & Health Research

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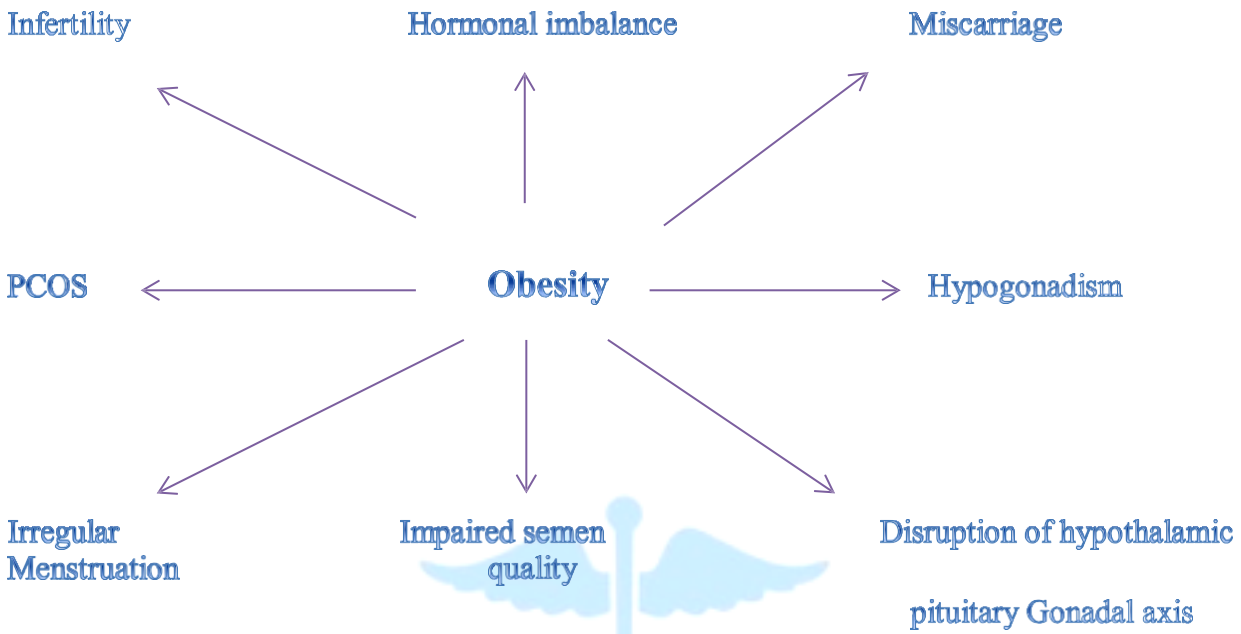
Flow diagram of effect of obesity on human body:



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