

West Coast Fertility Center

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Obesity adversely affects reproduction, but how specifically?

The prevalence of obesity has increased substantially over the past 2 decades. Almost two-thirds of women and three-fourths of men in the United States are overweight or obese. Nearly 50% of reproductive-age women are obese.

A disease of excess body fat and insulin resistance, obesity increases the risks of hypertension, diabetes, dyslipidemia, cardiovascular disease, sleep apnea, respiratory problems, and cancer as well as other serious health problems. While not all individuals with obesity will have infertility, obesity is associated with impaired reproduction in both women and men, adverse obstetric outcomes, and health problems in offspring. The American Society for Reproductive Medicine (ASRM) reviewed this important issue in a recent practice committee opinion.

Menstrual cycle and ovulatory dysfunction

Menstrual cycle abnormalities are more common in women with obesity. Elevated levels of insulin in obese women suppress sex hormone-binding globulin (SHBG) which in turn reduces gonadotropin secretion due to an increased production of estrogen from conversion of androgens by adipose aromatase. Adipose tissue produces adipokines, which directly can suppress ovarian function.

Ovulatory dysfunction is common among obese women. Among women with BMI levels >27 versus BMI levels 20.0 to 24.9. Obesity decreases fecundity even in women with normal menstrual cycles. This may in part be due to altered ovulatory dynamics with reduced early follicular luteinizing hormone pulse amplitude accompanied by prolonged folliculogenesis and reduced luteal progesterone levels.

Compared with normal-weight women, obese women have a lower chance of conception

within 1 year of stopping contraception; about 66% of obese women conceive within 1 year of stopping contraception, compared with about 81% of women with normal weight. Results of a Dutch study of 3,029 women with regular ovulation, at least one patent tube, and a partner with a normal semen analysis indicated a direct correlation between obesity and delayed conception, with a 4% lower spontaneous pregnancy rate per kg/m² increase in women with a BMI >29 versus a BMI of 21 to 29.

Assisted reproduction

Assisted reproduction in women with obesity is associated with lower success rates than in women with normal weight. A systematic review of 27 in vitro fertilization (IVF) studies (23 of which were retrospective) reveals 10% lower live-birth rate in overweight (BMI >25) versus normal-weight women undergoing IVF. Data from a meta-analysis of 33 IVF studies, including 47,967 cycles, show that, compared with women with a BMI <25 overweight or obese women have significantly reduced rates of clinical pregnancy and live birth.

Results of a retrospective study of 4,609 women undergoing first IVF or IVF/ICSI cycles revealed impaired embryo implantation, (controlling for embryo quality and transfer day)

Categories of Adult Obesity by Body Mass Index (BMI)

Category	BMI
Underweight	Less than 18.5
Normal	18.5 to 24.9
Overweight	25.0 to 29.9
Obesity, Grade I	30.0 to 34.9
Obesity, Grade II	35.0 to 39.9
Obesity, Grade III	≥40.0

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reducing the age-adjusted odds of live birth in a BMI-dependent manner by 37% compared with women with a BMI of 18.5 to 24.9. In a study of 12,566 Danish couples undergoing assisted reproduction, overweight and obese ovulatory women had a 12% and 25% reduction in IVF-related live birth rate, respectively decrease in live birth rate for every one unit increase in BMI.

Putative mechanisms for these findings include altered oocyte morphology and reduced fertilization in eggs from obese women, and impaired embryo quality in women less than age 35. Oocytes from women with a BMI >25 are smaller and less likely to complete development postfertilization, with embryos arrested prior to blastulation containing more triglyceride than those forming blastocysts.

Blastocysts developed from oocytes of high BMI women are smaller, contain fewer cells and have a higher content of triglycerides, lower glucose consumption, and altered amino acid metabolism compared with embryos of normal-weight women. Obesity may alter endometrial receptivity during IVF given the finding that third-party surrogate women with a BMI >35 have a lower live-birth rate (25%) compared with women with a BMI <35.

Pregnancy Outcomes

Obesity is linked to an increase risk of miscarriage. Results of a meta-analysis of 33 IVF studies including 47,967 cycles indicated that overweight or obese women have a higher rate of miscarriage than normal-weight women BMI <25. Maternal and perinatal morbidity are strongly associated with obstetric and perinatal complications, including gestational diabetes, hypertension, preeclampsia, preterm delivery, shoulder dystocia, fetal distress, early neonatal death, and small- as well as large-for-gestational age infants.

Obese women who conceive by IVF are at increased risk for preeclampsia, gestational diabetes, preterm delivery, and cesarean delivery. Authors of a meta-analysis of 18 observational studies concluded that obese mothers were at increased odds of pregnancies affected by such birth defects as neural tube defects, cardiovascular anomalies, and cleft lip and palate, among others. In addition to being the cause of these fetal abnormalities, maternal metabolic dysfunction is linked to promoting obesity in offspring, thereby perpetuating a cycle of obesity and adverse health outcomes that include an increased risk of premature death in adult offspring in subsequent generations.

Treatment for obesity

Lifestyle modification is the first-line treatment for obesity.

Pre-fertility therapy and pregnancy goals

Targets for pregnancy should include:

- preconception weight loss to a BMI of 35
- prevention of excess weight gain in pregnancy
- long-term reduction in weight.

For all obese individuals, lifestyle modifications should include a weight loss of 7% of body weight and increased physical activity to at least 150 minutes of moderate activity, such as walking, per week. Calorie restriction should be emphasized. A 500 to 1,000 cal/day decrease from usual dietary intake is expected to result in a 1- to 2-lb weight loss per week. A low-calorie diet of 1,000 to 1,200kcal/day can lead to an average 10% decrease in total body weight over 6 months.

Adjunct supervised medical therapy or bariatric surgery can play an important role in

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successful weight loss pre-pregnancy but are not appropriate for women actively attempting conception. Importantly, pregnancy should be deferred for a minimum of 1 year after bariatric surgery. The decision to postpone pregnancy to achieve weight loss must be balanced against the risk of declining fertility with advancing age of the woman.

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