LIFESTYLE AND ENVIRONMENTAL FACTORS AND THEIR IMPACT ON OVULATION DISORDERS. ARE INSULIN RESISTANCE AND OBESITY RELEVANT TO HYPERANDROGENISM?

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WARSAW

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Infertility is a disorder that an increasing number of couples are facing these days. Due to its global magnitude, the World Health Organization (WHO) now classifies infertility as a civilization disease. Infertility can be said to occur when a woman does not become pregnant after 12 months of regular intercourse (at least 2-4 times a week) without protection. The problem of infertility affects both partners, more or less equally. Sometimes the cause of the inability to get pregnant remains elusive, in which case one speaks of idiopathic infertility. Determining the cause of female infertility requires a number of diagnostic tests, the most important of which are laboratory tests directed at assessing the concentrations of hormones responsible for regulating the menstrual cycle.

The most common female cause of infertility is obstruction of the fallopian tubes and hormonal disorders that lead to abnormalities in the ovulation process.
Ovulation disorders, which occur most often in the course of polycystic ovary syndrome (PCOS), account for about 25% of infertility diagnoses among women. Moreover, 70% of women with ovulation failure are diagnosed with polycystic ovary syndrome. PCOS is one of the leading causes of infertility in women and affects 5-15% of women of reproductive age. Most women with PCOS experience one or more of the following symptoms: hirsutism, acne, infertility, obesity, insulin resistance, and dyslipidemia.

PCOS is often comorbid with insulin resistance and excessive body weight. Untreated polycystic ovary syndrome can lead to numerous metabolic diseases, psychiatric disorders, and infertility.
The data was obtained through a systematic review of literature published from 2010 to 2022.

WHAT LIFESTYLE FACTORS CAN AFFECT FEMALE FERTILITY?

Diet, physical activty, sleep, supplementation, chemical exposure, as well as oxidative stress caused by e.g. smoking, alcohol abuse, or prolonged stress

DIET

- Effective approaches to nutrition improve endocrine features, reproductive function, and cardiometabolic risk profile – even without marked weight loss
- Women with PCOS with a high adherence to the Mediterranean diet present with lower testosterone and HOMA-IR levels
- High itake of saturated trans fats increases the risk of anovulatory infertility
- Following a low glycemic index diet reduces HOMA-IR, fasting insulin, total cholesterol, LDL cholesterol, triglycerides, waist circumference, and total testosterone
- Vitamin D supplementation may improve ovulatory dysfunction and thereby fertility in women with PCOS.

PHYSICAL ACTIVITY

- Non-pharmacological interventions, especially diet and exercise, are the first-line treatment for preventing cardiometabolic risk factors and reproductive dysfunction
- Higher levels of habitual physical activity have been associated with more favorable anthropometric and body composition profiles, lower glycated hemoglobin, and blood pressure
- Total testosterone, FAI and androstendione were lower in active women with PCOS compared to those with sedentary lifestyles
- An increase in the average daily number of steps by 2,000 (which roughly translates to about 20 minutes of moderate-intensity walking) was independently associated with a decrease in FAI in women with PCOS.

OBESITY

- Central obesity aggravates endocrine and metabolic disorders in PCOS
- Accumulation of visceral fat prevails in women with PCOS
- Obesity significantly impacts the PCOS phenotype since it is associated with a higher prevalence of menstrual irregularity, hyperandrogenemia, and hirsutism
- Weight loss of 5-10% improves the hormonal profile of women with PCOS
- Both obese and non-obese women with PCOS, compared to healthy women of the same age with the same BMI, were metabolically inferior and had greater visceral obesity
- Non-obese PCOS has a similar risk to obese PCOS in that it has a similar amount of visceral fat (adjusted for body weight)

INSULINE RESISTANCE

- PCOS is a multisystem disorder
- Metabolic syndrome, underpinned by insulin resistance and obesity, is common in PCOS, and the insulin resistance is excessive relative to the degree of adiposity
- Hyperinsulinemia can significantly disrupt the normal function of the ovaries thereby leading to increased androgen production, which affects menstruation and ovulation disorders
- Insulin-resistant hyperinsulinism is often an important aggravating factor in PCOS pathogenesis. About half of women with PCOS have an abnormal degree of insulin resistance relative to their BMI. Insulin resistance in PCOS is independent of obesity

CONCLUSIONS

Polycystic ovary syndrome (PCOS) severely affects the quality of life of suffering women. Dietary patterns, lifestyle, and comorbidities collectively affect the severity and the associated consequences of PCOS. There is a clear link between insulin resistance, obesity, hyperandrogenism, and PCOS.
More research is needed to discover the common denominator linking ovarian hyperandrogenism, obesity, and insulin resistance. Possibly examining women with PCOS both with and without insulin resistance could make it possible to establish a new direction in the diagnostics and treatment of female fertility.