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A review article on pcos and its impact on quality of life in women correlation with age, basal metabolic index and various factors

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Abstract

Polycystic ovary syndrome (PCOS) is a hormonal disorder characterised by presence of oligomenorrhoea, anovulation and hyperandrogenism in females. PCOS mainly observed in women in adolescent age to pre-partum resulting in abortions. Symptoms mainly include irregular menstrual cycles, anovulation, acne, hirsutism and oligomenorrhea. The pathophysiology of PCOS involves the primary ovarian abnormalities, endocrine alterations and metabolic modifiers such as anti-Mullerian hormone, insulin resistance and chronic inflammation which causes metabolic disturbances and results hormone imbalance which results in hyperandrogenism therefore development of cysts in ovaries is observed. Diagnostic criteria are mainly done from the Rotterdam criteria of PCOSwhich includes mainly presence of menstrual irregularities, ultrasound scanning and Luteinizing Harmone (LH) and Follicle-stimulating hormone (FSH) ratio and raise of androgens level in body. Treatment options includes oral contraceptive pills, metformin therapy for insulin intolerance, local treatments for hirsutism by laser hair removal therapy, hormone replacement therapy for hyperandrogenism and acne. Non-pharmacological treatment includes diet changes, regular exercises and weight loss. Early diagnosis of PCOD can improve the quality of life and minimize the chances of causing cardiac problemsand further complications caused by PCOS such as hair loss, infertility and if left undiagnosed may result in uterus cancer.

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Introduction

Definition

Polycystic Ovarian Syndrome (PCOS) is defined as a health condition which is commonly seen in one in ten women of reproductive age. Where the female ovaries develop immature or partially mature eggs in enormous amounts and later on, they transform into cysts in ovaries and it often results due to increase of male hormones (androgens) [1].

Classificationofpcos

It is divided into 4 groups

1. ASYMTOMATIC FORM
   - No symptoms are seen in this form but presence of polycystic ovaries is observed.
2. MILD TYPE
   - We will observe polycystic ovaries and ovulation doesn't occur (anovulation).
3. CLASSICAL TYPE
   - Abnormal levels androgens (hyperandrogenism) are seen and Ovulation doesn't occur(anovulation).

4. METABOLLIC TYPE

- It is the mixture of both mild and classical type.
- It includes obesity and insulin resistance condition.2

TYPES OF PCOS

1. INSULIN RESISTANT PCOS

- When your body doesn't respond to insulin it causes increased level of insulin which results in hyperandrogenism causes ovulation dysfunction.

2. POST-PILLS PCOS

- It occurs due to over intake of oral contraceptives (pills) for desired adulatory regulations cycles.

3. INFLAMMATORY PCOS

If there is any chronic inflammation in our body then there is increase in levels of androgens and causes hyperandrogenaemia.

4. ADRENAL PCOS

- It occurs when the adrenal gland produces large amount of DHEA-S
  [DHEA (dehydroepiandrosterone) a precursor of androgens which is turned in to inactive form of DHEA-S] in the body due to stress.3

Epidemiology

- The prevalence of pcos globally estimated to be in the range of 5.5% and in women with the age group of 15-45 years is 12.6%.
- In Indiaprevalence of pocs lies between 8.2% to 22.5% based on Rotterdam diagnostic criteria5

Symptoms

- Hair loss
- Pelvic pain
- Imaginary periods
- Over weight
- Fatigue
- Increase testosterone level
- Acne
- Excess body hair growth and facial hair
- Mood swings
- Over bleeding
- Insulin resistance6

Complications

- Infertility
- Gestational diabetes
- Type 2 diabetes
- Sleep apnea
- Depression
- Metabolic syndrome
- Premature birth
- Non-alcoholic steatohepatitis
- Uterine cancer4

Risk factors

- Genetical history (33.60%)
- Obesity (5%)
- Type 2 diabetes (23.50%)
- Hypertension (4.90%)
- Cardiovascular disease (4.20%)7

Aetiology / Causes

- **Environmental factors**

Environmental variables have a significant impact on non-genetic inheritance such as intrauterine growth retardation and insulin resistance. Insults during pregnancy may cause intrauterine growth retardation, resulting in undersized for gestational age new-borns with a thrifty phenotype (red). This phenotype's insulin resistance trait is an illustration of long-term metabolic function programming and may contribute to childhood obesity problems. As a result of environmental risk factors like a sedentary lifestyle, a diet high in saturated fat, smoking, and excessive alcohol consumption, these children may go on to develop hypertension, glucose intolerance, and polycystic ovary syndrome (PCOS), which may also cluster in certain families because exercise and diet are greatly influenced by parental habits.8

- **Heritable characters and Genetic variation**

The family aggregation of PCOS and its associated features, which indicates a hereditary foundation for these illnesses, has long been acknowledged. which account for 10% of the heritability of PCOS, have been replicated in different populations of patients with PCOS. In terms of aetiology, PCOS is currently seen as a complex multigenic condition where predisposing and protecting genetic variations combine with substantial environmental factors to result in the many PCOS phenotypes, similar to other common metabolic disorders like type 2 diabetes mellitus [8].

- **Metabolic syndrome**

Obesity, abdominal adiposity, and insulin resistance may be the most significant variables contributing to the variability of PCOS. For instance, metabolomic studies released in 2012 show that, despite the possibility of central (hepatic) insulin resistance (even in PCOS-positive women without obesity), peripheral (muscle and adipose tissue) insulin resistance is really a trait of individuals with obesity. PCOS is caused by a primary defect in steroidogenesis, which results in an excess of androgen. The severity of this excess androgen is quite variable, and it can be brought on by a number of

factors, the best known of which are those related to being overweight [8].

- **Maternal pcos and post-natal environment**

During pregnancy, conditions like maternal hypertension, diabetes, or smoking may cause intrauterine growth retardation, which has been shown to cause a thrifty phenotype in kids who are born tiny for gestational age. These new-borns may grow up overweight due to the persistent metabolic function programming that predisposes them to insulin resistance. Later in age, these kids may develop hypertension, glucose intolerance, functional hyperandrogenism, adrenal axis hyperactivity with relative cortisol excess, or PCOS at age of 70, particularly if they are exposed to environmental variables including sedentary behaviour and a diet high in saturated fat. Due to the significant influence that parental behaviours have on children's activity and food choices, these characteristics may cluster in specific families [10].

- **Insulin resistance**

insulin acts as a gonadotropin on the ovary, facilitates androgen secretion from the adrenal glands and modifies luteinizing hormone pulsatility. Insulin resistance and compensatory hyperinsulinism also contribute to androgen excess in PCOS. As a result, PCOS is more common in those with any condition marked by systemic hyperinsulinism. In conditions like obesity, gestational diabetes, type 2 diabetes, syndromes of extreme insulin resistance brought on by mutations in the gene encoding the insulin receptor, autoantibodies against the insulin receptor, portosystemic shunts, or even insulinomas, systemic hyperinsulinism can be either endogenous or exogenous (such as in type 1 diabetes mellitus) [8].

- **Hyperandrogenism**

PCOS is primarily a hyperandrogenic condition, and growing data suggests that androgen excess plays a significant role in both the oligo-ovulation and cutaneous symptoms of the illness as well as the facilitation of insulin resistance and metabolic dysfunction in PCOS-affected women. Furthermore, both targeted and untargeted studies indicate that visceral adipose tissue from women with PCOS has genomic, transcriptomic, and proteomic profiles that are quite distinct from those of healthy women and resemble those of men, suggesting that an excess of androgen is a factor in the dysfunction of their adipose tissue [9].

- **Congenital virilization**

The excessive terminal (coarse) hair in androgen-sensitive parts of the female body is hirsutism (upper lip, chin, chest, back, abdomen, arms, and thighs). Virilization has more of a masculinizing effect than hirsutism does. Which occurs in the congenital stage of the particular [8].

PATHOPHYSIOLOGY AND RISK CONSIDERATIONS:

Polycystic ovarian syndrome is disorder presented with oligomenorrhoea, infertility, anovulation, hirsutism and obesity in women who have diagnosed with bilaterally enlarged cystic ovaries [13].

Pathophysiology

PCOS is a hyperandrogenic state. It is a diagnosis of exclusion. Nevertheless, it accounts for the majority. The pathophysiology of PCOS mainly involves the defects in hypothalamic pituitary axis, insulin regulation and ovarian function PCOS has linked to insulin resistance and obesity. Insulin involves in regulation of ovarian function, and ovaries reacts to excess insulin by producing androgen which results in anovulation. Follicular maturation arrest is a distinctive label for existence of ovarian abnormality [12]. In PCOS there is an elevation of luteinizing hormone (LH) and gonadotropin -releasing hormone (GnRH). whereas Follicular-stimulating hormone (FSH) levels are low. As a result, increase in GnRH there is a stimulation of ovarian thecal cells and results in production of more androgens. Follicular maturation can be improved by increasing FSH levels either by endogenously or exogenous [11].

PCOS and Hyperandrogenism

The release of GnRH from the hypothalamus triggers the Gonadotropin hormone release from pituitary, LH activates the LH receptor for androgen production in ovarian theca cells, FSH acts on FSH receptor vice versa in the ovarian granulosa cells to modify androgens to oestrogen which promote the follicle growth [19].

Insulin Resistance:

Hyperinsulinemia is the main reason for excess androgen production. Insulin directly triggers the action of LH and increases the GnRH indirectly. Insulin turns down the sex hormone binding globulin (SHBG), an important circulatory protein regulating the testosterone. The reduced sex hormone binding globulin can result in increase in the production of androgen levels which produce the clinical signs such as alopecia, hirsutism and acne. In PCOS insulin resistance can leads to dyslipidaemia [15].

Obesity and PCOS

Obesity has correlation to Hyperinsulinemia which results in elevated lipid profile and glucose intolerance. obesity increases the androgen production by stimulating luteinizing hormone, as it results in hyperandrogenism [Glueck and Goldenberg, 2019] [16].

Physical and Emotional Stress

Stress sets off the hypothalamic-pituitary-adrenal (HPA) pivot to deliver cortisol. Cortisol prompts IR by invigorating instinctive fat aggregation, gluconeogenesis, and lipolysis. In addition, cortisol excites glucose creation in the liver. Stress is additionally associated with improving insulin levels. Other stress effects on PCOS might refer to interference with anti-Mullerian hormone (AMH) and changing sex chemical levels [20].

Diagnosis criteria

PCOS is very likely to be present in a patient who presents with irregular menstruation, oligomenorrhea, or amenorrhea as well as indications of hyperandrogenism. PCOS is the most likely cause of these menstrual symptoms, even in the absence of hirsutism (it accounts for roughly 30% of all cases of amenorrhoea and 90% of amenorrhoeic women with normal oestrogen levels).14 If females experience an irregular period and in addition to blood reports showing high levels of testosterone furthermore in conformation observation of scanning report having poly cysts indicates that particular is having polycystic ovaries. ovulatory dysfunction includes oligomenorrhea (cycles lasts more than 35days) or amenorrhea (absence of cycles for 6 months). On an ultrasound technology if polycystic ovary is confirmed if an ovary containing 12 or more follicles measuring (2mm-9mm) in diameter or an ovary that has a volume greater than 10 ml. other tests that includes measurement of LH and FSH ratio, a ratio greater than 2 indicates PCOS. This test is not mandatory but that may be helpful [17].

Quality of Life in PCOS

The most common endocrine-related condition affecting young women is polycystic ovarian syndrome (PCOS). Menstrual irregularities, physical appearance, and infertility are all viewed as the only factors contributing to mental discomfort that lowers quality of life in terms of health (HRQOL). Infertility-causing hyperandrogenism, either oligo-ovulation or anovulation, and other metabolic problems are features of PCOS. A specific questionnaire is prepared considering 5 main domains.

1. Emotions
2. body hair
3. weight
4. infertility
5. menstrual problems

PCOSQOL (health-related polycystic ovarian syndrome quality-of-life questionnaire) is prepared and surveyed among population containing physical and psychological disturbances and compared to healthy population in order to estimate the quality of life amongst the PCOS subjects [21].

Pharmacological Treatment

The treatment mainly depends on the patient choice and condition.

If the patient doesn't want to conceive but have complaints regarding menstrual cycle then combined oral contraceptives are prescribed.18

Metformin is usually prescribed as 1st choice of drugs to restore the ovulation cycle in PCOS as metformin has an anti-hyperandrogenic effect in the short term.

Therapy options for females with infertility includes the ovulation induction agents such as clomiphene citrate or aromatase inhibitors [22].

Conclusion:

Early Diagnosis of the PCOD(polycystic ovarian disease) with close long term follow up enables an individual to overcome the metamorphosis of PCOD condition into PCOS(polycystic ovarian syndrome) and undergoing early screening for diabetes may reduce the risk of causing various cardiovascular diseases and also reduce the chances of causing into infertility and various types of cancers .PCOS is an prominent condition which is causing depression and effecting the quality of life of an individual due to physical ,psychological and metabolic disturbances to an individual.

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