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REVIEW ARTICLE **OPEN ACCESS**

Poly Cystic Ovary Syndrome

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ABSTRACT
With a prevalence of up to 17.8%, polycystic ovarian condition (PCOS) is the most prevalent endocrine and metabolic disorder in women. It is characterized by hyperandrogenism, irregular menstrual periods, and polycystic ovaries. Women with PCOS frequently have obesity and an abnormal metabolic profile, and 50–70% of them are insulin-safe. Hyperinsulinemia and hyperandrogenism (HA) in PCOS have significant strengths, but the factors underlying their relationship to PCOS are not fully understood. Having a large for gestational age (LGA) or small for gestational age (SGA) increases the risk of meconium goal, hospitalization for serious unit care, and perinatal mortality.
Key Words: *PCOS, Menstrual Cycle, Age Factor, Hirsutism, Obesity, Ovaries*

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INTRODUCTION

POLYCYSTIC OVARY SYNDROME

With a prevalence of up to 17.8% with symptoms include hyperandrogenism, irregular periods, and polycystic ovaries, polycystic ovarian condition (PCOS) is the most prevalent endocrine and metabolic disorder in women. In women with PCOS, obesity and an abnormal metabolic profile are common, and 50–70% of them are insulin-safe. Most ladies With PCOS can make up for their insulin obstruction (IR). Yet, an enormous extent of Them has modified beta-cell capability causing glucose bigotry, which increments the gamble of creating type 2 diabetes (T2D), freely of weight record (BMI) and age. Additionally, women with PCOS are more likely to develop dyslipidemia, hypertension, and other metabolic conditions. (1) According to estimates, one in ten women battle with PCOS and associated problems before menopause. (2)

The cause of PCOS is unclear, however it is believed to be multifactorial. Hyperinsulinemia and hyperandrogenism (HA) are significant areas of strength for PCOS, although the factors underlying their relationship with PCOS are not fully understood.

Pregnancy results and the drawn-out well-being results in the posterity brought into the world to moms with PCOS. It is noteworthy because, on the one hand, women with PCOS have an increased risk of experiencing pregnancy complications include toxicity, gestational diabetes, and premature births.

In PCOS women, increased LH activity is a common occurrence. It might be connected to the issues with follicle development and HA that PCOS patients frequently experience. (3)

However, their babies are more often conceived at small-for-gestational-age (SGA) or large-for-gestational-age (LGA) and are more likely to experience meconium goal, hospitalization for critical unit care, and perinatal mortality. Additionally, girls of PCOS-positive women who are at the peripubertal period exhibit signs of an odd reproductive turn of events. A modified adrenal capacity is also present. Children of women with PCOS also exhibit some metabolic problems throughout puberty, which may be caused by the article's discussion of an unfavorable environment during fetal life. Not just tiny girls of women with PCOS are affected. (1)

Depending on the investigator's point of view, three essential diagnostic characteristics of polycystic ovarian syndrome have been proposed with varying degrees of emphasis. On ultrasonography, these characteristics include hyperandrogenism, persistent anovulation, and polycystic ovaries. (4)

Definition

PCOS is an endocrine and metabolic condition with a variety of symptoms including polycystic ovary morphology, oligo- or anovulation, and clinical or biochemical hyperandrogenism. Also, the determination ought to be laid out without any different conclusions like Cushing's condition, innate adrenal hyperplasia,

androgen-delivering cancers and hyperprolactinemia. Different criterion for various symptoms of PCOD from different guidelines are mentioned in Table 1.

Table 1: Criterion for various symptoms of PCOD from different guidelines

Criteria	NIH 1990	ESHRE/ASRM (Rotterdam)2003	AE-PCOS 2006	NIH 2012 Acceptance of Rotterdam 2003
Hyperandrogenism	✓	✓	✓	✓
Ovarian dysfunction	✓	✓	✓	✓
Polycystic ovarian morphology		✓	✓	✓
	2 or 2 required	2 or 3 required	2 or 3 required	2 or 3 required
Exclusion of conditions that mimic PCOS	✓	✓	✓	✓

Epidemiology

The commonness of PCOS differs depending upon the symptomatic models utilized. While with the NIH (National institute of health) rules, the pervasiveness depends on 6.1% and 8.7%, the commonness with the Rotterdam models ultimately depends on 19.9% and 17.8% in similar population. Additionally, it has been shown that women with type 1 diabetes, type 2 diabetes, gestational diabetes, and obesity are more likely to have PCOS.

According to studies from the US (76%), and Australia (61%), where 15% and 19% of the population, respectively, were overweight, PCOS had the highest prevalences of obesity. However, the prevalence varies depending on whether the review population has been mentioned or if it is an unselected population exhibiting reference tendency in the evaluation of the prevalence of the weight among women with PCOS. The prevalence of stoutness in American women with PCOS has been shown to be 63% in a reference group, compared to 28.1% in the unselected population and 28.4% in the unselected control group. Additionally, the seriousness of the disease was different between focus groups in that regard. (5)

Diagnosis

Due to the disorder's inherent characteristics, including the variability of its symptoms and their changeability among age groups, polycystic ovarian disorder is challenging to understand. Due to the fact that pubescence mimics the symptoms and signs of polycystic ovarian condition, PCOS is challenging or difficult to diagnose in young and menopausal women. Menarche is also marked by the presence of several little antral follicles, which is very easy to confuse. The review of menses in menopausal women is incredibly inaccurate and moreover reliant on biochemical hyper androgenaemia.

Oligomenorrhea or amenorrhea, fruitlessness, and the development of cystic ovaries, which are initially identified on laparotomy and confirmed by biopsy, define PCOS. The transabdominal filter offers an all-encompassing perspective on the pelvic pit, and it very well might be helpful on the off chance that any related uterine or ovarian formative irregularities are available. The transvaginal filter has a more noteworthy goal and gives a more precise perspective on the inward construction of ovaries, particularly in stout ladies. The ultra-sonographic assessment permits assessing both outer and interior ovary perspectives.

The excess of androgens (hyperandrogenism), which is one of the quickest typical side effects of PCOS, is examined by research facility examinations, which is to say, by looking for increased serum levels of androgens, or through clinical assessment.

PCOS has gone through numerous emphases of indicative measures:

Models of the NIH (National Institute of Health) 1990: -

enduring anovulation

Hyperandrogenism can be clinical, biochemical, or both.

2003 Rotterdam models:

Anovulation or oligo

hyperandrogenism's biochemical or clinical signs

Imagining polycystic ovaries

Rules of AES 2009:

hyperandrogenism, which may include hirsutism or hyperandrogenemia. Ovulatory dysfunction, such as oligo or anovulation or even PCOD, as well as any other androgen excess Ovulation morphology on ultrasound or polycystic ovaries: It is debatable whether to include ultrasonographic evidence of PCOD morphology.

As for hyperandrogenism:

HA assurance in females during clinical and biochemical evaluation can be dangerous. (6)
Feminine brokenness with oligo/anovulation: -
The shortfall of the feminine cycle for a time of 45days or more as well as monthly cycles each year are likewise significant indicative signs. Extra qualities are unreasonable hair development ,baldness, skin break out and barrenness. Ongoing demonstrative boundaries: -
Ultra-sonographic evaluation was offered as a border, and antimullerian chemical [AMH] levels were suggested in its place. A measurement of ovarian stromal volume, calculated as a ratio of the stromal area to the entire ovary (S/A proportion), is another suggestive limit. Estimating the circulatory strain, weight, and level should be done as part of an actual assessment. Along with palpating the thyroid organ for masses or extension, a daily practise and actual general assessment should also have noted the presence of optional sex traits. To identify the specific hormonal discomfort, research facilities can estimate the levels of FSH, LH, thyroid-animating chemical, prolactin, dehydroepiandrosterone, and testosterone. HDL and total cholesterol were also obtained. a minimum of 12 follicles presents in every ovary.
The most used technique is also the Rotterdam PCOS diagnosis criteria in adults. A PCOS diagnosis would be made following an ultrasound that revealed two cases of clinical or biochemical hyperandrogenism, ovulatory failure, or polycystic ovaries. (7)

Differential judgement:

The doctor should think about a few possibilities, such as:

- Extracellular androgens.
- Cancers brought on by androgen.
- Acromegaly.
- Cushing's syndrome.
- Significant ovarian failure.

Examinations conducted at the research centre revealed the following: •Biochemical hyperandrogenemia;

• Estradiol and FSH hyperandrogenism.

• Laparoscopy

• Many PCOS patients, particularly those who are having trouble becoming pregnant, will undergo a laparoscopy.

• A brief, broad sedative is administered to the patient before a small cut is made in the umbilicus and a telescope is inserted to look at the pelvic organs, including the uterus, ovaries, and cylinders. It looks like the ovaries are ping-pong balls.

Hysteroscopy-

In hysteroscopy activity, a fine telescope is utilized to peer inside the hole of the belly. it is utilized for patients the people who have unusual draining.

Oestrone: - Serum androgen focuses certainly stand out in determination.

Vitamin D: - Deficiency of vitamin D is normal in ladies with PCOS. Particularly in hefty ones. Its lack likewise influences ripeness in ladies with PCOS. (8)

SIGN AND SYMPTOM OF PCOD-

1. Dermatological highlights -

Different dermatological adverse effects are frequently caused by elevated levels of androgens. These include skin breakouts, thinning on top/alopecia, and hirsutism (coarse and dull hair on the body parts where males typically produce hair, such as the face, middle, chest, and back). Teenagers' pubescence rather than PCOS may be the cause of some of the dermatological adverse symptoms.

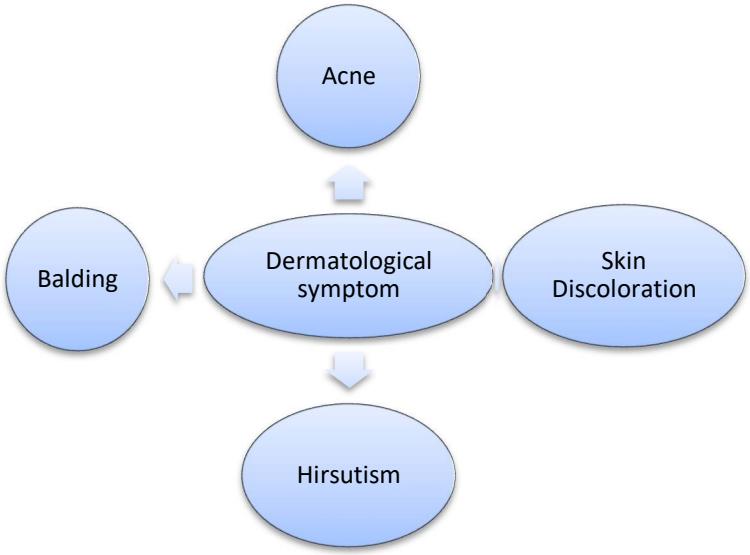

Fig 1: Signs and Symptoms of PCOD

2.Menstrual disorders

A complete lack of the monthly cycle (amenorrhea), a period that is delayed by 35 days or more (oligomenorrhea), or a heavy death (menorrhagia) are all examples of feminine difficulties.

91% of women who experience erratic menstrual cycles are likely to have PCOS. People with PCOS are more likely to report infertility.

3.Polycystic ovaries

PCOS patients may have over the top follicles, which are defined as at least 25 follicles that range in size from 2 to 10 mm in a single view on a transvaginal ultrasound. (9)

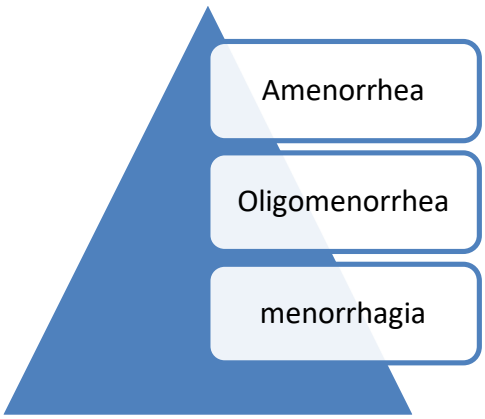

Fig 2: Types of PCOD

4. Virilization-Women who have virilization exhibit male-pattern hair growth and other physically masculine characteristics.

An imbalance in sex hormones, particularly male sex hormones like testosterone, is common among virilized women. Androgens are another name for the hormones used in the male sex. Virilization may result from androgen overproduction.

Androgens are produced by both sexes. The testicles and adrenal glands are the primary producers of androgens in males. In females, the adrenal glands and, to a lesser extent, the ovaries are the primary producers of androgens.

Another side effect of anabolic steroid use is virilization. Synthetic compounds known as anabolic steroids mimic the effects of the male hormone testosterone.

Male pattern baldness and excessive facial hair, typically on the cheeks, chin, and upper lip, are possible signs of virilization.

- Adding depth to your voice
- Tiny breasts
- Expansive clitoris

- Inconsistent menstrual cycles
- Enhanced sex desire

5. Obesity – Since the polycystic ovarian syndrome's initial description by Stein and Leventhal in 1935, obesity has been acknowledged as a typical aspect of the condition (PCOS). According to several research conducted in the United States, up to 80% of women with PCOS are overweight or obese. Studies have shown rates as low as 20%, while the frequency of obesity in affected women outside of the US has increased over time. This discrepancy in prevalence rates is partly explained by variations in the PCOS diagnosis criteria. However, even when equivalent diagnostic criteria are used, obese women outside of the United States have a lower prevalence and severity of obesity.

According to this observation, PCOS patients' development of obesity may be influenced by environmental variables, including lifestyle. The persistent link between PCOS and obesity points to a physiological explanation for this finding. Additionally, obesity makes many of the metabolic and reproductive issues linked to PCOS worse. The known information on the causes of this connection is examined in this review. (10)

PATHOPHYSIOLOGY

Another name for PCOS is STEIN LEVENTHAL SYNDROME. Menstrual irregularities after menarche, excessive hair growth on the top lip and chin, and infrequent periods are the main complaints about this syndrome. Obesity is a prominent symptom of PCOD but is not always present. Insulin resistance is characterized by the presence of dark pigmentation over the neck known as ACANTHOSIS NIGRICANS. Only between 50 and 60 percent of women are obese. Therefore, an overabundance of androgens in the body and highlighted insulin resistance are central to the pathogenesis of PCOD. An unhealthy lifestyle has been identified as the primary factor causing this illness. HIRSUTISM, often known as abnormal hair growth, is brought on by an unbalanced androgen level. Lean and slender women also suffer from this illness just as much as obese women do. Initial insulin resistance results in hyperinsulinemia, which sets off subsequent processes. (11)

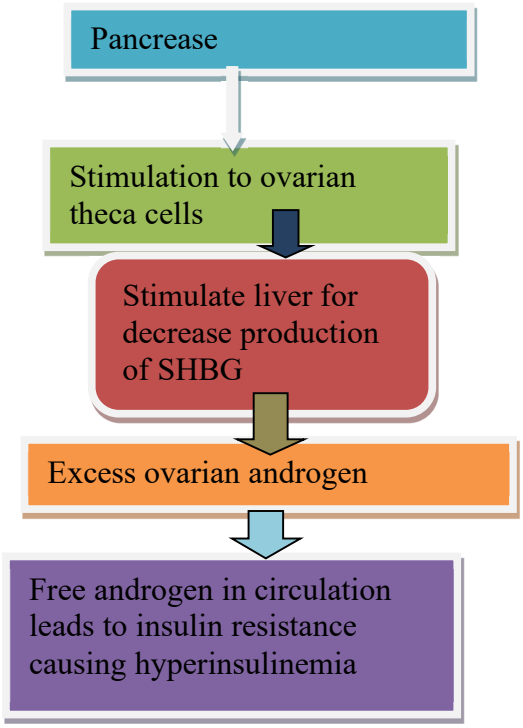

Fig 3: Pathophysiology of PCOD

Initial insulin resistance results in hyperinsulinemia, which sets off subsequent processes. In addition to genetic factors like smoking, habits, an unhealthy lifestyle, and weight gain, insulin resistance can also be brought on by environmental factors.

When hyperinsulinemia first develops, the ovary, especially the stroma and thick cells, are stimulated. The stimulations will result in an excess of androgen production. However, androgen is produced regardless

during a typical menstrual cycle and is converted to estrogen in those conditions. If excess androgen is produced, liver stimulation will result.

ROLE OF LIVER - SHGB, or sex hormone binding globulin, is made in the liver. Sex hormones are bonded to the SHGB. The manufacturing of SHGB will decline in the event of PCOD. Increased levels of free androgen are brought on by this reduction in production. Only 1% of the total androgen produced exists in free form; thus this free portion will rise. The proportions of androgen in the SHGB and albumin will decline by 80% and 19%, respectively. (12)

Through the creation of sex hormone binding globulin, the liver—an organ that responds to insulin—contributes considerably to both the availability of sex steroids and the body's overall insulin sensitivity. Our goal was to determine whether ectopic liver fat was related to reduced SHBG and whether this relationship mediated insulin resistance.

Greater insulin concentrations were shown to be significantly connected with higher liver fat and lower SHBG levels (r=0.25, p0.001 and r=0.18, p0.01, respectively) after adiposity was taken into consideration. The greatest insulin levels were found in women with the lowest SHBG and highest fat levels (interaction p=0.09). The effects of SHBG and liver fat on insulin levels were additive. Insulin and SHBG were more correlated in women with bigger livers. SHBG and liver fat appear to have independent effects on insulin levels because controlling for one another did not make each association weaker (p=0.023 and 0.001, respectively).

These results confirmed the strong independent correlations between midlife women's metabolic risk and elevated liver fat and reduced SHBG. These results underline the need for additional research into the role of liver fat in minimising the effect of SHBG on insulin levels. (13)

As we show independent correlations of each unhealthywith circulating insulin, the data imply that SHBG and ectopic liver fat may each be significant in modifying circulating insulin in healthy peri- and postmenopausal women. Furthermore, we describe for the first time how endogenous hormone profiles and liver fat affect metabolic outcomes.

Menopause and race had little impact on the SHBG levels, which were regulated by liver fat and connected to insulin levels. MS or prediabetic patients, as well as normoglycemic those who later acquire diabetes and recognize the prediabetic condition, are characterized by elevated fasting insulin levels. (14)

IMPACT OF OBESITY:

One of the androgens that the ovaries produce in the form of androstenedione. Additionally, a small amount of testosterone is released by the ovaries. Additionally, a small amount of testosterone is released by the ovaries. It is essential, but when androstenedione is converted to testosterone, a problem occurs. This process occurs in fat cells. Therefore, the more fat cells there are, the higher the level of testosterone will be. When oestrogenestrone is used, something happens. Tiny antral follicles are where steroidogenesis is organized.

Precocious pubarche in girls may start early due to physiological alterations in androgens during puberty, which is a risk factor for PCOS. In addition to its autonomous function, visceral fat is hypothesised to worsen these hormonal changes in adolescent girls. Additionally, HA and/or ovarian cysts are linked to obesity in adolescent girls.

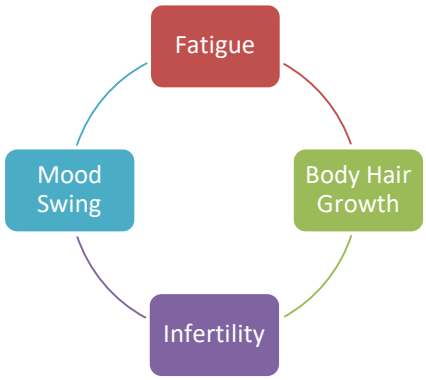

Fig 4: Impact of obesity

Studies have looked into the temporal links in girls and teenagers to try and determine which arises first, obesity or PCOS. According to one study, girls with high BMIs as children were more likely to develop oligomenorrhea and be diagnosed with PCOS when they were young adults (age 24), however, it is possible that these girls exhibited early signs of the condition. The impact of obesity on the emergence of aberrant

ovarian morphology was examined in a prospective study on 244 randomly chosen post menarchal girls from a large population-based birth cohort. (15)
In contrast to the normal-weight girls, PCOM was only discovered in 32.1% of the obese girls, indicating that obesity may be a contributing factor. Researchers looked into whether PCOS (or its characteristics) in adolescence is a predictor of later class III obesity (BMI 40) in a study including 493 girls. Despite not employing pelvic ultrasound, 12 (or 40%) of 30 oligomenorrheic females were given a Rotterdam diagnosis of PCOS at the age of 14. By the age of 24, 33 percent of these girls had class III obesity, compared to 8.4 percent of those without PCOS. Low SHBG, oligomenorrhea, high childhood insulin levels, elevated CFT, and MetS, all of which are known PCOS characteristics, were also predictors of class III obesity.
These findings show that the pathophysiology of obesity and PCOS are related, and they also imply that the diagnosis of either condition in adolescence should be closely watched in light of the potential long-term health consequences.

HORMONAL IMBALANCE
Androgens: Although they are sometimes considered masculine hormones, women also have them. Usually, higher amounts are found in women with PCOS.
Insulin: The blood sugar is controlled by this hormone. Your body may not respond to insulin as it should if you have PCOS.
Progesterone: Your body may not produce enough of this hormone if you have PCOS. You can have problems estimating when your period will arrive or miss it for a very long time. (16)
PCOS is associated with abnormal hormone production and metabolism, particularly androgen and oestrogen, in the body. Androgenic hormones such dehydroepiandrosterone sulphate (DHEA-S), androstenedione, and testosterone are often present in large quantities, despite the fact that there is frequently significant variance across patients.
According to some studies, the anterior pituitary gland's release of luteinizing hormone (LH) boosts the ovarian theca cells stimulatory impact, which may elevate androgenic hormone levels and cause irregular or absent ovulation. Follicle-stimulating hormone (FSH) levels are lower in relation to LH, which slows the process by which androgen hormones are converted to oestrogen. As a result, less oestrogen is available, which may prevent ovulation from taking place.
The CYP450 C17 enzyme, which is the rate-limiting stage in the body's manufacture of androgenic hormones like testosterone, has also been connected to PCOS in some studies. The presence of additional chemicals that inhibit or promote this enzyme, or anomalies in this enzyme, may contribute to the etiology of PCOS, though more research is required to confirm this.
PCOS and the body's resistance to insulin are strongly correlated. This could be a result of alterations brought on by aberrant insulin receptor binding.
In particular, the extra insulin may change the growth of follicles necessary for ovulation and increase the amount of testosterone produced by the ovaries. PCOS may develop as a result of restricted or delayed ovulation. Endometrial hyperplasia can result from excessive endometrium proliferation, and the metabolic syndrome's highlighted insulin resistance will also raise the risk of diabetes mellitus. A missed period will result from the wall merely growing and not shedding, but beyond a certain point, the endometrium will overrun its blood supply and shed, which will cause profuse bleeding. Days will pass during which both events will take place in a loop, with heavy bleeding coming first and then a missed period. (17)
Effect of excess Androgen: A class of sex hormones is called androgens. All genders produce androgens, but men produce a greater amount of them. They aid in the onset of puberty and are important for reproductive health and physical development. The most prevalent androgen is testosterone. Androgens are produced by the ovaries and testicles in the male and female reproductive systems, respectively. These hormones are also produced by the adrenal glands, which are located above each kidney.

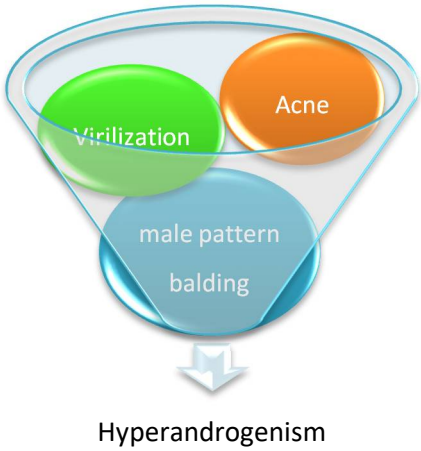

Fig 5: Effect of excess androgens

In both sexes, testosterone predominates as an androgen. Androstenedione, Dehydroepiandrosterone (DHEA), and Dihydrotestosterone are further androgens. Androgens support various bodily processes in both sexes, including bone density, muscle growth, puberty, red blood cell synthesis, and sexual activities. Although women also produce a small amount of androgen, men tend to produce more.

However, an overabundance of androgen will cause problems. Androgen excess contributes significantly to the constellation of metabolic disorders of PCOS, from obesity to insulin resistance, by having a visible impact on important peripheral metabolic tissues like the adipose, liver, pancreas, and muscle, as well as, very notably the brain. Hyperandrogenemia is thought to be the primary clinical indicator of PCOS. More than 80% of women who display symptoms of hyperandrogenism, such as hirsutism, acne, or alopecia, are thought to have PCOS. (18)

The ovary and adrenal gland use cholesterol as a shared precursor to creating androgens. Cholesterol is transformed into dehydroepiandrosterone (DHEA) and androstenedione through a series of enzyme processes. These reactions happen in the theca cells of the ovary, whereas they happen in the adrenal cortex of the adrenal gland. The rate-limiting enzyme for the production of sex steroids in theca cells and cortex is cytochrome P450c17.

The primary precursor for the synthesis of testosterone and oestrogen in the adrenal cortex and ovaries is androstenedione. Androstenedione is transformed to testosterone in the ovary's theca cells, where it is then changed into oestrogen by the enzyme cytochrome p450 aromatase in the granulosa cells. The rise of circulating testosterone and androstenedione levels is the most frequent biochemical disturbance in PCOS patients. Although the adrenal gland may potentially play a role in some individuals' androgen overproduction, compelling evidence points to the ovary as the main source of androgens in women with PCOS. (19)

CAUSES OF PCOD

1 Insulin resistance & Lifestyle

Up to 70% of PCOS-afflicted women develop insulin resistance, which prevents their cells from adequately using insulin.

The pancreas secretes the hormone insulin to facilitate the body's utilisation of dietary sugar for energy.

The body requires more insulin when cells cannot utilise it effectively. To make up for this, the pancreas produces extra insulin. The ovaries create more male hormones in response to increased insulin levels. Extra insulin may boost the production of androgen, making ovulation challenging.

The main contributor to insulin resistance is obesity. Your risk of type 2 diabetes can be increased by both insulin resistance and fat.

Insulin Resistance Factors

- Genetic influences lead to insulin resistance.
- Insulin resistance brought on by obesity (related to diet and inactivity)
- A combination of both of these factors

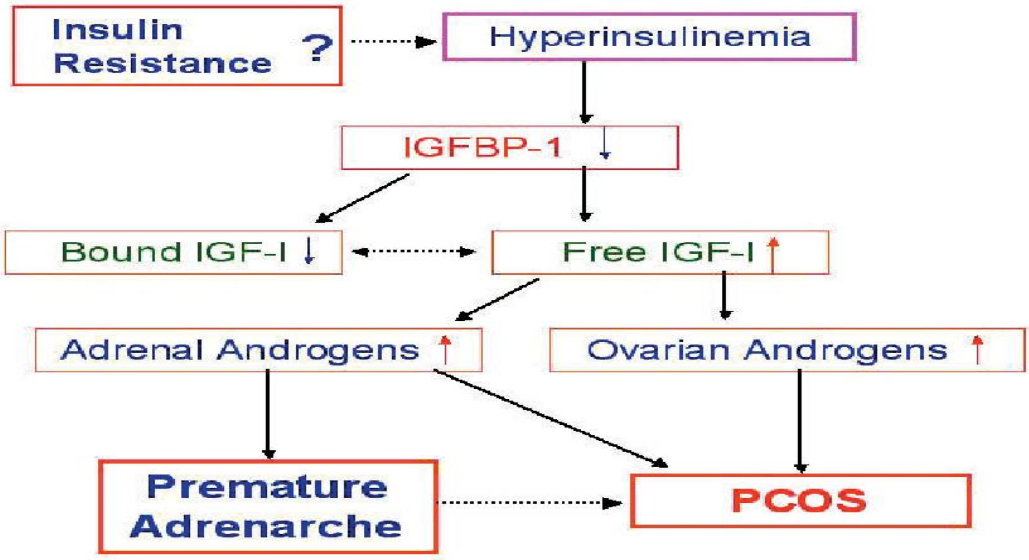

Fig 6: Cause of PCOD

Chronic low-grade Inflammation –

There is a genetic component to the continuous low-grade inflammation associated with PCOS. Proinflammatory genotypes such as those that encode TNF-, the type 2 TNF receptor, interleukin-6 (IL-6) and its signal transducer are associated with PCOS. (20)

Measurement of circulating C-reactive protein (CRP) utilizing high-sensitivity assays has been the main focus of investigations addressing the state of chronic low-grade inflammation in PCOS. IL-6, an endocrine cytokine produced by adipose tissue, in this case, stimulates the liver to create CRP, an acute phase reactant that is also directly produced by adipose tissue. Comparing the ATP III criteria for metabolic syndrome to CRP levels >3 mg/L, the cardiovascular event is predicted by both criteria equally. By encouraging the absorption of lipids into foamy macrophages within atherosclerotic plaques, CRP also has a functional purpose.

According to a recent meta-analysis, CRP is the most reliable circulating measure of persistent low-grade inflammation in PCOS. Regardless of whether they have PCOS, normal-weight women with PCOS still had lower CRP elevations (3.0 mg/L) than obese women (>3.0 mg/L). Therefore, PCOS-related CRP spikes remain hidden in the presence of obesity and fall below the threshold for predicting metabolic or cardiovascular risk. According to this, a single static circulating marker in PCOS might not accurately reflect inflammation at the molecular level. Another reason for IR in tissues that are sensitive to insulin is a rise in CRP levels. Increased pro-inflammatory substances released by the liver and monocytes are the cause of IR. This increase in secretion is induced by CRP. (21)

Heredity

Many people all over the world are affected by the multifactorial condition known as a polycystic ovarian syndrome. Due to the numerous social and stress-related problems that people with PCOS experience, different facets of the condition were investigated in order to draw a firm conclusion. Infertile women with small, glossy ovaries were first discovered in 1972. Another investigation into the deteriorating ovaries was published later, in 1844. Research on several facets of PCOS, including its cellular mechanism, hormonal involvement, environmental risk factors, and genetic predispositions, continued. In 1968, Cooper and associates released the pioneering investigation on the genetic basis of PCOS. In families with an autosomal dominant inheritance, PCOS investigations have identified many siblings and relatives. (22)

The idea of autosomal dominant inheritance of PCOS was reinforced by the prevalence of PCOS in the first-degree relative of the propend, which was shown to be in about 55–60 percent in numerous small families. Later, monogenic reasons of male-pattern baldness, oligomenorrhea, and hirsutism in PCOS women were discovered.

Twin studies in small cohorts of monozygotic and dizygotic twin pairs revealed that PCOS is an X-linked polygenic disorder rather than an autosomal dominant or monogenic disease. Furthermore, twin studies indicated that genetics played a role in 72 percent of the variance in PCOS risk.

Women with PCOS exhibit certain genetic relationships, and PCOS runs in families. There are probably multiple genes involved in the illness, not just one.

The likelihood of developing PCOD is 50% among women with close female relatives who have the condition. PCOD is a risk factor for developing diabetes; thus, as you age, it could cause Type 2 diabetes. Since PCOD has not yet been linked to a single gene, the genetic causes are likely complicated and comprise many genes.

Excess androgen production

Elevated androgen levels are the most consistent symptom of PCOS, and the majority of patients (about 60%) display hyperandrogenism. Hyperandrogenism is considered to be one of the main characteristics of PCOS (Rotterdam definition). Serum levels of several androgens, including testosterone (T), androstenedione (A4), dehydroepiandrosterone sulphate (DHEAS), as well as the enzyme necessary to convert pro-androgens to bioactive androgens, 3-hydroxysteroid dehydrogenase (3-HSD), are high in women with hyperandrogenic PCOS. It was shown that PCOS women have greater plasma testosterone concentrations, which are capable of being converted to estrone in adipose tissue. Ovulatory dysfunction is brought on by an increased change of estrone to estradiol, which affects follicle formation and raises the LH to FSH ratio. (23)

Insulin resistance and hyperinsulinemia can lead to a decrease in sex hormone binding globulin levels, which in turn causes an increase in free androgens and unfavorable metabolic profiles, which can lead to excess androgen production. Larger, multi-cystic ovaries and theca interstitial hyperplasia have been observed in females who are exposed to high levels of androgens due to endogenous adrenal androgen hypersecretion in congenital adrenal hyperplasia or exogenous testosterone treatment in female-to-male transsexuals. A greater androgen release is also seen in cultured human theca internal cells taken from PCOS ovaries, and this secretion persists over the course of prolonged culture. These findings support the idea that androgens play a part in the development of ovarian characteristics associated with PCOS. (24)

Weight

Obesity-related conditions include polycystic ovary syndrome. As a result, gaining weight and being obese help PCOS develop. However, there are other ways that the onset of PCOS might impede attempts to establish sustainable weight loss and contribute to future weight gain.

Sometimes, gaining weight might make the signs of the polycystic ovarian syndrome and insulin resistance worse. Some PCOD victims assert that they have a healthy weight and claim they have never had symptoms like irregular menstruation or excessive hair growth. But after infants gain weight, these symptoms start to manifest.

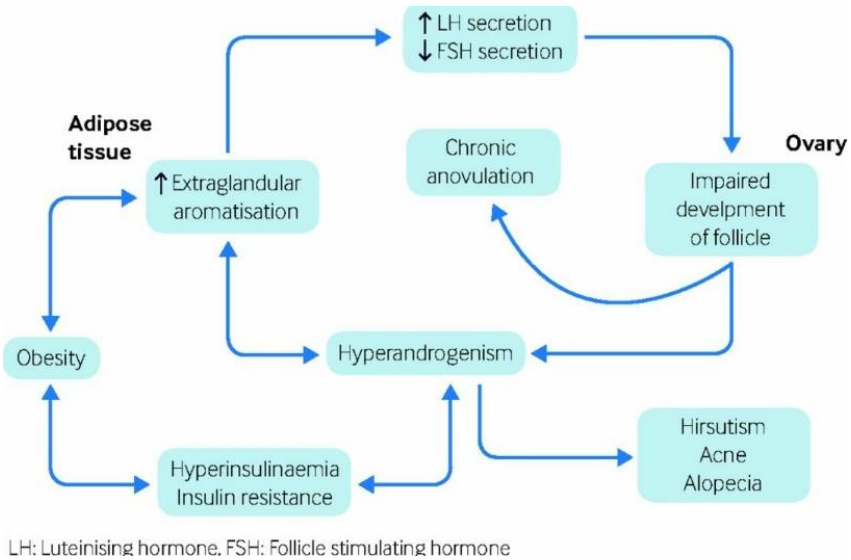

Fig 7: Effect of Hyperandrogenism

RISK FACTORS OF PCOD

The risk factors for PCOD are mainly linked to the genetic as well as certain health issues related to family history as per research evidence. (25) Life style diseases such as obesity, weight gain also contributes to the same. Improper dietary pattern also leads to development of PCOD such as excessive intake of diets and drinks enriched with sucrose, trans fat, fructose, animal fat as well as processed food. Conditions such as insulin resistance, hyperandrogenism worsens the original condition as these also comes under the prime

risk factors. Adopting healthy lifestyle, regular exercises, intake of natural nutrients can aid the recovery process for PCOD.

GENETIC FACTORS

The genetic basis for development of PCOD is uncertain as exact inheritance pattern has not been defined yet. Some studies have claimed it to be an autosomal dominant disease while some believe that it is due to both genetic as well as environmental factors (acquired and inherited traits). (26)

Medical conditions such as Hirsutism, enlargement of ovaries, hyperandrogenism, metabolic disorders and oligomenorrhea can be considered as diagnostic parameters for PCOD as indicated in reports of several scientists based on pedigree analysis.

This disease has also been linked to physiological conditions like Oligospermia and increased LH secretion which gives an idea of its connection with X-linked pattern of inheritance (indicated through a study on male subjects) which makes the genetic consolidation approach even more complex for the disease.

Genetic locus for PCOS can be identified through two main methods viz. association of studies approach and linkage studies approach. The former deals with identification of a predisposing allele in large group of population (for clear identifiable results) that has appeared frequently in affected individuals than the normal ones while the latter method involves a kind of pedigree analysis approach based on identifying linkage between phenotypic and genomic grounds among probands and their related families.

However, these approaches didn't work for complex traits as in case of PCOD because factors such as expressivity, variable penetrance have to be taken into consideration for such studies. These methods are actually robust tool for identifying mendelian disorders mainly.

ROLE OF OBESITY:

Polycystic ovary syndrome (PCOS) is highly prevalent among 6-10% of reproductive age women between 12-15 years and even adolescence whose contributive factor is obesity in majority of the population.

Metabolic dysfunction, hyperandrogenism, acne, hirsutism, oligomenorrhea and sub-fertility are considered as clinical diagnostic presentations for PCOS from both radiological and biochemical prospects. 38-88% of women suffering from PCOS are either obese or overweight as reported in epidemiological data. Analysis of relevant literatures on this matter reveals that women with obesity are at 2.7 times higher risk for development of PCOS than non-obese.

The increase in overall body weight corresponds to increase in problem of insulin resistance mediated by inflammatory pathways especially on PI3-K post-receptor hence, use of the term "metabolic insulin resistance" is more frequent in case of PCOS. 'Mitogen-activated protein kinase' (MAP-K) which is also another post-receptor insulin pathway remains unaffected in case of both obesity and PCOS whose preferential activation leads to atherogenic, mitogenic and steroidogenic effects. Defective PI3-K insulin pathway leads to compensatory hyperinsulinemia resulting in metabolic dysfunction which is often complicated by MAP-K insulin pathway resulting in deleterious and pleiotropic effects especially in obese affected women.

Epidemiologically, Genetic studies have also indicated the correlation between obesity and PCOS mediated by different mechanisms including reproductive and steroidogenic effects of hyperinsulinemia and metabolic imbalance resulting out of insulin resistance.

UNHEALTHY LIFESTYLE:

A prevalent lifestyle disorder is polycystic ovarian disease (PCOD), also known as polycystic ovarian syndrome. Every day that goes by, the younger generation is experiencing it more frequently. The prevalence of this condition is rising, and the most recent research conducted in India indicate that every fourth woman has PCOD. According to some sources, PCOD is most frequently caused by a sedentary lifestyle, which explains why urban populations are more likely to experience PCOD than rural ones. People in villages lead a more sedentary lifestyle and engage in unhealthier eating habits than those in cities. The population of villages is more active and consumes lighter fare than that of cities, at least. Every second disease is mostly brought on by poor eating habits and an unhealthy lifestyle. Similar to PCOD, this lifestyle disorder was brought on by unhealthful diet and lifestyle choices. It needs to be handled carefully since if it is kept in the body for a long time, it can lead to a number of disorders, including infertility, gynaecological issues, hypertension, gestational diabetes, and depression.

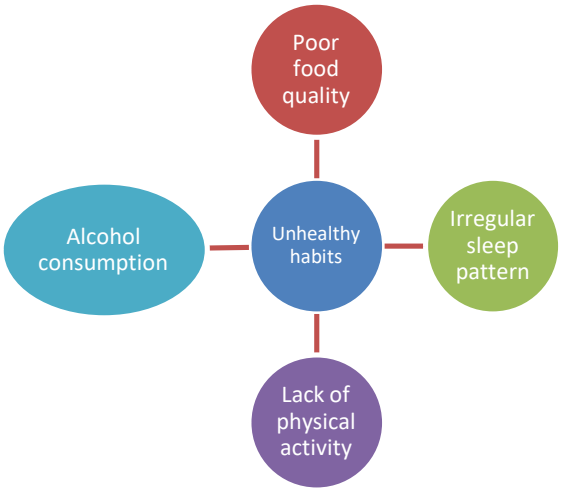

Fig 8: Factors of unhealthy lifestyle

Women who are in reproductive life are affected by PCOD. As the name of the condition implies, numerous cysts in the ovaries might affect how well they function. Acne, facial hair, an irregular and unpleasant menstrual cycle, and weight gain are some of its earliest signs. The above signs and symptoms of PCOD are caused by an increase in male hormones in the body. Along with bad diets and lifestyles, other factors that may contribute to its rise in prevalence include genetic susceptibility, dietary inadequacies, weakened immune systems, and other metabolic diseases. A family history of PCOD or a genetic predisposition raises the likelihood of its occurrence, although neither factor guarantees that an individual will develop the condition.

Glucose tMetabolic disorders (obesity, weight gain, insulin resistance) resulting due to lack of nutritious diet consumption, avoiding exercises, adopting sedentary life style and emotional imbalance are the leading causes of PCOD in urban young population.

A study conducted and organized by AIIMS on women suffering from PCOD revealed that the main factors for the concerned disease in different patients includes obesity (60%), fatty liver (50%), insulin resistance (70%), high level of androgens (60-70%) and glucose intolerance (40-60%) . However, bringing changes in lifestyle such as exercises (~150 minutes /- week), nutritious diet (reduction in refined foods intake), physical movements can surely help the recovery faster by reducing the overall body weight which in some cases, may improve ovulation. Keeping your body calm and stress free via meditation & yoga can help in better stress management resulting out of PCOD symptoms.

Insulin Resistance:

Glucose intolerance resulting out of improper insulin secretion, insulin resistance, metabolic and physiological imbalance condition associated with obesity are primarily associated with PCOS. Serine/threonine kinase is also responsible for such abnormality associated with insulin-receptor signaling. Defect in serine phosphorylation affects the modulatory activity on enzyme P450c17 associated with biosynthesis of androgen which eventually leads to hyperandrogenism and insulin resistance in women suffering from PCOS.

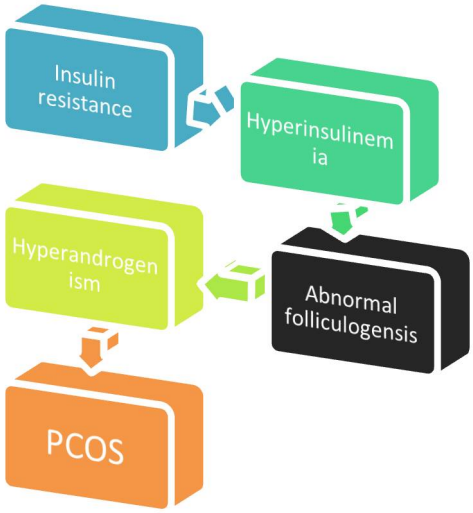

Fig 9: Factors of Insulin Resistance

Insulin acts through its own receptor than IGF-I receptor for augmenting adrenal, ovarian steroidogenesis and even LH release from pituitary gland which is indicated in several recent reports.
Cell growth is not affected by defect in insulin action; indeed, it selectively affects glucose metabolism only. PCOS, being menarchal onset disorder, is appropriate for examining carbohydrate metabolic defect as well as identification of NIDDM genes via positional cloning studies. Women suffering from PCOS along with indications of dysfibrinolysis, lipid abnormalities and insulin resistance are generally predicted to be at high risk for development of cardiovascular diseases, however, prospective studies are required for ascertaining it.
For metabolism of sugars, it must get entered in cells which is mediated by insulin through insulin receptors located on cell surface. However, people with problem of insulin resistance need to produce more amount of insulin than the normal ones for processing sugar into cell. This problem gets worsen by a factor of 70-80% in women with PCOS along with obesity which in long turn, results into development of diabetes in those individuals due to insulin resistance (if left unchecked). Diabetes can be easily diagnosed through HbA1c glucose test or via combination of oral glucose test and insulin reporting the blood sugar level above 200mg/dL. Diabetes may result because of improper functioning of insulin receptors even though the body is producing normal amount of insulin required.

TREATMENT OF PCOD

Non-pharmacological approaches: -
Treatment strategy for PCOS roams around curing symptoms as the main cause is not known, however, this is contradicted by the patient's willingness for fertility. Basically, this treatment approach includes parameters by which either insulin resistance could be lower down or bringing androgen action on the target tissues to a halt. Process for anovulation correction can be opted.
Another approach for treatment of PCOS in obese patients focuses on lowering their body weight which will ultimately reduce the level of hormones like LH, androgen and insulin. This may even correct the ovulatory phase and hence, pregnancy on the long run.
Destroying androgen generating tissue by laparoscopic ovarian drilling technique can help in decreasing androgen levels in patient's body and can even prevent chances of multiple pregnancies. This surgical process involves creation of multiple perforations on ovarian surface and stroma for destroying androgenic tissue.

- Pharmacological Approaches: -
  Healthful lifestyle recommendations must be given to all women with PCOS before turning to pharmaceutical treatments, regardless of their weight, complaint, or anything else. This is because women can generally only benefit from a healthy diet and regular exercise when the condition is mild to severe. (27)

Anovulation-

Clomiphene citrate (Clomid, Sanofi) is the first line drug for ovulation induction whose mechanism of action is not exactly known. 50mg/day dose is usually prescribed in initial phase for 5 days so as to induce ovulation but in case of failure of conception, same dose is repeated for another 5 days in subsequent cycles.

High dose (100mg/day for 5 days) can be prescribed after a gap of 30 days from the preceding cycle for next three cycles only (in case, absence of ovulation even after first cycle of therapy). However, before opting any further therapy, treatment using same can be carried out for a total of six cycles.
Treatment using clomiphene for pregnancy has been found to be successful in nearly 30% of the patients, however, 20% amongst them reported cases of stillbirths or spontaneous abortions. Several adverse side effects such as ovarian hyperstimulation syndrome (OHSS), gastrointestinal (GI) distention, multiple pregnancies, ovarian enlargement, bloating, hot flushes and discomfort have been reported for treatment using clomiphene.

Antidiabetic Agents

Improvement in fertility, ovulation induction, reduction in insulin resistance and lowering of androgen levels can be sought by aiding the medication therapy using clomiphene with antidiabetic drugs especially metformin.
The indication for metformin in treatment of PCOS induced infertility have been demonstrated through a study conducted on two groups of 320 women and comparison was done against placebo. The result were positive for metformin including 53.6% higher pregnancy rate and 41.9% live births as compared to the placebo where these were just 40.4% and 28.8% respectively. However, there was no evidence to credit metformin or its combination with clomiphene for increase in live birth rates.

Antiandrogens-

Hyperandrogenic symptoms including acne, hirsutism and alopecia in women with PCOS can be cosmetically relieved using waxing, epilators and shaving, however, they are often associated with skin irritation and redness. Medical spas (electrolysis, laser treatment) can be preferred but they are expensive. OTC products for treatment of acne have problem of irritation at the applied site and also, they are not much effective.
Oral or topical antiandrogens including flutamide (Eulexin, Schering/Merck), Spironolactone (Aldactone, Pfizer) and finasteride (Propecia, Merck) are used for treating alopecia as well as controlling signs and symptoms of acne and hirsutism as they act by lowering androgen levels. The additional benefit of antiandrogens is to control lipid levels elevated in PCOS patients. A study on 40 women was conducted for demonstrating the role of antiandrogens in treatment of hirsutism for which spironolactone, flutamide and finasteride were administered over a period of 6 months in the dosage regimen of 100mg, 250mg and 5mg/day respectively. 25-100mg dose of spironolactone twice daily is most often used as antiandrogen because of its low cost, easy availability and safety. However, contraception is suggested for patients with PCOD taking antiandrogens because of their teratogenic effects on male fetus retarding genitalia formation. Hormonal therapies comprising antiandrogens and COCPs are suitable for moderate to severe forms of hirsutism. For adolescents with PCOS problem, COCPs are alone capable of treating hirsutism. Estrogen present in COCP acts by retarding production of ovarian and adrenal androgen by decreasing level of LH hormone. It also increases hepatic SHBG production which helps in reducing free androgens. On the other hand, progestins acts by inhibiting the activity of 5α-reductase enzyme and simultaneously, blocks the AR. A small RCT based on comparing the efficacy of combinations of 30 μg Ethinyl estradiol and 0.15 mg desogestrel vs 35 μg Ethinyl estradiol and 2 mg cyproterone acetate (not available in US) in treatment of hirsutism was carried out over a time period of 12 months, however, the results showed no significant differences among the two combinations tested.

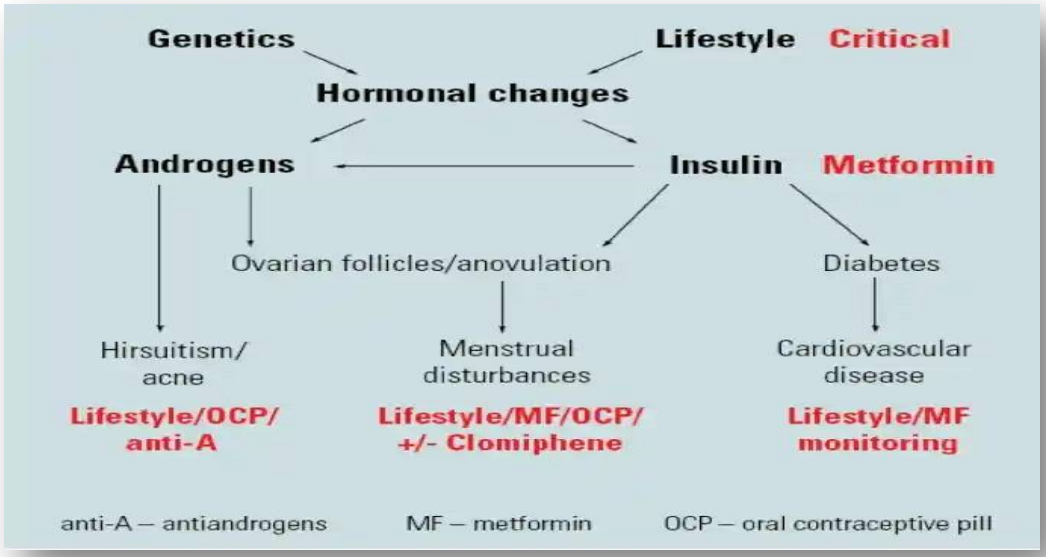

Fig 10 : Effects of Antiandrogens on PCOD

Oral contraceptives

This is one of the option for treatment of PCOS in women (reluctant to pregnancy) for regulating menstrual cycle as well as controlling androgen levels, acne and hirsutism simultaneously in which estrogens and progestin combinations are given.

Some of them even contains antiandrogenic progestins as in Dienogest (e.g. Natazia) and Bayer's drospirenone (e.g. Yaz) for synergistic actions in controlling androgenic effects theoretically. Usually, positive clinical results begin to appear after a period of 6 months in patients with hirsutism. (28)

E. COCPs

As per international evidence-based recommendations, it is stated to use COCPs (estrogen and progestin preparations) for correcting irregularities in menstrual cycles and hyperandrogenism condition in patients with confirmed PCOS especially the adolescents. There is quiet uncertainty regarding accurate dose of drug needed for the treatment, however, 20 to 30 µg Ethinyl estradiol (least dose ~ 35 µg) is usually recommended. Along with this, cyproterone acetate is also given in combination for treating PCOS. COCPs are usually contraindicated for thromboembolism condition, so, patient must be properly diagnosed along with family history for the same. There are no predictable evidences available for the treatment using COCPs beyond 24 months. However, for long run regarding contraception, cops can be used.

Management of Hirsutism-

The treatment approach for this clinical condition requires high commitment for months to years depending on the type or the combination of procedures/therapy sought. The most common therapies (clinically evaluated) available for hirsutism includes antiandrogens, topical medications, physical hair removal methods, COCPs and light-based therapies.

Out of various physical methods available for hair removal including waxing, electrolysis, chemical epilation, bleaching, shaving and plucking, all are temporary except electrolysis as hair follicle is destroyed in this procedure which can result in alteration in pigment and cause scarring. Experienced technician is required for the same while other methods are easily carried out by adolescents on their own even before getting diagnosed for PCOS. (29)

13.9% eflornithine cream can be topically applied to women less sensitive to skin irritation for improving facial hirsutism. This functions by inhibiting ornithine decarboxylase enzyme irreversibly which is required for proper growth and differentiation of hair follicles.

For long term solutions, light therapy using Lasers such as alexandrite, diode, neodymium-doped yttrium aluminium and high intense pulsed light (600-1100nm wavelength) can be utilized for destroying hairs as melanin present in them absorbs radiation in this wavelength region. However, this often generates the risk in the form of dyspigmentation, scarring and blistering to dark-skinned individuals possessing greater amount of melanin as epidermal melanin also absorbs radiation near the same wavelength region. Neodymium-doped yttrium laser can be used to overcome such side effects as it possess longer wavelength. 50% hair reduction is noted for laser treatment post 6 months along with mild pain, perifollicular oedema,

skin redness, scarring, blisters, burns and hyper/hypopigmentation as side effects which can be managed with local anaesthetics and cooling mechanisms before and after treatment respectively. Direct contact with sunlight should be avoided before as well as after the laser treatment. This treatment helps to improve hirsutism in young females suffering from PCOS along with their quality of life, depression and anxiety levels.

Surgery

The less common Laparoscopic ovarian drilling surgical technique can be opted in case of failure of ovulation inducing medication therapy which involves scrapping off androgen producing tissue from ovary by poking it using a needle for reducing androgens levels in patients which may help the patient to ovulate via imbalance in hormone levels.

Different Surgical options available are :-

Ovarian drilling: reduction of androgen levels by scrapping off tissue from ovaries via tiny holes.

Oophorectomy: removal of one or both the ovary by surgery.

Hysterectomy: this surgical procedure includes removing whole or the part of uterus.

Home remedies

Several home remedies focusing on adopting better life style such as eating healthy nutritious diet, performing meditation, yoga and exercises for maintaining normal body weight and quitting smoking can surely help in intervening several symptoms of PCOS such as problem of development of insulin resistance as well as reducing the risk of diabetes and cardiovascular diseases, although, there is no permanent cure for this disease.

Pregnancy and menopause

PCOS affects the patients throughout their lives including post menopausal phase where secondary health issues like cardiovascular diseases associated with it gets even worsen. Other medical implications such as gestational diabetes, premature births, increased risk of miscarriage and preeclampsia are also associated with PCOS. Neonates born to a woman suffering with PCOS are at greater risk for dying and this problem gets complicated in case of multiple births (twins/triplets)

In vitro fertilization (IVF)-

This technique involves fertilizing egg with sperm in laboratory and implanting the resulting zygote or embryo in uterus. This procedure is suited for those women candidates with PCOS who are unable to ovulate even after medication therapy.

Acne treatment

The basic treatment strategy focuses on reducing sebum production, suppressing Propionibacterium acnes, preventing microcomedone formation and controlling inflammation for preventing scaring. Benzoyl peroxide 0.1%/2.5% (Epiduo Gel), an OTC product is preferred initially for mild acne conditions which can be aided with topical retinoids and proper skin care. However, systemic antibiotics such as macrolides are necessary for moderate and severe acne conditions for at least 3-4 months until new inflammatory lesions gets ceased. Help from dermatologist must be sought early so as to prevent any negative impact on psychosocial well being of adolescents as acne have direct impact on it.

Other Therapies

5-10mg/day dose of Medroxyprogesterone acetate (MPA) for 10 to 14 days is suitable for treating conditions of dysfunctional uterine bleeding and amenorrhea in women suffering from PCOS who are either at no risk for pregnancy or not willing to conceive. Abnormal endometrial proliferation, insulin sensitivity and lipid profile can be controlled using progestin therapy on monthly basis in PCOS patients, however, it doesn't have any impact on production of ovarian androgens. (30)

Statins –

They are known to play an effective role in lowering low-density lipoprotein-cholesterol (LDL-C), total cholesterol, triglycerides and testosterone levels as a strategy for treatment of PCOS. Simvastatin (Zocor, Merck) is more effective for lowering testosterone levels by 17.1% as compared to metformin (136%) in women suffering form PCOS. (31)

PREVENTION AND MANAGEMENT OF PCOD-

Education and Counseling

This is very important aspect which must be dealt with utmost care as it directly affects the emotional as well as mental status of adolescents with PCOS who are already worried about future fertility than their peer mates on cultural basis as well. Proper, authentic and appropriate counseling should be given to the PCOS patients regarding self-care with proper discussions and explanations using empathetic approach.

Lifestyle Interventions

Adolescents with PCOS who are obese or overweight should be motivated to adopt healthy life style such as healthy diet, regular exercises, physical workout, rid from sedentary behavior, etc. along with their

treatment plans. These life style interventions in adolescents should be accompanied with the help from parents and family. Proper management of anxiety and psychological factors including disordered and unhealthy eating, concern about body image, etc. is required for adhering and thoroughly engaging with these lifestyle interventions which will help in enhancing quality of life and balancing hyperandrogenism, IR and body weight on the long run as indicated through two systematic reviews.

Although there is not a particular diet type which can be recommended to patients with PCOS for reducing their body weight. For demonstrating this, five randomized clinical trials were conducted on obese adolescents with PCOS. However, management of menstrual irregularity and body weight have been shown by the consumption of hypocaloric (<40 g fat per day) and low-carbohydrate diet (20 to 40 g/day) over the period of 12 weeks without any difference in diets. On the similar note, consumption of low glycemic and low fat diets over a period of 6 months has significant impact on body weight without any difference in diets. Additionally, significant loss in weight, regularity in menstrual cycles and improvement in hirsutism condition can be brought about by consuming low energy diet for at least 6 months as compared to healthy diet. Same changes along with improvement in androgen levels can occur via exercises, training about nutrition education and behavioral therapy when adopted for 12 months period in adolescents with PCOS and obesity.

Physical activities (moderate to vigorous) have better impact on health if done for longer duration at least 60 minutes/day with significant frequency and intensity. If it is not possible to exercise regularly then, at least thrice per week for 60 minutes duration must be carried out in order to lose weight and maintain good health. This is also advantageous to prevent heart attack risks in patient with PCOS. Performing Yoga for a period of 12 weeks also helps in managing symptoms arising due to PCOS. Limiting the use of electronic devices such as mobiles, tablets, TV, computers, etc. to only 2 hours/day helps in improving health of adolescents provided that they don't have sedentary behavior. (32)

For management of PCOS in adolescents, strategies for weight loss (~7% of the total body weight in obese) are highly crucial as this also helps in controlling metabolic disturbances and improving psychological behavior, irregularities in menstrual cycles as well as androgen levels. Diet pills are not recommended for adolescents due to limited availability of data on their use.

Screening of Other Comorbidities

Besides weight gain in adolescents with PCOS, other comorbidities such as type II diabetes, sleep apnea, dyslipidemia and glucose intolerance may be present which have nevertheless connection with increase in body weight. These must be thoroughly screened, diagnosed and examined on any indication of hyperinsulinemia, IR and obesity along with consideration of family or personal risk factors followed by suitable treatment. Depression, anxiety, eating disorders, altered self-esteem and quality of life are other frequent comorbidities in adolescents with PCOS.

Transition to Adult Care Providers

This requires thorough understanding and education regarding PCOS with its medical management, comorbidities and interventions in life style on the long run for preventing any further complication. Medical help via specialists from different disciplines including general practitioners, family physicians, gynecologists and endocrinologists can be sought for management of PCOS. Proper discussion regarding therapeutic options available for PCOS should be carried out with adolescents. Various parameters such as local availability of specialized clinics, medical expert, major issues regarding health, preferences/wish list of adolescent, health insurance and management of fertility issues in future must be properly judged and assessed before selecting any adult care specialist.

Exercise

In India, 37.5 to 62.5% of patients with PCOS phenotype has issues of obesity with family history of the same as reported in current studies based on evidence. Medical conditions such as type II Diabetes Mellitus, hypertension, glucose intolerance, hyperandrogenism and irregular menstrual periods are more frequent in obese patients than the lean ones with PCOS. [66] Metabolic profile including diabetic condition has been found to be improved by performing physical activities for at least 150 min/week. However, there are no authentic reports for this result due to lack of suitable randomized clinical trials except indications from controlled studies conducted on few patients with PCOS. (33)

Diet

Although the influence of good nutritious diet on controlling obesity and weight gain is reported widely but limited data is available form RCTs conducted o Indian women with PCOS. Diet mediated weight control is effective for improving rate of pregnancy and hyperandrogenemia condition in PCOS patients having problem of central obesity. There is not a specific diet effective for PCOS. Consultation regarding weight management can be sought from dietician. Calorie-restricted diet can be considered as first line therapy for patients who experienced weight loss through life style interventions (physical activity) followed by second

line therapy in which insulin-sensitizer drugs (e.g. Metformin) are prescribed provided that the body weight is neutral after first line therapy. (34)

CONCLUSION

One of the most prevalent diseases affecting women of reproductive age is PCOS.

It is a syndrome with many different aspects, including lifelong health problems and problems with reproduction, metabolism, and the cardiovascular system. Many of the clinical symptoms of PCOS seem to be brought on by insulin resistance, despite the fact that this is still unknown. Additionally, it appears that insulin resistance is linked to type 2 diabetes, lipid issues, and glucose intolerance. In order to effectively treat this illness, treatment should focus on reducing androgen-induced symptoms, protecting the endometrium, and reducing long-term risks of diabetes and cardiovascular disease.

The main goal of treatment for many affected women with this illness is to increase infertility. Nurse-midwives can assess and treat many of the presenting complaints and lifestyle issues related to PCOS, such as menstrual irregularities, hirsutism, and obesity. In order to manage more complex conditions like infertility and insulin resistance, the nurse-midwife may choose to collaborate with a gynaecologist or endocrinologist. To stop the extensive impacts of this condition, we must act right away. (l)

The following health issues seem to be more likely to affect women with PCOS over the course of their lives:

- growth in weight or obesity
- If they don't already have insulin resistance
- diabetes type 2
- anomalies in blood fat and cholesterol
- a cardiovascular condition (heart disease, heart attacks and stroke)
- sleep apnea
- endometrial carcinoma (cancer) (2)

If other uncommon causes of the same symptoms have been ruled out and you satisfy at least two of the following three requirements, PCOS can typically be diagnosed.

- You experience irregular or infrequent periods. this suggests that your ovaries don't consistently discharge eggs (ovulate)
- You have high levels of "male hormones," like testosterone, according to blood tests (or sometimes just the signs of excess male hormones, even if the blood test is normal)
- scans revealing polycystic ovaries in you

If other uncommon causes of the same symptoms have been ruled out and you satisfy at least two of the following three requirements, PCOS can typically be diagnosed. You experience irregular or infrequent periods. this suggests that your ovaries don't consistently discharge eggs (ovulate) You have high levels of "male hormones," like testosterone, according to blood tests (or sometimes just the signs of excess male hormones, even if the blood test is normal) scans revealing polycystic ovaries in you

Having a healthy diet and doing regular exercise is one of the greatest methods to manage PCOS.

Overweight or obese women with PCOS are prevalent. Just 5% to 10% of your body weight lost could help you feel better and have more regular periods. Additionally, it might aid in controlling issues with ovulation and blood sugar levels.

Your doctor might advise you to minimise starchy or sugary meals because PCOS can result in elevated blood sugar. Eat meals and foods high in fibre instead, as they gradually raise your blood sugar levels.

Maintaining an active lifestyle also aids with insulin and blood sugar regulation. Additionally, regular exercise will aid in reducing your weight.(3)

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