REVIEW ARTICLE

A REVIEW ON POLYCYSTIC OVARIAN SYNDROME

Bhuvaneshwari, S. 1, Poornima, R. 2 and Horne Iona Averal 3

Research Scholars, Department of Zoology, Holy Cross College, Tiruchirappalli – 2

Associate Professor, Department of Zoology, Holy Cross College, Tiruchirappalli - 2

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a disorder with complex and multiple etiologies. The symptoms are classified into clinical, endocrinological and metabolic aspects. Prevalence of PCOS is between 5 – 10% in the women of reproductive age due to the excess amount of male hormone present in the female. The final stage of PCOS leads to infertility, which is a big drawback to the human kind. This review gives a wide knowledge about the PCOS with their etiologies.

INTRODUCTION

Polycystic ovary syndrome is the most cause of anovulation in women (Yen, 1980). In 1935 Stein and Leventhal published their report on amenorrhea, hirsuitism, obesity and enlarged polycystic appearing ovaries. Hence this syndrome is otherwise known as Stein Leventhal’s Syndrome. The overall prevalence among the women in reproductive age group is between 4% and 8% (Chang, 2004), although the prevalence may be as high as 30% in women with secondary amenorrhea, 75% in women with oligomenorrhea and 90% in women with Hirsuitism (Adams, Polson and Franks, 1986). The prevalence of infertility is mainly caused by anovulation in PCOS women varies between 35 – 94% (Goldzieher and Green 1963; Franks, 1995; Guzick, 1998). Dahlgren et al., 1992, explained that women with PCOS have a good chance of getting children as like healthy women after treatment to infertility.

PATHOPHYSIOLOGY

The understanding of PCOS is still lacking with multiple unknown and potential etiologies with various mechanisms. Several theories had been put forward for pathophysiology (Tsilchorozidou et al., 2004; King, 2006). These have been listed below in detail.

1. Alteration of Gonadotrophin – Releasing Hormone (GnRH) secretion results in the increased secretion of Luteinizing hormone (LH).
2. Alteration in the secretion of insulin and its action results in hyperinsulinemia and insulin resistance.
3. Defect in androgen secretion results in increased ovarian androgen production.

SIGN AND SYMPTOMS

The main features of PCOS is generally classified into three categories, they are Clinical, Endocrine and Metabolic.

The clinical features include menstrual irregularities, hirsuitism, acne and anovulatory infertility. The endocrine features include androgen elevation and LH hormone. The metabolic features are insulin resistance, obesity, lipid abnormalities and impaired glucose tolerance.

CLINICAL SYMPTOMS

Oligomenorrhea is otherwise known as dysfunctional bleeding, is dominant symptom of anovulatory component of PCOS. The menstrual irregularity of the PCOS is chronic and can be manifested in different ways. Generally, erratic menstruation owing to anovulation. Some women with PCOS have prolonged amenorrhea associated with endometrial atrophy. Some women have regular cycles at first and then irregularity of periods with weight gain (Taylor, 1998). Hull in 1987 explained about the chronic amenorrhea, oligomenorrhea and prolonged erratic menstrual bleeding are characteristics of women with PCOS. Cycles with an interval greater than 35 days are likely to be anovulatory and are reported in 50 - 90% of women with PCO. In addition a number of normal cycling women with PCO may also be anovulatory if signs of hyperandrogenism are also present.

Hyperandrogenism is one of the major characteristics of PCOS. The most common PCOS sign of hyperandrogenism in PCOS women is hirsuitism. The prevalence range of hirsuitism in PCOS women varies between 17 – 83 % (Goldzieher and Green, 1962; Guzick, 1998). The most common method for assessing hirsuitism is Ferriman and Gallwey scale (Ferriman and Gallwey, 1961). Hyperandrogenism partly resolves before menopause with increasing age i.e. more than 40 years old (Elling et al., 2000; Winters et al., 2000). Faddy et al., 1992 reported about the decline in follicle during the process of ageing. Most of the findings said that the common thing is hyperandrogenic...
Anovulation in women whether they have a typical PCOS or not, could be a functional ovarian hyperandrogenism (FOH) (Barnes and Rosenfield, 1989a; Ehrmann et al., 1995). Next sign of hyperandrogenism is acne. This means the male pattern in the females, it’s also expressed as the signs of virilisation. That means male pattern balding, alopecia, increased muscle mass, male patterning of hair growth on face and deepening of voice which is otherwise called as clitoromegaly, which reflects in the production of tumor (Yen, 1999).

**ENDOCRINOLOGICAL SYMPTOMS**

Biochemical markers like LH Follicle Stimulating Hormone (FSH) plays a major role in the prevalence of PCOS. Particularly LH is a major characteristic feature of PCOS. Women with PCOS have an increase in both LH pulse frequency and amplitude. The increased secretion of LH leads to hypothalamic (GnRH) pulses. Meanwhile the increase LH results in androgen production by theca cells within the ovary (Ehrmann, 2005; Tsilchorozidou et al., 2004).

Endocrinological features of PCOS are characterised by high levels of serum LH and testosterone, high estrone to estradiol ratios (Rajaniemi et al., 1980; Quignan, 1976) and by excessive response of the serum LH level to LH – RH stimulation (Duignan, 1976; Ota et al, 1979). LH hypersecretion both basally and in response to the GnRH administration is the characteristic hallmark of PCOS (Yen et al, 1970; Barnes et al, 1989).

The elevated level of LH is mainly due to the sensitivity increase in LH pulse amplitude frequency, but mainly amplitude (Venturoli et al., 1988, Hayes et al., 1998). High LH level and low FSH level (Gonadotrophic pattern) can be due to the increased pulse secretion activity (Waldstreicher et al., 1988), attributed to a reduction in hypothalamic period inhibition because of chronic absence of progesterone. (Berga and Yen, 1989; Cheung et al., 1997). Even though huge scientists explain about the LH secretion but the mechanism of the reduced hypothalamic sensitivity is still unclear. The presence of hyperinsulinaemia and hyperandrogenemia often present in the women with PCOS have some GnRH pulse modification(Tsilchorozidou et al., 2004).

Luciano et al., 1984 stated that slight hyperprolactinemia was found in patients with PCOS in 5% to 30%. This comment was also agreed by Franks (1989). Bracero and Zacur (2001) revealed that both PCOS and Hyperprolactinemia are independent disorders. Franks (1995) reported that patients with prolactinomas can identify their Polycystic ovary conditions through ultrasonography. Extreme levels of prolactin elevation may stimulate adrenal production of dehydroepiandrosterone sulphate (DHEA-S) (Marx and Metha,2003).

**METABOLIC SYMPTOMS**

Achrad and Thiers (1921) recognised about the intolerance of glucose and hyperandrogenism. This is otherwise called as ‘diabetes of beared women’. The term insulin resistance is defined as the reduced glucose response to a given amount of insulin. The mechanism behind the insulin resistance are peripheral target tissue resistance, decreased hepatic clearance which is otherwise called as increased pancreatic sensitivity.

Euglycaemic clamp technique indicate the insulin resistance is a common features of PCOS and both obese and non – obese women with the syndrome are more insulin – resistant and hyperinsulinaemic than age and weight matched normal woman (Chang et al., 1983; Dunai et al., 1989 , 1992).

The pancreatic β - cell secretory dysfunction has been reported in PCOS by Ehrmann et al., 1995a; Dunai and Finegood, 1996a. The decreased secretion of insulin after meal and increased secretion under basal conditions is said to be the β - cell defect. Hence the decreased postprandial secretory response resembles the β – cell dysfunction of type 2 diabetes mellitus which is a most common symptom of PCOS.

Rodin et al., 1998 reported that PCOS and type 2 diabetes mellitus were not associated, the reduction of insulin clearance rate is due to the decreased hepatic insulin extraction and partially response to the elevations of insulin concentration. This statement is also investigated by Mahaber et al., 1989; O’Meara et al., 1993.

Although no systematic control studies to determine the prevalence of obesity in exact way, but most of the investigators have found that 30 – 50% PCOS person are obese was proven experimentally by Franks (1995). PCOS patients have a tendency to increase in Waist – hip ratio. That means the visceral obesity (Rebuffe – Scribe et al., 1989; Bringer et al., 1993).

**LINK OF PCOS WITH OTHER DISORDERS**

Generally PCOS have a good link with other disorders like hypothyroidism, glucose intolerance, diabetes and cardiovascular diseases. Hypothyroidism is the most common disorder in thyroid function and has been associated with wide range of reproductive abnormality including menstrual disorders, amenorrhea, infertility and frequent abortions (Mochizuki, 1997). These reproductive abnormalities can be treated with thyroid hormone therapy (Beamer et al., 1981). However, the mechanism of action of thyroid hormone on female reproduction in hypothyroid animals in not fully understood. Because of the difficulty is obtaining spontaneous hypothyroid model animals, most of the numerous studies examining the effect of hypothyroidism on female reproduction have used the thyroidectomy particularly in rats (Hagino, 1971; Duignan, 1976). T3 and T4 are tyrosine based thyroid hormones which are produced by follicular cells of thyroid gland and are regulated by TSH made by the thyrotrophin of the anterior pituitary gland. Most of the thyroid hormone circulating in the blood is bound to transport proteins only a very small fraction of the circulating hormone is free and biologically inactive that leads to hypothyroidism. The symptoms are also same with PCOS (Hershman and Higgins, 1995). Insulin resistance and the dysfunction of the β – cells are the two ideal symptoms for the cause of glucose intolerance and type 2 diabetes mellitus (Reaven, 1988). Thus the women with PCOS have an increased risk of having type 2 diabetes. In 1987 Dunai et al., stated that 40% of obese women with PCOS had impaired glucose tolerance or type 2 diabetes. This state was proven according to WHO based criteria. The prevalence rate is higher than those of the women with the same age group (Harris et al., 1987). Legro et al., 1999 have demonstrated that the women with PCOS have significantly increased risk factor for glucose intolerance.
Women with PCOS may have gastrointestinal diabetes (Lanzone et al., 1995).

Insulin resistance is considered to be a high risk factor for coronary heart disease which is associated with the type two diabetes (Reaven, 1988). Hypertension (Ferrannini et al., 1987) abdominal obesity and lipid profiles (Orchard et al., 1983). Hence the overall features are called as “Metabolic Syndrome X”. Wild et al., 1990 analysed 102 – pre and postmenopausal women undergoes the investigation of chest pain, in that 52 women were having arterial lesions and they report diabetes, hypertension, hirsuitism and coronary heart disease. Prelevic et al (1995, 1996) reported about the lower cardiac flow velocity, higher resting forearm flow during reactive hyperaemia and low incremental forearm flow in PCOS than in teen age – matched control women.

TREATMENT OF PCOS

Polycystic ovary syndrome can be treated and cured in many ways. Allopathic doctors found a good solution for the cause of PCOS, but in herbal medicine there are few preventive medicines that can cure PCOS. Many of the PCOS – affected women are the after math of insulin – resistance (Dunaif, 1999; Dunaif and Finegood, 1996; Dunaif et al., 1989) and obesity (Evans et al., 1983). PCOS and insulin resistance are the sensitizing agents that have treated properly. There are huge invention studies that have been demonstrated a positive effect of metformin on both reproductive and metabolic aspects of PCOS (Glueck et al., 2006; Hahn et al., 2004 ; Lord et al., 2003 and Palomba et al., 2005). Goldenberg et al., 2005 reported that metformin improves equally in menstrual irregularities both in insulin – resistant and insulin – sensitive PCOS patients. Tan et al., 2007 demonstrated the role of metformin with several experiments like lean PCOS patients. In that metformin improves not only androgen levels, acne and menstrual irregularities but also in homeostasis model assessment - insulin response and the area under insulin response curve. Kumari et al., 2005 demonstrated in a study including 17 lean and obese PCOS patients treated with 1500 mg metformin daily that ovulation and pregnancy rates were higher in lean PCOS group. Her studies also state that metformin therapy shows a positive effect on endocrine and metabolic variables even in lean and insulin – sensitive women. Dose dependent metformin effect shows the divergent effect concerning the outcome of overweight and obese patients was clearly explained by Harbone et al., 2005. Metformin administration has been shown to improve ovarian response to gonadotrophins in women with clomiphene citrate – resistant PCOS (Yarl at al., 2002). Acarbose is widely used in the management of type 2 diabetes and it lowers the serum insulin concentration too. This is the only effect of acarbose use in causes with PCOS (Lilliana et al., 2001). Metformin shows slight side effects when compared to acarbose similarly acarbose is the safe and effective agent that could be used in clomiphene – resistant PCOS (Sonmez et al., 2005). Grant in 2009 explains about the herbal tea i.e. spearmint (MENTHA SPICATA) has antiandrogenic properties, which helps to treat hirsuitism which can be caused due to PCOS. The antiandrogenic property in the spearmint gradually decreases the level of testosterone a male hormone present in the female with PCOS.

Sun and Yu (2000) proves that a special herbal tea which is a combination of shorthorned Epimedium herb (Herba epimedii), Dodder seed (Semen cuscutae) flowers of Solomonseal rhizome (Rhizoma polygonati), Chinese fox – glove root (Radix rehmanniae) and lateral roots of aconite (Radix aconiti) gives a drastic change in obesity and ovulation in androgen sterilized rats injected with testosterone propionate.

CONCLUSION

Polycystic ovary syndrome which is quite common in all age of women right from the teenage to the menopase stage, but its prevalence is quite higher in the women at the reproductive age. This syndrome carries a different multiple potential etiologies, which is unclear. Several researches are going on to find out the exact etiology for the cause of PCOS, but day by day the etiological symptoms are getting more complicated. The PCOS have also a link with ovarian tumor, in the final stage, endometrial cancer, cardiovascular diseases, diabetes mellitus obesity etc which is a dangerous effect to the human beings in short term effect and also in the long term cause. Moreover the dangerous effect to the mankind is infertility. To rectify all those symptoms proper, well balanced diet and exercise in regular is must.

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