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PREDISPOSING FACTORS OF POLYCYSTIC OVARY SYNDROME

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To study the relevant risk factors and their association with polycystic ovary syndrome. So as to provide basis for early diagnosis and treatment of PCOS. A case-control method, 130 women with PCOS were as recruited case group, and 130 women without PCOS as control group. Questionnaire was adopted to collect data regarding risk factors of PCOS. Anthropometric measurements were taken. Results: We analyzed that the risk factors of PCOS included in menstrual cycle disorder ($X^2 = 4.990$, $p<0.05$), bad mood ($X^2 = 4.054$, $p<0.05$), preexisting thyroid ($X^2 = 8.938$, $p<0.01$), family history of diabetes ($X^2 = 15.606$, $p<0.01$) and irregular eating pattern ($X^2 = 29.786$, $p<0.01$). Conclusion: To target the high risk factors of menstrual cycle disorder, mood disorder, pre-existing thyroid , family history of diabetes and irregular eating pattern of female population, we should implement early screen, diagnose and treatment of PCOS in order to reduce the incidence rate of PCOS and improve prognosis of PCOS.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a frustrating experience for women, often complex for managing clinicians and is a scientific challenge for researchers. As research in PCOS is rapidly advancing, it is vital that research evidence is translated to knowledge and action among women, healthcare professionals and policy makers. Polycystic ovary syndrome is the most common endocrine abnormality in reproductive age women. Prevalence of PCOS among women at reproductive age was reported to be 5%-10% (Wang *et al.*, 2013). The prevalence of PCOS has increased with the use of different diagnostic criteria and has recently been shown to be 18% (17.8±2.8%) in the first community based prevalence study based on current Rotterdam diagnostic criteria (ESHRE/ASRM, 2004). Importantly, 70% of women in this study were undiagnosed

(March *et al.*, 2010). The disease is characterized by oligomenorrhea or amenorrhea, unovulation, Insulin Resistance (IR), hyperandrogenemia and cysts on the ovaries (Liu *et al.*, 2014) and deemed as one of the main cause of anovulatory infertility. Abdominal over weight and obesity also important components of PCOS that affects 30-70% of the PCOS population (Vrbikova and Hainer, 2009). Promisingly lifestyle intervention comprising dietary, exercise and behavioral therapy improve fertility and reduce cost per birth significantly. With case-control study design, this study investigates the risk factors of PCOS among women at reproductive age and preventive measures against PCOS.

METHODS AND MATERIAS

A case-control study was conducted at infertility center in

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Indore city from July 2015 to April 2016. A total of 180 women diagnosed with PCOS according to the 2003 Rotterdam consensus criteria and out of them 130 were eligible to be included in this study. Exclusion criteria were as follows: (i) patients with pre- existing diabetes and other genetic problem (ii) patients not completed the given questionnaire. For control group, 130 women without PCOS were selected randomly during the same time period. A predesigned questionnaire was used for data collection. The questionnaire included information regarding socio-economic and demographic characteristics, menstrual information, parity, pre-existing thyroid, mood disorder, family history of diabetes and eating pattern. Height and weight of selected women were measured in light clothes without shoes and BMI (kg/m²) was calculated. It was derived by dividing weight in kilogram by square of height in meters.

Statistics was done using Statistical Package for the Social Science (SPSS) 21.0. All the values were expressed as percentage and mean ± Standard Deviation (SD), continuous variables were compared using the Z-test and categorical data using the chi-square test. P-values of <0.05 were considered statistically significant.

RESULTS

The demographic characteristics of the women with PCOS and without PCOS are summarized in Table 1. Women with PCOS were slightly older than women without PCOS (mean age 32.23 ± 4.40 yrs Vs 29.63 ± 4.09 yrs, $p<0.01$). BMI was statistically significant between women with and without PCOS (26.08 ± 4.91 kg/m² Vs 23.36 ± 3.26 kg/m², $p<0.01$). The age of menarche was found slightly more among women with PCOS as compare to without PCOS (13.93 ± 1.65 yrs Vs

Table 1: Demographic Characteristics of the Study Population

	Women with PCOS (n=130) mean±SD	Controls (n=130) mean±SD	Z Value	p Value
Age (years)	32.23 ± 4.40	29.63 ± 4.09	4.934	<0.01**
BMI (kg/m²	26.08 ± 4.91	23.36 ± 3.26	5.271	<0.01**
Age of menarche (years)	13.93 ± 1.65	13.37 ± 1.34	2.99	<0.01**
Duration of marriage (years)	6.15 ± 4.75	5.50 ± 3.65	1.24	>0.05
Note: ** highly significant at 1% level.				

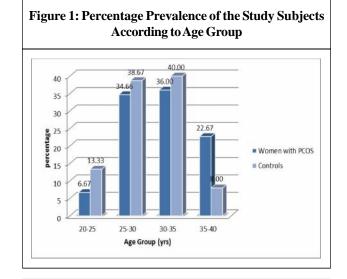**Figure 1: Percentage Prevalence of the Study Subjects According to Age Group**

Table 2: Predisposing Factors and their Association with PCOS in Study Population

	Women with PCOS (n=130) Frequency (%)	Controls (n=130) Frequency (%)	X^2 Value	p Value
Irregular menstrual cycle	76 (58.46)	58 (44.61)	4.99	<0.05*
Nulliparous	98 (75.38)	79 (60.76)	6.386	<0.05*
Mood disorder	62 (47.69)	46 (35.38)	4.054	<0.05*
Hypo thyroid	71 (54.61)	47 (36.15)	8.938	<0.01**
Family history of diabetes	29 (22.30)	7 (5.38)	15.606	<0.01**
Family history of PCOS	10 (7.69)	4 (3.07)	2.718	>0.05
Irregular eating pattern	87 (66.92)	43 (33.07)	29.785	<0.01**
Note: * significant at 5% level; ** highly significant at 1% level.				

13.37 ± 1.34 yrs, $p<0.01$). The duration of marriage was not significant between both groups (6.15 ± 4.75 yrs Vs 5.50 ± 3.65 yrs, $p>0.05$).

Table 2 reveals the predisposing factors and their association between women with PCOS and controls. Irregular menstrual cycle, nulliparous and mood disorder were found to have significant association with PCOS ($X^2 = 4.990$, $p<0.05$; $X^2 = 6.386$, $p<0.05$, and $X^2 = 4.054$, $p<0.05$). Highly significant association was observed between PCOS and pre-existing thyroid ($X^2 = 8.938$, $p<0.01$). Family history

of diabetes was also significantly associated with PCOS ($X^2 = 15.606$, p<0.01). Family history of PCOS was found to be more in PCOS group but not associated with PCOS ($X^2 = 2.718$, p>0.05). Irregular eating pattern was found to be more in women with PCOS as compare to controls, highly significant association was observed between irregular eating pattern and PCOS ($X^2 = 29.785$, p<0.01).

DISCUSSION

Etiology of PCOS is still inconclusive due to its complexity. One study attributes its causes to the interaction between genetic and environment factors (*Chin J Obst Gynecol*, 2008). Some studies also suggested that adolescent obesity increases the probability of PCOS at a later stage of life and insulin resistance as well as ensuring hyperinsulinemia may directly or indirectly result in LH secretion that leads to hyperandrogenemia (Li *et al.*, 2012; and Zhang and He, 2014). In our study women with PCOS were found to have higher BMI than controls, higher BMI was statistically significant with PCOS (p<0.01). Previous studies, showing that an increased body fat is present not only in the majority of women with PCOS who are obese, but also occurs in overweight and normal weight women affected by the syndrome (Kirchengast and Huker, 2004; and Carmina *et al.*, 2007). A result of the study indicates that the risk factors for PCOS include irregular menstruation, unpleasant mood, pre-existing thyroid, family history of diabetes and irregular eating pattern. Most PCOS patients experience the onset of irregular menstruation since adolescence and endocrine dyscrasia along any part of the hypothalamic pituitary-gland axis may lead to irregular menstruation and an ovulation (Du *et al.*, 2012). It is also confirmed by our study that PCOS is closely related to irregular menstruation. IR as an important contributor to PCOS was found in some of our participants and some studies reported that percentage of IR among PCOS patients was as high as 50%-70% (Karakas *et al.*, 2010). Both national and abroad psychology evaluation studies discovered severe mental or psychological disorder among PCOS patients, and it is inferred that unpleasant mood also increase the risk for PCOS. Research of Xiao et al. described similar findings in this aspect (Xiao *et al.*, 2011). A higher prevalence of mood disorders occurs in women with PCOS, mood disorder was noted in 53% of women with PCOS (Jedel *et al.*, 2010). Some studies showed that thyroid disorders are more common in women with PCOS as compared to the normal population (Sinha *et al.*, 2013; and Ramanand *et al.*, 2013). A previous study suggested that the association of PCOS and autoimmune thyroid disease is increasingly being recognized, while the causality of this association is still uncertain (Singla *et al.*, 2015). Family history of diabetes, notably a inherited metabolic disorder, also significantly high risk for PCOS. This is consistent with the finding of Roe *et al.* (2013). Irregular eating pattern, skipping of breakfast impacted overweight positively. Lower micronutrients intake was associated with skipping breakfast (Kerver *et al.*, 2006). Other studies showed that a regular meal frequency leads to higher post prandial energy expenditure, lower energy intake and improved impaired insulin sensivity compared with irregular eating in 2 week interventions (Farshchi *et al.*, 2004). One study advises proper diet and regular physical exercise to obese PCOS patients to achieve significant alleviation of symptoms like excessive hair and irregular menstruation and if combining medicine with nutrition therapy within three months patients can also expect significant improvement in metabolism and internal secretion.

There are few limitations of present study like less number of patients. Other metabolic disease factors were not contained in this study, because of the limitation of epidemiologic survey. Thus larger, prospective comparative trail is required in future to establish the facts in this direction.

CONCLUSION

We conclude that higher BMI and increased body fat were positively associated with PCOS. Our study indicates that the risk factors for PCOS including irregular menstrual cycle, unpleasant mood, pre-existing thyroid, family history of diabetes and irregular eating pattern are significantly associated with PCOS.

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