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A STUDY ON RISK FACTORS ASSOCIATED WITH POLYCYSTIC OVARY SYNDROME IN A COMMUNITY SETTING: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: The study aims to investigate risk factors related to polycystic ovary syndrome (PCOS) in women around B G Nagar. It also seeks to compare anxiety and depression levels in women with and without PCOS, examine comorbidities associated with PCOS, and raise public awareness about the condition.

Methodology: A 6-month cross-sectional observational study was undertaken in and around BG Nagar, Nagamangala, Mandya. Subjects were enrolled based on inclusion and exclusion criteria, and were classified as women with or without PCOS. Data on sociodemographic details, risk factors, comorbidities, and anxiety and depression were collected and analyzed using SPSS.

Results: The study included 507 people, with the majority of them being over 30 years old. PCOS was more prevalent in participants with a higher BMI. The 168 PCOS patients experienced 38.5% diabetes, 26.9% hypertension, and 23.1% headaches. The researchers discovered a substantial difference in anxiety and sadness levels between the PCOS and non-PCOS groups. PCOS patients have greater levels of anxiety and despair.

Conclusion: A study found that irregular periods, lack of physical activity, and obesity are major risk factors for developing PCOS. It also discovered a link between PCOS and anxiety/depression.

Keywords: Polycystic Ovary Syndrome; Risk factors; GAD-7 scale; PHQ-9 questionnaire

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a multifactorial and polygenic illness characterised by a wide range of signs and symptoms related to reproductive, endocrine, and metabolic dysfunction. Obesity and insulin resistance are the most common physio pathological characteristics in PCOS patients. Polycystic ovarian disease (PCOD) is a common reproductive endocrine illness that affects 5%-10% of reproductive-age women. The most unpleasant symptoms in people with PCOS have been identified as hirsutism, acne, monthly irregularity, and infertility **[1]**. Nonetheless, weight increase has been identified as the most disturbing symptom in teenagers and young women with PCOS **[2]**. PCOS women have multiple 8 mm cysts in their ovarian sac. The ovary contains more than 12 cysts. Because of this disease, around 70% of females are sterile **[2]**. The aetiology of this illness is due to genetic and environmental factors. PCOS is exacerbated by a poor lifestyle, nutrition, or viral factors **[3]**. Due to insulin resistance and its elevated level, the ovaries'function disturbs and rises androgen level leading to anovulation **[4]**. The level of gonadotrophin-releasing hormone, follicular stimulating hormone (FSH), luteinizing hormone (LH), and prolactin is also disturbed in the case of PCOS **[9]**.

The classic features of PCOS include clinical or biochemical hyperandrogenism, oligomenorrhea or amenorrhea associated with chronic anovulation, and polycystic ovary syndrome morphology **[4]**.

The current consensus is that the use of the Rotterdam criteria is appropriate for adult women. For diagnosis of PCOS, women must fulfil two of the three characteristics: oligoovulation or anovulation, clinical and/or biochemical hyperandrogenism, or polycystic ovary morphology on ultrasound with the exclusion of other disorders **[5]**.

Women with PCOS are also vulnerable to psychological symptoms in areas other than depression **[6]**. The spontaneous abortion rate in PCOS is approximately one third of all pregnancies. This is at least double the rate for recognized early abortions in normal women (12– 15%). Reasons for this are unclear although hypotheses include elevated LH levels, deficient progesterone secretion, abnormal embryos from atretic oocytes, and an abnormal endometrium. Attempts to improve the live birth rate by

lowering LH using GnRH agonist therapy was successful in retrospective studies **[7]**.

Women with PCOS are at a substantially higher risk of impaired glucose tolerance and type 2 diabetes with combined prevalence rates of 35–40% for glucose intolerance. Several studies have shown that women with PCOS have increased cardiovascular disease risk factors, including dyslipidaemia, hypertension, endothelial dysfunction, reduced vascular compliance, and atherosclerosis **[8]**. Insulin resistance occurs in the majority of women with PCOS, particularly if more sensitive probes are used, and is more severe in obese women **[10]**.

Hirsutism, acne, menstrual irregularity, and infertility have been shown to be the most distressing symptoms in adults with PCOS **[11]**. In adolescents and young women with PCOS, however weight gain has been identified as the most distressing symptom **[5]**.

Polycystic Ovary Syndrome (PCOS) is an endocrine disorder mainly due to hormonal imbalance. We found it necessary to recognize the major risk factors contributing to the disease's development. This study focused on identifying the predisposing risk factors and also comorbidities associated with PCOS in a community setting. The findings of this study will help to better understand and prevent Polycystic Ovary Syndrome and its complications. The study also focuses on educating and creating awareness among women regarding polycystic ovary syndrome

MATERIALS AND METHODS

This is a cross-sectional observational study carried out at villages in and around B.G. Nagara, Nagamangala, and Mandya for a period of six months. A total of 508 consecutive women between ages of 15 and 45 years who satisfy the Rotterdam criteria for PCOD were studied. The approval of the Ethics Committee of the Institution was obtained prior to the commencement of the study. The ideal sample size was selected by using suitable sampling methods.

Rotterdam criteria for PCOD require 2 out of (1) oligo/anovulation, (2) clinical and/or biochemical signs of hyperandrogenism, (3) polycystic ovaries and exclusion of other etiologies such as hypothyroidism, hypoprolactinemia, congenital adrenal hyperplasia, androgen-secreting tumors, and Cushing's syndrome **[12]**.

Considering the inclusion and exclusion criteria, the eligible subjects were enrolled in the study after obtaining their written consent. Patients with a history of adrenal hyperplasia, Cushing's syndrome and history of psychiatric illness, mental retardation, substance dependence, or chronic medical illness including cancer were excluded from the study.

The participants were allowed to take decisions regarding their participation and

withdrawal from the study. The enrolled subjects were classified as women with PCOS and without PCOS using suitable questionnaires or criteria, whichever is applicable.

Pro forma for were designed for women with PCOS (Sociodemographic details, risk factor analysis, comorbidities) and women without PCOS (demographic details and other relevant information). The data collection process was done with the proper explanation about the aim of the study and questionnaires. The study protocol was submitted and approved by the Institutional Review Board and Ethical Committee. Written informed consent was obtained from every participant and stored separately from the rest of the study material. Confidentiality and anonymity were strictly maintained by allotting a subject identification number to each participant instead of their names.

Ethical clearance was obtained from Institutional Ethics Committee, Adichunchanagiri Hospital And Research Center No. IEC/AH&RC/AC/0031/2022.

The data were analyzed using the SPSS for Windows, Version 20, Chicago, SPSS Inc. Descriptive statistics such as frequency and percentage for categorical variables and mean ± standard deviation for continuous variables were used. Independent sample t-test, Mann– Whitney U-test, were used for normal and nonnormal data. For all tests, the statistical significance was fixed at 5% level ($P < 0.05$).

RESULT

Table 1 shows that age, gravida, parity, marital status, education, vocation, irregular menstruation, alcohol, tea drinking, bad mood, family relationship, family history of PCOS, diabetes, infertility, and mother's irregular menstruation are all significantly associated with PCOS incidence.

Table 2 shows the co-morbid conditions which includes diabetes, hypertension, migraine, and depression to be associated with PCOS patients. The most common co-morbid condition identified is diabetes followed by hypertension and migraine.

Table 1: *Chi – square* analysis of risk factors for PCOS

Variables	Measurement	Case (n = 168)	x^2	P
Age	Year	1.50±.254	2.174	.607
BMI	kg/m2	1.40±.699	6.295	178
Age of menarche	Year	1.80±.632	5.863	.439
Gravida	Count	2.20±.814	65.126	.000**
Parity	Count	1.15±.743	13.226	.004*
Marital status	Married	144(85.7%)	11.365	0.001
	Unmarried	24(14.3%)		
Education	High school	44(26.2%)	11.985	0.007
	Higher secondary	44(26.2%)		
	Degree	49 (29.2%)		
	None	31(18.5%)		
Occupation	Unemployed	73(43.5%)	6.374	0.041
	Employed	71 (42.3%)		
	Other	24(14.3%)		
Abnormal menstruation	No	39 (23.2%)	202.006	0.000
	Yes	129(76.7%)		
Alcohol intake	Occasionally	136(81%)	51.603	0.000
	Frequently	32(19%)		
Tea drinking	Occasionally	22(13.1%)	31.167	0.000
	Frequently	146(86.9%)		
Bad mood	No	64 (38.1%)	36.849	0.000
	Yes	104 (61.9%)		
History of infetility	No	122(72.6%)	6.309	0.012
	Yes	46(27.4%)		
Family history of PCOS	No	52(31%)	6.444	0.011
	Yes	116 (69%)		
Family history of diabetes	No	147 (87.5%)	47.570	0.000
	Yes	21 (12.5%)		
Family history of infertility	No	137 (81.5%)	72.689	0.000
	Yes	31 (18.5%)		
Mother's irregular menstruation	No	153 (91.1%)	42.921	0.000
	Yes	15 (8.9%)		
Habit of physical exercise	No	98 (58.3%)	16.221	0.000
	Yes	70 (41.7%)		
H/W Ratio	<0.7	67(39.9%)	33.53	.000* *
	0.7-0.8	89(53%)		
	>0.8	12(7.1%)		
Dietary habits	Vegan	15(8.9%)	6.76	.343
	Mixed	153(91.1%)		

Table 2: Co-morbid conditions associated with PCOS

Co – morbid conditions in PCOS participants	Frequency (n)	Percentage (%)
Diabetes	20	38.5
Depression	6	11.5
Migraine	12	23.1
Hypertension	14	26.9
tendinitis	0	0.0
any arthrosis	0	0.0
fractures	3	5.8
Endometriosis	0	0.0
gestational hypertension	1	1.9
pre-eclampsia	0	0.0
any others	0	0.0
Total	52	100

DISCUSSION

Etiology of PCOS is still inconclusive due to its complexity. One study attributes its cause to the interaction between genetic and environment factors **[13]**. Due to the fact that PCOS patients share one significant clinical manifestation of hyperandrogenemia, male hormone has been widely acknowledged as a biomarker for PCOS in recent years. Except for hyperandrogenemia, PCOS also involve obesity, insulin resistance and type 2 diabete and all of these complications lead to the ovarian production of androgen. Some studies also suggested that adolescent obesity increases the probability of PCOS at a later stage of life and insulin resistance as well as ensuing hyperinsulinemia may directly or indirectly result in LH secretion that leads to hyperandrogenemia **[14-16]**. As it has been confirmed obesity is the main risk factor for type 2 diabetes, there is a hypothesis that obesity, insulin resistance as well as hyperandrogenism were all potential risk factors for PCOS **[4]**. Ethnic differences have a crucial role in PCOS metabolism, including insulin resistance, glucose intolerance, dyslipidemia, and so on.

According to our study's findings, risk factors for PCOS include abnormal menstruation, a family history of PCOS, infertility and diabetes, a mother's irregular menstruation, bad mood, and a lack of physical activity. Our study identified a significant p value of <0.05 for factors such as irregular menstruation, family history of PCOS, Diabetes, infertility and mood swings, tea drinking and lack of physical activity. This is parallel to the results identified by **Shan *et al*.,** to study the relevant risk factors of the polycystic ovarian syndrome (PCOS) of Li People to provide the basis for early diagnosis and treatment of PCOS, where in the common risk factors for PCOS were identified as irregular menstruation, tea drinking, family history of diabetes and infertility, unpleasant mood swings etc.

Our study identified that a family history of PCOS and diabetes, particularly an inherited metabolic disease, increases the risk of PCOS substantially. This is consistent with the finding of **Tian *et al*.,** who reported the odds ratio of a mother's infertility OR was 8.599 while our study found that it was 10.2, which suggested the heredity of the PCOS disease.

In our study, among 168 participants with PCOS, 136 (81%) participants did not consume alcohol and only 32 (19%) participants with PCOS consumed alcohol. Similarly, in a study conducted by **Shan *et al*.,** to study the relevant risk factors of the polycystic ovarian syndrome (PCOS) of Li People to provide the basis for early diagnosis and treatment of PCOS, it was found that 224(38.6%) participants consumed alcohol frequently and

356(61.4%) participants with PCOS did not consume alcohol.

In our study, among 168 participants with PCOS,70 (41.7%) participants had a habit of exercising, and 98(58.3%) participants with PCOS did not have a habit of exercising. On the contrary, in a study conducted by **Shan *et al*.,** to study the relevant risk factors of polycystic ovarian syndrome (PCOS) of Li People to provide the basis for early diagnosis and treatment of PCOS, it was found that 421(72.6%) participants with PCOS exercised regularly and only 159(27.4%) participants with PCOS did not have a habit of exercising.

In our study, among 168 participants with PCOS,52 (31%) participants suffered from other co-morbid conditions, and 116 (69%) participants did not have any co-morbid conditions. Among the participants with PCOS,20(38.5%) participants suffered from Diabetes, followed by hypertension in 14(26.9%) participants, migraine in 12 (23.1%) participants, depression in 6 (11.5%) participants, fractures in 3(5.8%) participants and gestational hypertension in 1(1.9%) participant. This was similar to a study conducted by **Kunjappa L *et al*.,** to investigate the comorbidities, medication use, and healthcare services among women with polycystic ovary syndrome (PCOS) at age 46 years, it was found that the women with PCOS had a higher risk for DMT2, depression, migraine, hypertension, tendinitis, osteoarthritis (especially in the knee, back, or shoulder), fractures, endometriosis, gestational diabetes, and pre-eclampsia.

CONCLUSION

The findings of the study suggested that irregular menstrual cycles, physical inactivity, and obesity were the major risk factors for PCOS development. Moreover, the study found a significant correlation between PCOS and anxiety and depression in women. This study highlights the importance of regular physical activity and maintaining a healthy body weight to prevent the development of PCOS and mental health disorders associated with it. Further research is needed to continue to examine the complexities of PCOS and ways to best support individuals affected by this condition.

Early detection and diagnosis of the condition is necessary to prevent complications and further studies are needed to assess all variables that may impact the quality of life in patients with PCOS. The findings of this study can be used to develop preventive strategies and interventions to improve the overall health and well-being of women with PCOS.

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REFERENCE

[1] Tabassum F, Jyoti C, Sinha HH, Dhar K, Akhtar MS. Impact of polycystic ovary syndrome on quality of life of women in correlation to age, basal metabolic index, education and marriage. PloS one. 2021 Mar 10;16(3):e0247486.

[2] Kujanpää L, Arffman RK, Pesonen P, Korhonen E, Karjula S, Järvelin MR, Franks S, Tapanainen JS, Morin-Papunen L, Piltonen TT. Women with polycystic ovary syndrome are burdened with multimorbidity and medication use independent of body mass index at late fertile age: a population-based cohort study. Acta obstetricia et gynecologica Scandinavica. 2022 Jul;101(7):728-36.

[3] Shan B, Cai JH, Yang SY, Li ZR. Risk factors of polycystic ovarian syndrome among Li People. Asian Pacific journal of tropical medicine. 2015 Jul 1;8(7):590-3.

[4] Rodgers RJ, Avery JC, Moore VM, Davies MJ, Azziz R, Stener-Victorin E, Moran LJ, Robertson SA, Stepto NK, Norman RJ, Teede HJ. Complex diseases and co-morbidities: polycystic ovary syndrome and type 2 diabetes mellitus. Endocrine Connections. 2019 Mar 1;8(3):R71-5.

[5] Shrestha A, Dixit A, Zaidi A. Assessment of lifestyle and diet modification of patients suffering from polycystic ovarian disease (PCOD) in North India. Journal of Food and Nutrition Sciences. 2019;7(4):60-5.

[6] Rotterdam ES. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril. 2004;81(1):19-25.

[7] Prathap A, Subhalakshmi TP, Varghese PJ. A cross-sectional study on the proportion of anxiety and depression and determinants of quality of life in polycystic ovarian disease. Indian journal of psychological medicine. 2018 May;40(3):257-62.

[8] Hart R, Doherty DA. The potential implications of a PCOS diagnosis on a woman's long-term health using data linkage. The journal of clinical endocrinology & metabolism. 2015 Mar 1;100(3):911-9.

[9] Carmina E, Lobo RA. Polycystic ovary syndrome (PCOS): arguably the most common endocrinopathy is

associated with significant morbidity in women. The journal of clinical endocrinology & metabolism. 1999 Jun 1;84(6):1897-9.

[10] Strowitzki T, Capp E, von Eye Corleta H. The degree of cycle irregularity correlates with the grade of endocrine and metabolic disorders in PCOS patients. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2010 Apr 1;149(2):178-81.

[11] Tian X, Ruan X, Wang J, Liu S, Yin D, Lu YJ. Analysis of risk factors for 437 c

[12] Liu Y, Li C, Wang LL. Logistic regression of risk factors for polycystic ovarian syndrome with Clomiphene citrate resistance. J Reprod Med 2014; 39(11): 1542-1545.

[13] Society of Gynecology and Obstetrics of the Chinese Medical Association. Expert consensus for diagnosis and treatment of polycystic ovarian syndrome. Chin J Obst Gynecol 2008; 43(7): 553-555.

[14] Zhang JY, He H. Risk factors and treatment for infertility caused by polycystic ovarian syndrome. Hainan Med 2014; 25(12): 1750-1753.ases of polycystic ovary syndrome. J Cap Univ Med Sci. 2014;35(4):414-8.

[15] Xiao WH, Qiu XY, Zhang T, Zhuang AW. Study on the mood of polycystic ovarian syndrome patients. Zhejiang J Trad Chin Med 2011; 46(11): 795-796.

[16] Le Donne M, Alibrandi A, Giarrusso R, Lo Monaco I, Muraca U. Diet, metformin and inositol in overweight and obese women with polycystic ovary syndrome: effects on body composition. Minerva Ginecol 2012; 64(1): 23-29.