Proceedings of the Pakistan Academy of Sciences: Part B
Life and Environmental Sciences 59(1): 77-83 (2022)

ISSN (Print): 2518-4261; ISSN (Online): 2518-427X
http://doi.org/10.53560/PPASB(59-1)703

Pakistan Academy of Sciences

Research Article

Investigation of Prevalence and Awareness of Polycystic Ovary Syndrome among Pakistani Females

Shumaila Zulfiqar*, Sufia Noor, Huda Rafique, Beenish Rehman, Aleefia Babar, Tayyaba Shahid, Azka Abid, Munnaza Abdul Razzaq, Sobia Gulraiz, Shanzeh Tahir, and Iram Anjum

Department of Biotechnology, Kinnaird College for Women, Lahore

Abstract: Polycystic ovary syndrome (PCOS) is a polygenic, endocrine disorder causing ovarian dysfunction. This syndrome encompasses a broad spectrum of phenotypic expression due to heterogeneity. This study aimed to investigate the prevalence and phenotypic factors contributing to the onset of PCOS in Pakistani women. Participating females (n=130) were recruited from different regions of Pakistan explicitly those who were trying to conceive for years. We designed a questionnaire having different subsections comprising questions related to psychological and environmental aspects linked with PCOS. We also analyzed the proportion of women having prior awareness about the genetic basis of the disease. The retrieved data was analyzed through SPSS V.21 by employing descriptive statistics. A Chi-square test was used to establish a correlation between PCOS and associated symptoms. Our findings suggest that factors like obesity, facial and abdomen hair growth, irregular periods, menstrual flow, cramps, and hormonal acne corresponds to PCOS in participating females with a p-value ($0.000 < 0.05$). Around half of the participants were reported to be experiencing one or other symptom related to PCOS from which hirsutism and anxiety were the most common. Furthermore, our findings indicate that multiple psychological and environmental factors contribute to the onset of the disease with a P-Value ($0.000 < 0.05$). However, a significantly higher p-value ($0.247 > 0.05$) for excessive hair loss in participants were observed demonstrating that hair loss is not linked with PCOS. In this survey, 46.5 % of participants responded that they know that PCOS can be inherited. 28.5 % of women responded that they had a family history of PCOS. Adopting a healthy lifestyle and maintaining a healthy weight can minimize the severity of PCOS. This survey evaluates different hypotheses which would facilitate a better understanding of the prevalence and associated symptoms of PCOS in Pakistan thereby enabling researchers to develop better diagnostic, management, and treatment strategies for patients.

Keywords: Pakistani, PCOS, Genetic disorder, Prevalence, Awareness, Infertility, Obesity

1. INTRODUCTION

Polycystic ovary syndrome (PCOS) is a complex disorder associated with an imbalance of hormones that causes menstrual irregularities and the appearance of cysts on one ovary or sometimes both ovaries. Affected individuals generally represent clinical heterogeneity. Commonly reported symptoms include hirsutism, acne, infertility, obesity, early onset of type 2 diabetes mellitus (DM), and alopecia [1, 2]. The prevalence of PCOS is quite higher in Pakistani women 52 % as compared to western Caucasian women, for instance, 20-25 % in the UK [3-7]. So far, the exact inheritance pattern of PCOS is unclear. However, various studies suggested that the PCOS mode of inheritance could be autosomal dominant with reduced penetrance, multifactorial and X-linked [8]. This condition develops during the early years of puberty and is determined by the interplay of a variety of genetic and environmental factors [9]. Previously considered a disorder of adult women, PCOS, in recent studies, has been stated as a lifelong syndrome, manifesting since prenatal age. The clinical presentation of PCOS changes with age, with young women complaining mostly of reproductive and psychosocial issues and elderly women complaining primarily of metabolic

Received: January 2022; Accepted: March 2022
*Corresponding Author: Shumaila Zulfiqar <shumaila.zulfiqar@kinnaird.edu.pk>

symptoms. Poor food choices and physical inactivity can increase the environmental risk of PCOS. Obesity, infectious agents, and pollutants may also play a role. With lifestyle changes including weight loss and exercise, the reproductive and metabolic characteristics of PCOS can occasionally be reversed [10].

In 1990, the National Institutes of Health (NIH) referred to hyperandrogenism and oligoovulation as a diagnostic criteria for PCOS. This results in the exclusion of other disorders mimicking PCOS such as adult-onset congenital adrenal hyperplasia, hyperprolactinemia, and androgen-secreting neoplasms [11]. The most widely used diagnostic methods including ultrasonography and hormonal tests have been considered insufficient to evaluate androgen excess, ovulation, and polycystic ovaries. So far, a 100 % authentic diagnostic method is unavailable for PCOS [12]. Also, little data is available regarding PCOS symptoms, management, and treatment options.

We investigated PCOS awareness among women and found it deficient in the general population. This study is performed to highlight the symptoms and prevalence of PCOS among Pakistani women.

2. MATERIALS AND METHODS

2.1 Data Collection

Primary research data was collected by using a questionnaire. Google forms were distributed via the internet to different internet-based platforms like WhatsApp and Instagram.

A total of 130 females aged 18-30 years from Lahore, Sialkot, Islamabad, and Gujranwala participated in this study. Data confidentiality and compliance with the Declaration of Helsinki were ensured.

The questionnaire was a structured questionnaire that had a total of 24 questions, all of which were close-ended questions. The questions targeted three different aspects related to PCOS and hence the questionnaire was divided into three different sections.

The 1st section consists of questions that helped gain primary data on whether or not the females facing symptoms of PCOS were aware of having a disease or not. The questions were based on associated clinical symptoms of PCOS such as obesity, excessive hair growth on the face and lower abdomen, painful and heavy blood flow, irregular periods, hormonal acne, and hair loss leading to bald spots.

The 2nd section of the questionnaire contained questions related to mood swings, low self-esteem, depression, body image, eating disorders, anxiety, getting tired easily, and having trouble conceiving.

The 3rd section of the questionnaire consisted of whether the participants were aware of the fact that PCOS can be inherited.

2.2 Statistical Analysis

Inferential statistics were used to determine the association of symptoms with PCOS. The data was analyzed using SPSS V21. Received data from the questionnaire was carefully recorded in SPSS spreadsheet. The correlation was established by using chi-square. Statistical significance was defined as $P<0.05$.

3. RESULTS

All participating women (n=130) were in their reproductive ages (18-30 years); having at least higher secondary education; trying to conceive for years recruited for this study (Fig. 1A).

Firstly, we performed a phenotypic analysis of PCOS symptoms such as for overweight, excessive hair growth on the face and lower abdomen, painful periods and heavy blood flow, irregular periods, hormonal acne, and hair loss leading to bald spots (Fig. 1B & 1C). Correlation values to the symptoms are shown in (Table 1).

Our results exhibit that all these symptoms correspond to PCOS among participants with a p-value ($0.000 < 0.05$). Hence, we reject the null hypothesis and conclude that there is a significant relationship between these symptoms causing PCOS in individuals.

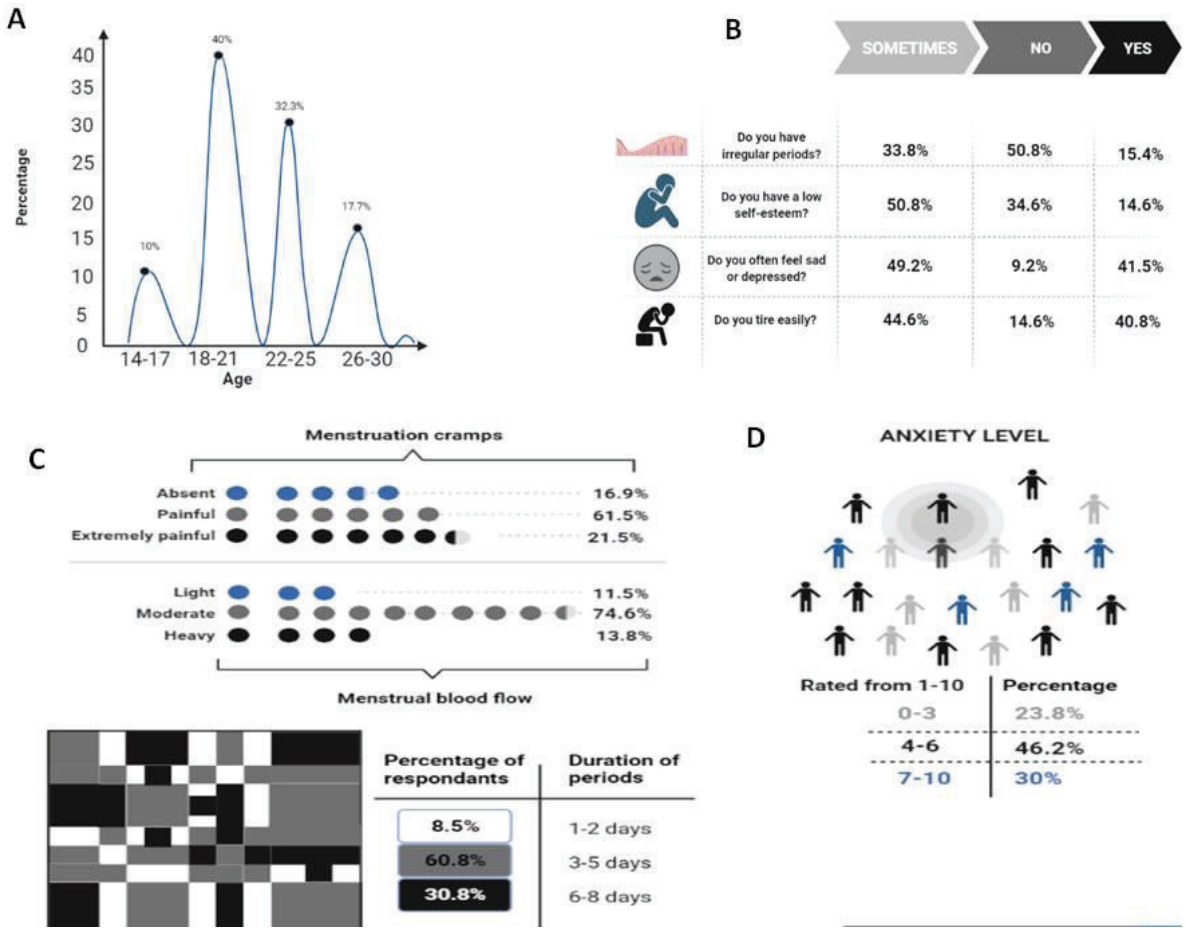

Fig. 1. Pictorial representation of different factors associated with PCOS. (A) Graph indicating ages of participating females; B. Chart showing responses received for questions related to the level of self-esteem, regularity of periods, and tiredness; C. Pictorial representation of responses received for menstrual cramps (Higher); D. High Level of anxiety in the participants.

However, the p-value of excessive hair loss in individuals (0.247 > 0.05) is significantly higher hence, it is quite considerable that there is no association between hair loss and PCOS. Referring to the data obtained through the survey which shows that 50 % of our respondents agreed that they face issues of extreme hair loss which is contradicting the statistical results (Fig. 2A). This explains that the combination of various symptoms may cause extreme loss of hair in some individuals.

Secondly, questionnaire section 2 comprised of psychological and environmental aspects which have a direct relation to the occurrence of PCOS. The Chi-square test was used again to understand the correlation between PCOS and the psychological and environmental aspects. The aspects for investigation were mood swings, self-esteem level, depression, body image, eating disorder, obesity anxiety, getting tired easily, and having difficulties conceiving as shown in (Fig. 2B & 1D). Results showed that the p-value of all these factors corresponds to PCOS (0.000 < 0.05) hence, we reject the null hypothesis and conclude that there is a significant relation between these psychological and environmental factors with PCOS (Table 2).

Thirdly, our area of focus was to investigate whether the participants were aware of the fact that PCOS can be inherited (section 3). Studies have proven polycystic ovary syndrome to be a familial condition but do not have a clear pattern of inheritance. In this survey, 46.5 % responded that they know that the disease can be inherited (Fig. 3A). In this survey, 28.5 % of individuals responded with “yes”, and agreed that they had affected females in their families.

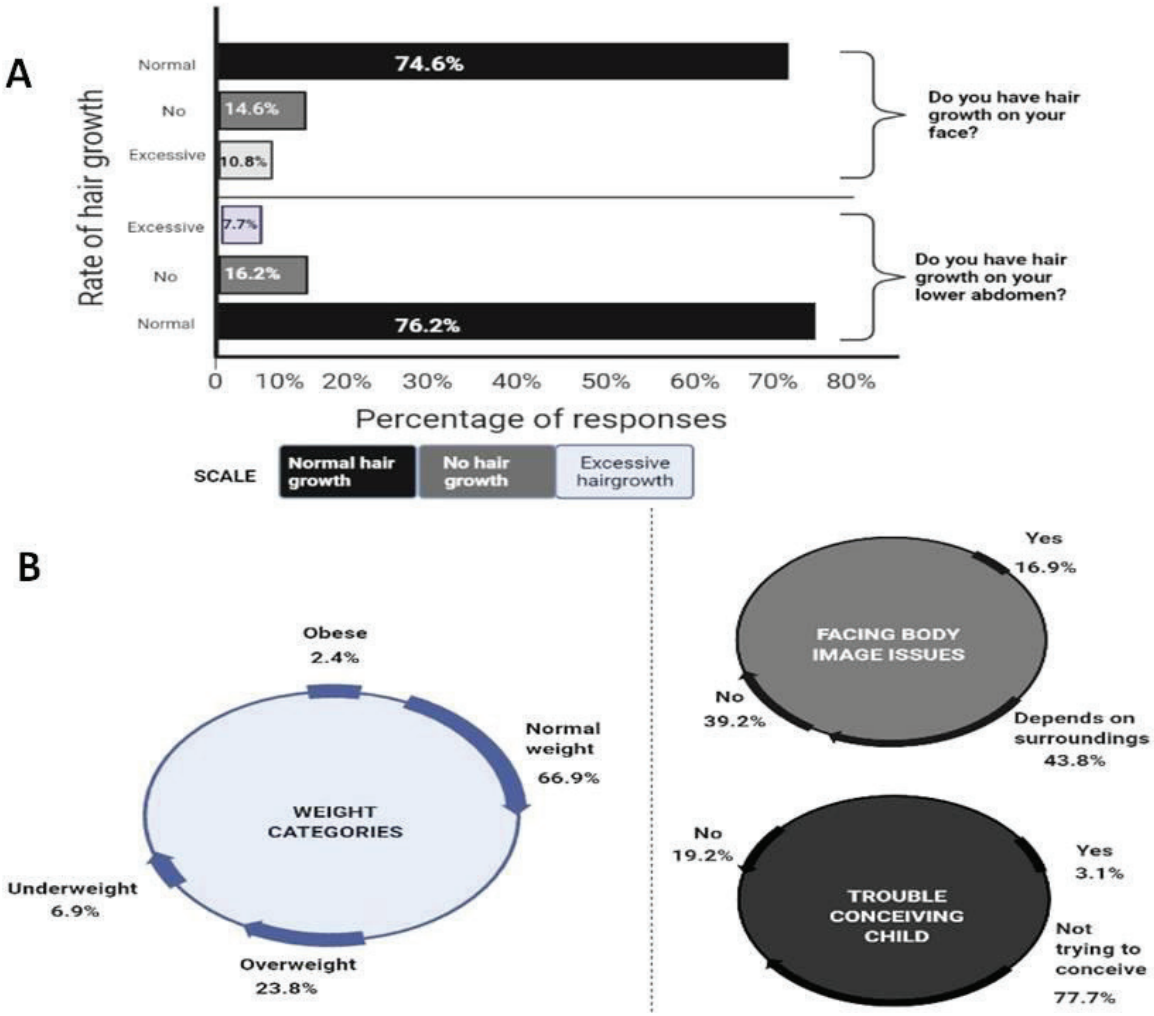

Fig. 2. Cartonic representation of different factors associated with PCOS and responses received from participants. A. Proportion of individuals suffering from extreme hair loss; B**.** The proportion of individuals who had weight issues and trouble conceiving a child.

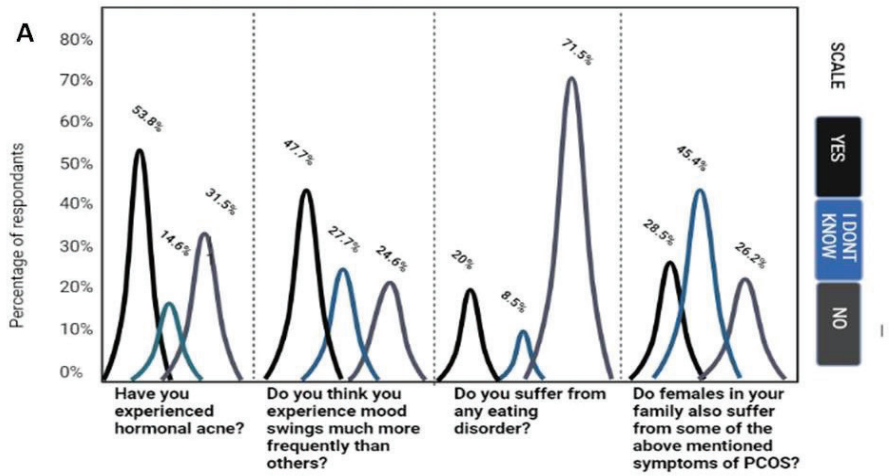

Fig. 3. Graphical representation of multiple responses linked to PCOS

Table 1. Chi-square test to identify the correlation between the symptoms and PCOS

	Weight	Hair Growth on Face	Hair Growth on Lower Abdomen	Menstrual Blood Flow	Irregular Periods	Menstrual Cramps	Hormonal acne	Extreme hair loss	Bald Spots
Chi-Square	300.446[a]	236.041[b]	244.868[b]	239.736[b]	54.579[b]	103.570[b]	69.157[b]	1.339[c]	175.35[c]
df	3	2	2	2	2	2	2	1	1
Asymp. Sig.	.000	.000	.000	.000	.000	.000	.000	.247	.000

*Df degrees of freedom; Asymp. Sig. Asymptotic Significance

Table 2. Chi-square test indicating the correlation between the psychological and environmental factors and PCOS

	Mood Swings	Low Self Esteem	Depression	Body Image	Eating Disorder	Anxiety	Fatigue	Trouble Conceiving
Chi-Square	5.474[a]	71.289[a]	71.158[a]	57.579[a]	239.474[a]	51.026[a]	38.000[a]	197.053[a]
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.065	.000	.000	.000	.000	.000	.000	.000

*Df degrees of freedom; Asymp. Sig. Asymptotic Significance

4. DISCUSSION

Polycystic ovarian syndrome (PCOS) is among one of the most debatable endocrine disorders with no exception in Pakistan. It is one of the major causes of infertility in females with little awareness of its symptoms characterized by cystic acne, hair loss or baldness, obesity or having problems with weight loss, and menstrual irregularities along with heavy blood flow, among women.

In this study, a total of 130 women participated with the majority of women aged 18-30. Our results suggested that (18.4 %) of patients with PCOS have excessive facial and lower abdomen hair growth. Patients also suffer from hormonal acne (53.8 %) and body image issues (16.9 %) developed due to difficulty in weight loss and obesity. Different studies report that obesity is not a reason behind PCOS. However, obesity does aggravate many other aspects of the phenotype, especially cardiovascular risk factors such as glucose intolerance and dyslipidemia as compared to non-obese women [13-15]. These symptoms affect the quality of life of women leading to a higher prevalence of depression. Obesity has been largely associated to be the major factor causing depression and emotional stress in this study. (41.5 %) participants responded that they have undergone depression and (30 %) agreed that they suffered from anxiety. The reason could be abnormal androgen production, demoralization faced by patients having higher BMI, and social withdrawal due to PCOS. A complex lifestyle stigmatizes women leading to low self-esteem as they think that they have lost their feminism [16, 17].

PCOS has a genetic basis as well as it can be inherited from one generation to the other. Many candidate genes have been found to be associated with PCOS such as *CYP11a*, *CYP21, CYP17*, and *CYP19* play an important role in causing PCOS however, psychological and environmental aspects also play a significant role in the manifestation of the disease. According to an estimation, there exists a 20 % to 40 % chance of developing polycystic ovary syndrome if the individual has an affected mother or sister. However, the role of various environmental factors is undeniable. Our findings show that 28.5 % of women responded

that their family members also suffer from PCOS. It is also supported by other studies which found the prevalence of PCOS in first-degree relatives is 55-60 % showing that it has an autosomal dominant pattern of inheritance [18].

A similar study was conducted in Pakistan to evaluate the clinical manifestation of PCOS symptoms among women. It showed a high percentage of PCOS symptoms (obesity 80%, irregular periods 71.8 %, and acne 67.3 %) therefore supporting the results of our study (irregular periods 49.2 %, acne 53.8 %, extreme hair loss 50 %, and trouble losing weight 42 %) [7].

Our study has shown that there is a high percentage of women showing symptoms of PCOS in Punjab Pakistan. The study also showed that 45.4 % of women were unaware of these symptoms being present in their family and 35.7 % do not know about their genetic prevalence. However, the sample size is a limiting factor in this study. More participants should be recruited and a pilot study can be conducted to confer the actual prevalence of PCOS in Pakistan.

Adopting a healthy lifestyle and reducing weight can reduce the severity of PCOS. The progression of PCOS can also be reduced through having a balanced and healthy diet that is low in fat with rich in fiber. Hence there is a need to create an awareness regarding the symptoms of PCOS so that it can be treated accordingly and women can lead a good quality of life.

5. CONCLUSION

PCOS is a complex condition highly prevalent in Pakistani women. Prevention by the rapid diagnosis of at-risk pre-pubertal and early pubertal girls through lifestyle modifications is a future aim. The need for long-term studies is crucial to understand which phenotypes will present additional health risks at increased age and if there is a difference in morbidity rates among PCOS patients. Advanced techniques like Genome-wide association studies (GWAS) can be employed to recognize and track the genetic spectrum of this condition. Timely diagnosis could be a remarkable breakthrough in the management and treatment. In treatment modalities, assisted reproductive technology (ART) could be opted for treating infertility in PCOS patients. Public awareness seminars can also help in educating women about this condition. There is a need to do more research on the genetics and etiology of PCOS for anticipation of threats and treatment paradigms of this syndrome.

6. CONFLICT OF INTEREST

The authors declare no conflict of interest.

7. REFERENCES

1. A. Bayona, V.M. Vaello, J. Zamora, L.N. Chavez, M.L. Ramírez, and H.F. Escobar-Morreale. Prevalence of PCOS and related hyperandrogenic traits in premenopausal women with type 1 diabetes: a systematic review and meta-analysis. *Human Reproduction Update* (2022).
2. N. Elasam, A. Alawia, A. Mohamed, A. Ahmed, E. Manal, A. Abusham, B. Hassan, and I. Adam. The prevalence and phenotypic manifestations of polycystic ovary syndrome (PCOS) among infertile Sudanese women: a cross-sectional study. *BMC Women's Health* 22(1):1-7 (2022).
3. S. Franks, Polycystic ovary syndrome. *New England Journal of Medicine* 333: 853-861 (1995).
4. E. Carmina, and R.A. Lobo. Polycystic ovary syndrome (PCOS): arguably the most common endocrinopathy is associated with significant morbidity in women. *The journal of clinical endocrinology & metabolism* 84: 1897-1899 (1999).
5. E.S. Knochenhauer, T.J. Key, M.K. Miller, W. Waggoner, L.R. Boots, and R. Azziz, *The Journal of Clinical Endocrinology & Metabolism* 83: 3078-3082 (1998).
6. R. Azziz, C. Marin, L. Hoq, E. Badamgarav, and P. Song. Healthcare-related economic burden of the polycystic ovary syndrome during the reproductive life span. *The Journal of Clinical Endocrinology & Metabolism* 90: 4650-4658 (2005).
7. S. Sidra, M.H. Tariq, M.J. Farrukh, and M. Mohsin. Evaluation of clinical manifestations, health risks, and quality of life among women with polycystic ovary syndrome. *PLoS One* 14: e0223329 (2019).
8. M.D. Kahsar-Miller, C. Nixon, L.R. Boots, R.C. Go, and R. Azziz. Prevalence of polycystic ovary syndrome (PCOS) in first-degree relatives of patients with the syndrome (PCOS) in first-degree relatives of patients with PCOS. *Fertility and sterility* 75: 53-58 (2001).

9. E.D. Kandarakis, H. Kandarakis, and R.S. Legro. The role of genes and environment in the etiology of PCOS. *Endocrine* 30: 19-26 (2006).
10. M. Shannon, and Y. Wang. Polycystic ovary syndrome: a common but often unrecognized condition. *Journal of midwifery & women's health* 57: 221-230 (2012).
11. M.I. Hsu, T.H. Liou, S.Y. Chou, C.Y. Chang, and C.S. Hsu. Diagnostic criteria for polycystic ovary syndrome in Taiwanese Chinese women: comparison between Rotterdam 2003 and NIH 1990. *Fertility and sterility* 88:727-729 (2007).
12. A. Dunaif, J. Given, and F. Haseltine. Diagnostic criteria for Polycystic ovary syndrome: towards a rational apporoach. *Polycystic Ovary Syndrome, Boston,* 377-384 (1992).
13. R.S. Legro, A.R. Kunselman, W.C. Dodson, and A. Dunaif. Prevalence and predictors of risk for type 2 diabetes mellitus and impaired glucose tolerance in polycystic ovary syndrome: a prospective, controlled study in 254 affected women. *The Journal of Clinical Endocrinology & Metabolism* 84: 165-169 (1999).
14. D.A. Ehrmann, R.B. Barnes, R.L. Rosenfield, M.K. Cavaghan, and J. Imperial. Prevalence of impaired glucose tolerance and diabetes in women with polycystic ovary syndrome. *Diabetes Care* 22: 141-146 (1999).
15. A.P. Chaudhari, K. Mazumdar, and P.D. Mehta. Anxiety, depression, and quality of life in women with polycystic ovarian syndrome. *Indian Journal of Psychological medicine* 40: 239-246 (2018).
16. C. Kshetrimayum, A. Sharma, V.V. Mishra, and S. Kumar. Polycystic ovarian syndrome: Environmental/ occupational, lifestyle factors; an overview. *Journal of the Turkish German Gynecological Association* 20: 255 (2019).
17. M.J. Khan, A. Ullah, and S. Basit. Genetic basis of polycystic ovary syndrome (PCOS): current perspectives. *The Application of Clinical Genetics* 12: 249 (2019).
18. N. Ajmal, S.Z. Khan, and R. Shaikh. Polycystic ovary syndrome (PCOS) and genetic predisposition: A review article. *European Journal of Obstetrics & Gynecology and Reproductive Biology*: X 3: 100060 (2019).