



Awareness of Polycystic Ovarian Syndrome among College Going Females in Gurgaon: A Cross-Sectional Study

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Abstract

Objectives Women not only take care of family members, they are also source of power and symbol of progress in a society. At the same time, physical and mental well-being of women relies on healthy lifestyle and adequate reproductive health knowledge. With growing incidence of polycystic ovarian syndrome (PCOS), it is crucial to increase awareness about the disease among women at an early age in life. The present survey investigates awareness level of college going females about PCOS.

Materials and Methods 428 females were recruited from 3 colleges in district Gurgaon, Haryana, India, based on convenience sampling. The respondents filled a self-completion questionnaire containing sociodemographic details, menstrual cycle details, and questions related to PCOS.

Statistical Analysis Descriptive statistics was used to calculate frequency and percentage of variables. Pearson's chi-square test of independence was used to identify factors associated with awareness of PCOS. A p -value of < 0.05 was considered to be statistically significant.

Results The mean \pm SD age of respondents was 19.9 ± 1.7 years (range = 18–24 years). Only 78 females (18.22%) had heard about PCOS. Being knowledgeable was significantly associated with mother's education ($p = 0.001$), length of menstrual cycle ($p = 0.022$), and family history of PCOS ($p < 0.001$).

Conclusion The present study indicates awareness of PCOS among college going females was very poor. There is an urgent need of increasing awareness about PCOS among young adult college going females not only for prevention, early diagnosis, and treatment of the disease but also to prevent its long-term consequences.

Keywords

- ▶ polycystic ovarian syndrome
- ▶ infertility
- ▶ menstrual irregularities
- ▶ hirsutism
- ▶ anxiety
- ▶ awareness

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Introduction

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in females of reproductive age with prevalence of 8 to 13% on basis of diagnostic criteria used across different parts of the world.¹ It is a complex disorder with reproductive, metabolic, and psychological features. Reproductive features include elevated levels of luteinizing hormone, reduced levels of follicle-stimulating hormone along with increased androgens, and insulin levels which results in menstrual irregularities (oligomenorrhea or amenorrhea).² Increased production of androgens and underproduction of estrogens by the ovaries result in formation of multiple tiny cysts on ovaries, hirsutism, acne, and alopecia.^{2,3} During pregnancy, females with PCOS are at increased risk of gestational diabetes and spontaneous abortion in first trimester of pregnancy.^{2,4} Metabolic features include insulin resistance (IR) compensated by hyperinsulinemia, impaired glucose intolerance test, and dyslipidemia. Anovulation combined with hyperinsulinemia promotes proliferation of endometrial cells which further increases the risk of endometrial carcinomas. Females with PCOS have increased risk of type 2 diabetes, metabolic syndrome, and cardiovascular diseases (CVDs).^{2,4} There is a four to seven times higher risk of heart attack in females diagnosed with PCOS than females who do not have PCOS in the same age group.² Psychological features include loss of femininity, body dissatisfaction, anxiety, depression, eating disorders, and suicidal attempts.³ IR and increased androgen production are identified as key pathophysiological elements for PCOS development; the exact cause is still unrecognized. Moreover, clinical presentation significantly depends on environmental factors, lifestyle, genotype, and ethnic background.^{4,5} As per Rotterdam criteria, diagnosis is based on presence of two out of three criteria—hyperandrogenism, oligoovulation, or anovulation, and presence of multiple cysts on ovaries—after exclusion of the diseases like thyroid disease (thyroid-stimulating hormone), hyperprolactinemia, nonclassic congenital adrenal hyperplasia, Cushing disease, androgen producing tumors, and hypogonadotropic hypogonadism.⁶

The aim of the present survey was to evaluate awareness of PCOS among college going females in Gurgaon, Haryana, India.

Materials and Methods

Strengthening The Reporting of OBservational Studies in Epidemiology statement is used to report the study.

Study Design

It is a cross-sectional survey. Data collection was done in February, March, and April 2021. College going females were recruited from three colleges in Gurgaon district, namely, Government College for Girls, Sector 14, Government College, Sector 9, and Nirankari Baba Gurubachan Singh Memorial (NBGSM) College, Sohna.

Sample

Inclusion criteria were females above 18 years available in campus at time of data collection and willing to participate in the study. Convenient sampling was used.

Questionnaire Development and Validation

A self-completion questionnaire was constructed and questions primarily focused on awareness related to disease. Gynecologist was approached for content validity on basis of desired outcome. A pilot study was undertaken on 10% of the sample size. Simple split-half method was used to assess reliability of the questionnaire by applying Spearman–Brown prophecy coefficient formula. The reliability value of the tool was 0.89, and hence the questionnaire was found to be good. The first set included six questions related to sociodemographic details (age, area of living, type of family, religion, mother education, and father education). Second set included six questions of personal details (age of menarche, dysmenorrhea, number of pads used in a day, days of menstrual flow, length of menstrual cycle, and family history of PCOS) followed by third question whether they have ever heard about PCOS. If yes, then what was the source of information. Question 4 was about anatomical knowledge of disease while questions 5 to 11 were multiple choice (with more than one correct answer) on sign/symptoms, causes/risk factors, diagnosis, long-term complications, psychological complications, treatment, and preventive measures of PCOS. After obtaining written informed consent, study objectives and time required to fill the questionnaire were explained to respondents. They were informed that they can refuse to participate and can withdraw from study anytime without any loss/penalty. Confidentiality and privacy was assured by keeping the document in sealed envelope and locked cabinets separately until analysis.

Sample Size

Cochran formula for infinite population was used and minimum sample size was calculated to be 385. A total of 424 participants were needed after accounting for attrition rate of 10%. A total of 428 females were recruited.

Statistical Analysis

Data analysis was done in May and June 2021. Missing data was given 0 input values. Descriptive statistics were performed to determine knowledge of PCOS. Data was first entered into Microsoft Excel spreadsheet. It was then coded and transferred into SPSS. Statistical analysis was done using IBM's Statistics version 23. Descriptive statistics was used to calculate frequency and percentage of variables. Pearson's chi-square test of independence was used to identify factors associated with awareness of PCOS. A *p*-value of < 0.05 was considered to be statistically significant.

Results

A total of 428 students completed the questionnaires. ► **Table 1** shows sociodemographic details of participants. Mean age of

Table 1 Sociodemographic characteristics of participants

Variables	Frequency (n = 428)	Percent
Age (in years)		
18 to 20	298	69.63
21 to 23	108	25.23
> 24	22	5.14
Area of living		
Rural	224	52.34
Suburban	125	29.21
Urban	79	18.46
Type of family		
Joint	228	53.27
Nuclear	200	46.73
Religion		
Hindu	416	97.20
Muslim	12	2.80
Mother education		
None	65	15.19
Up to graduation	337	78.74
Postgraduation	26	6.07
Father education		
None	16	3.74
Up to graduation	373	87.15
Postgraduation	39	9.11

students was 19.97 years (standard deviation = 0.08 years). Most females were 18 to 20 years of age (69.63%). Majority of respondents were from rural area (52.34%) followed by suburban area (29.21%) and urban area (18.46%). Note that 53.27% of participants had joint family while remaining 46.73% were from nuclear family. All females were Hindu except 2.80% who were Muslim. Note that 78.74% females' mothers were educated up to graduation and 87.15% females' fathers were graduate. **Table 2** shows 70.79% had age of menarche from 14 to 16 years of age and 53.04% had dysmenorrhea. Most of the females had 2 to 4 days of menstrual flow (54.67%) using 2 to 4 pads in a day (92.29%). Among the participants, length of menstrual cycle was < 21 days in 13.79%, 21 to 35 days in 74.53%, and > 35 days in 4.91%; amenorrhea was found in 1.17% and 5.61% females had no fix date for menses. Out of these 428, there were 2 females already diagnosed with PCOS and 5 had sisters diagnosed with PCOS.

Table 3 indicates only 78 females (18.22%) heard about PCOS while 350 (81.78%) had never heard the name. Sources of information were Internet (7.71%), friend (5.14%), doctor (2.34%), family (1.17%), and women health and hygiene session in college (1.87%). Seventy-three girls (17.06%) were aware that it is a disease of the ovary.

Note that 10.05% respondents knew that irregular or absent menses and facial acne are sign/symptoms of PCOS

Table 2 Personal details of participants

Variables	Frequency (n = 428)	Percent
Menarche age (in years)		
11 to 13	113	26.40
14 to 16	303	70.79
17 to 19	12	2.80
Dysmenorrhea		
Absent	201	46.96
Present	227	53.04
Pads used in a day		
2 to 4	395	92.29
5 to 7	33	7.71
Days of menstrual flow		
2 to 4	234	54.67
5 to 7	183	42.76
> 8	11	2.57
Menstrual cycle (in days)		
< 21	59	13.79
21 to 35	319	74.53
> 35	21	4.91
Amenorrhea	5	1.17
Randomly, no fix date	24	5.61
Family history of PCOS		
Absent	423	98.83
Present	5	1.17

Abbreviation: PCOS, polycystic ovarian syndrome.

Table 3 Respondents' knowledge of PCOS

Knowledge	Frequency (n = 428)	Percent
Heard about PCOS	78	18.22
Didn't heard about PCOS	350	81.78
Source of knowledge		
Doctor	10	2.34
Friend	22	5.14
Family	5	1.17
Internet	33	7.71
Health and hygiene session in college	8	1.87
Knowledge of anatomical part		
It's a disease of ovary	73	17.06

Abbreviation: PCOS, polycystic ovarian syndrome.

while 9.81 and 6.78% knew about weight gain and abnormal hair growth, respectively (**Table 4**). Note that 9.11% females identified hormone imbalance as cause/risk factor for PCOS while 7.71 and 7.48 identified physical checkup and

Table 4 Awareness of signs/symptoms of PCOS

Signs/symptoms	Frequency (n = 428)	Percent
Irregular or absent menses	43	10.05
Facial acne	43	10.05
Abnormal hair growth	29	6.78
Reduced fertility	13	3.04
Weight gain	42	9.81
Frontal hair loss	11	2.57
Pelvic pain	25	5.84
Out of control eating	6	1.40
Stress	24	5.61
Anxiety	24	5.61
I don't know	5	1.17

Abbreviation: PCOS, polycystic ovarian syndrome.

Table 5 Awareness of causes/risk factors of PCOS

Causes/risk factors	Frequency (n = 428)	Percent
Insulin resistance	15	3.50
Weight gain	19	4.44
Hormone imbalance	39	9.11
Physical inactivity	20	4.67
I don't know	11	2.57

Abbreviation: PCOS, polycystic ovarian syndrome.

ultrasound scan are diagnostic tools, respectively (► **Tables 5** and **6**). ► **Table 7** conveys only 5.14% could recognize ovarian cancer as long-term consequence, whereas ► **Table 8** presents depression (7.01%) followed by anxiety (5.37%) was identified as psychological complication. Lifestyle modification as a treatment was recognized by maximum respondents (3.50%) (► **Table 9**) and most of the participants marked fiber-rich diet along with exercise as preventive measure (8.18%) (► **Table 10**).

► **Tables 11** and **12** reveal being knowledgeable of PCOS was significantly associated with the mother's education ($p = 0.001$) and menstrual cycle ($p = 0.022$). There was also a statistically significant association between knowledge of PCOS and presence of family history of PCOS ($p < 0.001$).

Table 6 Awareness of diagnosis of PCOS

Diagnostic methods	Frequency (n = 428)	Percent
Menstrual history	25	5.84
Physical checkup	33	7.71
Blood test	15	3.50
Ultrasound scan	32	7.48
I don't know	13	3.04

Abbreviation: PCOS, polycystic ovarian syndrome.

Table 7 Awareness of complications related to PCOS

Complications	Frequency (n = 428)	Percent
Diabetes	10	2.34
Endometrial cancer	11	2.57
Ovarian cancer	22	5.14
Increased androgens	8	1.87
Cardiovascular disease	6	1.40
I don't know	27	6.31

Abbreviation: PCOS, polycystic ovarian syndrome.

Table 8 Awareness of psychological complications of PCOS

Psychological complications	Frequency (n = 428)	Percent
Anxiety	23	5.37
Depression	30	7.01
Snoring	10	2.34
Binge eating disorder	7	1.64
Walking unrefreshed from sleep	17	3.97
I don't know	24	5.61

Abbreviation: PCOS, polycystic ovarian syndrome.

Discussion

The present survey was to assess awareness of college going females about PCOS. The study reveals 18.22% females had heard the name of disease. This study is in line with the study conducted in Bhopal city by Gupta et al which indicated 21.6% girls were aware of PCOS.⁷ In contrast, Rawat et al during a study among adolescent girls in Dehradun found that only 1.06% participants had knowledge on PCOS.⁸ Also, study conducted by Jena et al in the Department of Obstetrics and Gynecology, All India Institute of Medical Sciences (AIIMS), Bhubaneswar reported only 2.79% and by Sharma et al among rural and urban population of Punjab indicated only 3.30% participants knew about the disease.^{9,10} Chainani did a survey in D.Y. Patil Hospital, Navi Mumbai and

Table 9 Awareness of treatment options for PCOS

Treatment	Frequency (n = 428)	Percent
Lifestyle modifications	15	3.50
Laparoscopic ovarian drilling surgery	11	2.57
Hormone replacement therapy	9	2.10
Cognitive behavioral therapy	2	0.47
I don't know	2	0.47

Abbreviation: PCOS, polycystic ovarian syndrome.

Table 10 Awareness of preventive measures of PCOS

Preventive measures	Frequency (n = 428)	Percent
Fiber-rich diet	35	8.18
Exercise	35	8.18
Meditation	27	6.31
Weight loss	15	3.50
I don't know	8	1.87

Abbreviation: PCOS, polycystic ovarian syndrome.

concluded 38% females and Patel et al did a survey in Indore city and reported 41% females heard about the disease.^{11,12} Another study carried in gynecology outpatient department at a tertiary care hospital by Kaundal revealed 43.4% females heard about PCOS.¹³ Salama and Elbana at Nursing Institute of Benha Teaching Hospital and Nursing Institute of Health Insurance Hospital, Egypt revealed that most of the adolescents had inadequate knowledge and only 6.3% of studied population had adequate knowledge.¹⁴ Pramodh reported 38% female Emirati students at Zayed University, Dubai

campus were aware of PCOS.⁴ In a population-based cross-sectional survey conducted all over Saudi Arabia by Alessa et al, 56.7% Saudi females had knowledge about PCOS.¹⁵ In a study done by Mohamed at Faculty of Nursing at Minia University in Egypt only 7.3% students had good knowledge about the disease.¹⁶ Rao et al, in a cross-sectional study at Texas Woman's University which is multiethnic university, concluded only 4% of women and 2.1% of the men said that they knew everything about PCOS.¹⁷

Gurgaon is the fourth most populated district of Haryana state. Growth rate of population here was 73.1% during 2001 to 2011 against 19.9% for Haryana state as a whole. District Gurgaon had 425 large and medium industrial units in 2010. It has corporate offices of more than 60 multinational companies, industrial units of 35 multinational companies, and 582 small-scale/micro small-medium industrial units.¹⁸ Gurgaon, The Millennium City, is home to the best companies in the country and in the world like Google, TCS, Microsoft, IBM, Airtel Bharati, etc. Besides, there are more than 10 universities and more than 50 colleges/institutes in district Gurgaon. Therefore, women seeking best higher education, superior training, and professional growth are heading

Table 11 Association between sociodemographic characteristics of participants and knowledge of PCOS

Variables	Knowledgeable (n = 78)	Not knowledgeable (n = 350)	Test statistic	p-Value
Age (in years)				
18 to 20	55	243	$\chi^2 = 1.350$	0.509
21 to 23	21	87		
> 24	2	20		
Area of living				
Rural	39	185	$\chi^2 = 2.314$	0.314
Suburban	20	105		
Urban	19	60		
Type of family				
Joint	41	187	$\chi^2 = 0.019$	0.89
Nuclear	37	163		
Religion				
Hindu	77	339	Fisher's exact	0.703
Muslim	1	11		
Mother education				
None	4	61		
Up to graduation	64	273	$\chi^2 = 13.632$	0.001 ^a
Postgraduation	10	16		
Father education				
None	1	15		
Up to graduation	66	307	$\chi^2 = 4.217$	0.121
Postgraduation	11	28		

Abbreviation: PCOS, polycystic ovarian syndrome.

^a $p < 0.05$.

Table 12 Association between personal details of participants and knowledge of PCOS

Variables	Knowledgeable (n = 78)	Not knowledgeable (n = 350)	Test statistic	p-Value
Menarche age (in years)				
11 to 13	17	96	$\chi^2 = 1.103$	0.576
14 to 16	59	244		
17 to 19	2	10		
Dysmenorrhea				
Absent	42	159	$\chi^2 = 1.815$	0.178
Present	36	191		
Pads used in a day				
2 to 4	72	323	$\chi^2 = 0.000$	0.995
5 to 7	6	27		
Days of menstrual flow				
2 to 4	36	198	$\chi^2 = 2.887$	0.236
5 to 7	40	143		
> 8	2	9		
Menstrual cycle (in days)				
< 21	9	50	Fisher's exact = 10.839	0.022 ^a
21 to 35	55	264		
> 35	10	11		
Amenorrhea	0	5		
Randomly, no fix date	4	20		
Family history of PCOS				
Absent	73	350	Fisher's exact	< 0.001 ^a
Present	5	0		

Abbreviation: PCOS, polycystic ovarian syndrome.

^a $p < 0.05$.

toward Gurgaon city from all over the nation. Undoubtedly, women play a crucial role in making a family, progress of society, and nation building. Carrier-oriented females postpone marriage and delay pregnancy. As per information provided by "The PCOS Society India" approximately 70% of females with PCOS face difficulties in conceiving, may take longer duration, and need medical help for becoming pregnant. Hence, family planning before 35 years of age is recommended.¹⁹ Young females need to be empowered with knowledge about the disease which has increasing incidence especially in urban areas. It is of utmost importance to identify the gaps in knowledge and awareness of PCOS among young college going females in Gurgaon district which is going through phenomenal transformations in industry and urbanization since the last two to three decades. Thus, this study was undertaken to assess awareness level of PCOS among college going females in district Gurgaon.

As it is evident from studies conducted in different parts of India, level of awareness about the disease can be as low as 1.06% and as high as 43.4%. Also, there is large difference in perception of the disease among women across the world. Level of awareness depends upon the population studied,

health care background in education, higher level of education, cultural differences, level of parents' education (especially mothers' education level), family history of PCOS, and sources of information available. Conducting the surveys assessing awareness level of PCOS in different regions of the country will help in identifying the target areas and target population to increase the awareness level. Also, these surveys will help in developing most suitable tool to educate such population.

PCOS is a complex disorder involving hypothalamus-pituitary-ovarian axis. It results in metabolic changes, hormonal imbalances, and IR. It disturbs females' physiological functioning, physical appearance, mental health, and self-perception which in turn affect her family life and social life. A female may need to visit dermatologist, endocrinologist, gynecologist, dietician, psychiatrist, and physical therapist depending upon the symptoms. Management of the disease requires a multidisciplinary team with good communication among all its members.

Sometimes diagnosis of the disease take years and females are dissatisfied with the treatment. Not addressing all the components of the disease at the same time further extends time in getting complete relief from all symptoms and

increases cost effectiveness. Most of the females are driven to long-term physiological and psychological complications due to lack of knowledge about risk factors/causes and all the treatment options available. There is also lack of awareness about preventive measures and multidisciplinary approach for management of PCOS. Since this is a lifelong disease there is need to educate females at an early age of life.

Quality of life is remarkably lower in females with PCOS as compared with healthy females. Weight gain, stress, and anxiety present in these females are also risk factors for chronic illness like diabetes and CVDs.²⁰ Maximum number of females with PCOS report difficulty conceiving as the most significant concern.²¹ Females also have reported lack of counseling and care during the treatment.²²

Educational programs to increase awareness of the disease should be made mandatory in curriculum. Screening of PCOS in schools/colleges/universities and all types of educational institutes and primary health care centers is extremely important. PCOS awareness workshops and support groups should be established on regional levels. Health professionals should be encouraged for educating patients and their family members for long-term consequences and also motivating them for regular follow-ups. National level public advertisements on television, radio, Internet, newspaper, and magazines that are easily accessed and understood by individuals are required urgently. Young females should also be encouraged for regular physical exercises, participation in sports activities, avoiding sugar containing drinks and frequent fast food consumption, stress management through meditation, and discussion with health care professionals about their reproductive health.

Conclusion

Prevention of this common chronic condition and its consequences relies on increasing awareness at an early age of life. The present study indicates awareness of PCOS among college going females to be very poor. Although females were aware that irregular or absent menses, facial acne, weight gain, and abnormal hair growth are symptoms of PCOS but increasing awareness for all other symptoms is also needed. Internet was the most common source of information followed by friends. Very few girls could identify diabetes, increased androgens, CVD, and endometrial cancer as long-term complications along with risk of ovarian cancer.

Prior Presentation

This study was virtually presented at the 4th International Conference on Multi-Disciplinary Research Studies and Education (ICMDRSE 2021), 29-30 June, 2021, Kuala Lumpur, Malaysia.

Ethical Approval

This survey was reviewed and approved by Research Ethical Committee at School of Medical and Allied Sciences, G. D. Goenka University (GDGU/SoMAS/REC/Approvals/2020/01).

Author Contributions

R.J. contributed in the conception of survey, collection, analysis, and interpretation of data; and drafted the manuscript. E.D.S. revised it critically for intellectual content. R.D. read and approved the final manuscript.

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Conflict of Interest

None declared.

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