Original Research Article

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Prevalence and associated risk factors of polycystic ovarian disease in professional college going girls of Agra City: a cross-sectional study

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ABSTRACT

Background: Polycystic Ovarian Disease is the most common endocrine disorder among females of reproductive age group. This study was aimed to assess the prevalence of PCOS and its associated risk factors in girls of 18-30 years of age, studying in various professional colleges of Agra city.

Methods: Sample size for this study was calculated as 1108. Girls from various professional colleges in Agra were approached (n=1280), 36 girls disagreed to give consent and 64 forms were incomplete. 1200 agreed to participate. They were asked to fill up a questionnaire asking details of menstrual cycle and features of hyperandrogenism. Anthropometric measurements like height, weight, waist and hip circumference were taken. Blood pressure was measured. A probable case was defined as a girl with menstrual irregularity or hirsutism or both. All the probable cases were asked for detailed examination, hormone estimation, and ovarian ultrasonography.

Results: Of the 1200 girls, 220(18.30%) had menstrual irregularity, 101(8.40%) had hirsutism, and 65(5.40%) had both menstrual irregularity and hirsutism. After hormonal evaluation and ultrasonography, prevalence of PCOS according to Rotterdam's criteria was found to be 16.60% .PCOS was found to be significantly associated with socioeconomic status I and II, non-vegetarian diet, snacking, inadequate physical activity, obesity and overweight, central obesity, prehypertension and hypertension, family history of PCOS and self-perceived feeling of disturbed emotional health in girls.

Conclusions: An early lifestyle modification and health education among girls is required to reduce PCOS and its complications in girls.

Keywords: Emotional health, Obesity, Prehypertension, Physical activity, Polycystic ovarian syndrome

INTRODUCTION

Polycystic ovary syndrome (PCOS) is said to be the commonest endocrine disorder of females of reproductive age group with heterogenous presentations, which includes menstrual disturbances and hyperandrogenism. Women with PCOS are at increased risk of reproductive problems including infertility or subfertility, endometrial cancer, and gestational problems. PCOS is an emerging disease among the young females and it is a major public health concern in terms of a frustrating experience for

women and a challenging complex syndrome for clinicians.² Globally, prevalence estimates of PCOS are highly variable, ranging from 2.2% to as high as 26% of this age group depending on how it is defined.³ The variation in the prevalence is due to the difference in diagnostic criteria, the heterogenous symptomatic presentation, logistic difficulty in carrying out blood tests and ultrasound and the variation in age group of different studies.⁴ Most of the young girls do not visit health facilities until they have late sequelae of this disease. Most of the prevalence studies in India are hospital based

studies and recently a few studies among adolescents in schools report prevalence of PCOS as 9.13% to 36%.⁵

PCOS is associated with a wide spectrum of presenting features, including anovulation, obesity, abnormal facial and skin hair growth (hirsutism). 6,7 Due to association of PCOS with insulin resistance, based on evidence, women with PCOS are at an increased risk for developing type-2 diabetes, dyslipidemia, hypertension, and heart disease.8 Risk factors associated with PCOS obesity, inadequate physical exercise, and family history of PCOS like symptoms in someone during their pubertal transition.⁹ There are limited large epidemiological, communitybased studies. Early diagnosis and treatment of PCOS prevents late complications of PCOS and also control the symptoms. 10 Aim of this study was to find the prevalence of PCOS and its associated risk factors in professional college going girls between the age group of 18-30 years in Agra city.

METHODS

It is a descriptive cross sectional study done for the duration of 12 months done in the Department of Community Medicine, Sarojini Naidu Medical College, Agra, from April 2019 to March 2020. Sample size was calculated as 1108 with an estimated prevalence of 8.2%, precision of 20%, and confidence interval of 95%.³ On adding 10% for non-responders, it was raised to the round figure of 1200. Simple random sampling method was used. Approval was taken from Institutional Ethical Committee of S.N. Medical College, Agra (IEC/2021/17).

Inclusion criteria

Girls between 18-30 years of age pursuing professional courses in streams like medical, paramedical, engineering, management, law, mass communication etc., in various colleges of Agra and willing to participate in the study and Girls who had attained menarche at least 3 years back were included in the study.

Exclusion criteria

Girls who were known cases of Cushing's syndrome, who were not willing to participate in the study will be excluded from the study, who were pregnant, who were taking oral contraceptive pills (OCPs) for contraception were excluded from the study.

The girls who agreed to give written informed consent to participate in this study were asked to fill up a semi-structured questionnaire asking about the details of their socio demographic profile, family history, menstrual history and features of hyperandrogenism like hirsutism and hair loss/alopecia, dietary habits, frequency duration and intensity of physical exercise and self perceived feeling of stress or disturbed emotional health. Their anthropometric measures were taken and Blood pressure was measured to find association of PCOS with obesity and hypertension including prehypertension. Responses were verified by a trained research assistant. A girl having either irregular menstrual cycles or hirsutism (self-reported) or both of these together was suspected to have PCOS.

Menstrual irregularity was defined as clinically irregular cycles in previous six months i.e., presence of chronic amennorhoea or oligomenorrhoea (menstrual cycle \geq 35 days). Hirsutism was assessed self-reported. It was defined as presence of coarse/dark colored male like hair growth over \geq 9 body parts (Modified Ferriman Galleway score) or over the whole body. 11-13

All the girls who were suspected cases of PCOS on the basis of symptoms were called for detailed clinical examination, hormone estimation, and ultrasonography to confirm PCOS on the basis of Rotterdam's criteria i.e having 2 of the following 3 features: menstrual irregularity, hirsutism, polycystic ovaries. 14-16 Polycystic ovaries was defined as ≥12 follicles measuring 2-9 mm in diameter with or without ovarian volume >10 mL/10cm3 in either one or both the ovaries.¹⁷ Data collected was entered in Microsoft excel 2010 version and further data analysis was done using SPSS-22 statistical software. The Chi square test was used and significance of results was reported p<0.05.

RESULTS

Total 1200 girls were included in the study. Mean age of the study participants was 21.63±3.19 years and most of them were between 18-20 years of age (49.00%). Most of the girls were unmarried (91.00%). Majority of them (40.25%) were from medical profession followed by 33.25% girls from paramedical courses like nursing, pharmacy, etc. 15.25% girls were engineering students and 11.25% participants were students from other professions like management, law, mass communication etc.

Table 1: Prevalence of PCOS related signs and symptoms among study participants.

Endocrinological Abnormalities	Present N (%)	Normal N (%)	Total N(%)	Chi square test
Menstrual irregularity	220(18.30)	980(81.70)	1200(100)	
Hirsutism	101(8.40)	1099(91.60)	1200(100)	χ2=140.36 and
Menstrual Irregularity+Hirsutism	65(5.40)	1135(95.60)	1200(100)	p<0.00001 at df=3
Hair loss/ Alopecia	212(17.60)	988(82.40)	1200(100)	

Table 2: Prevalence of PCOS according to Rotterdam's Criteria among study participants.

PCOS variables	PCOS present N=1200 (%)
Menstrual Irregularity+Hirsutism(MI+H)*	65 (5.40)
Menstrual Irregularity +Ovarian morphology (MI+O)	111 (9.30)
3.Hirsutism+Ovarian morphology(H+O)	23 (1.90)
Total	199 (16.60)

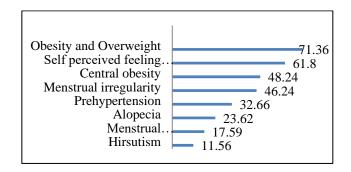


Figure 1: Prevalence of various signs and symptoms in PCOS (%).

Table 3: Association between PCOS and risk factors.

Risk Factor	Response	N	PCOS	Non PCOS	OR	p-value
Age≥20 years	Yes	616	112	504	1.3	0.12
	No	584	87	497	1.3	
Menstrual Irregularity	Yes	980	107	873	5.86	<0.00001
	No	220	92	128	3.00	
Dysmenorrhoea	No	815	138	677	1.08	0.64
	Yes	385	61	324	1.00	0.04
Hair loss/Alopecia	Yes	212	47	165	1.60	0.015
	No	988	152	836	1.00	0.015
Non Vegetarian diet	Yes	384	85	299	1.75	0.004
	No	816	114	702	1./3	0.004
Snacking	Yes	1061	190	871	3.15	<0.00001
	No	139	9	130	3.13	< 0.00001
Obesity and Overweight	Yes	418	142	276	6.54	<0.00001
	No	782	57	725	0.34	< 0.00001
Central Obesity	Yes	353	96	257	_ 2.70	< 0.00001
	No	847	103	744	2.70	
Hypertension+Prehypertension	Yes	346	77	269	1.70	0.004
	No	854	122	732	1.70	
Hirsutism	Yes	65	35	30	1.5.4	0.08
	No	1135	164	971	1.54	
Inadequate physical activity	Yes	727	137	590	1 5 1	0.009
	No	473	62	411	1.54	
Family History of PCOS	Yes	71	32	39	4.72	<0.00001
	No	1129	167	962	- 4.72	< 0.00001
Family History of NCD	Yes	254	54	200	1.40	0.024
	No	946	145	801	1.49	
Self perceived feeling of	Yes	636	123	513	1.54	0.006
disturbed emotional health	No	564	76	488	1.54	0.006

Mean age of menarche in our study was 13.5 ± 1.41 years. Menstrual irregularity was present in 220 (18.30%) of the girls (Table 1). Among these girls, menstrual cycles were irregular since menarche in 25.90% girls and were intermittently irregular in 74.10% girls. 4.66% of the study participants were previously diagnosed cases of PCOS.

Features of clinical hyperandrogenism like hirsutism and alopecia (both self-reported) were present in 8.40% and 17.60% of study participants respectively and on

application of Chi square test, results were found to be statistically highly significant (p<0.00001). There were 3 phenotypes of PCOS found in our study (Table 2). On the basis of Rotterdam's criteria, the prevalence of PCOS was found to be 16.60%.

Mean BMI was 22.06±3.52 kg/m² in our study participants. Among the PCOS cases, 71.36% were either overweight or obese on the basis of Asian Indian criteria (Figure 1). Central obesity was present in 48.24% of the girls having PCOS. Most common endocrinological

abnormality in PCOS cases was menstrual irregularity (46.23%) followed by alopecia in 23.62% of the girls having PCOS (Figure 1).

Maximum association of PCOS was found with the girls who were overweight and obese on calculation of Odds' ratio (OR). The association of PCOS with irregular cycles, alopecia, central obesity, non-vegetarian diet, eating unhealthy snacks, inadequate physical activity, family history of PCOS, family history of non-communicable diseases (NCD), Hypertension including prehypertension, self-perceived stress/depression was found to be significant statistically on applying Chi square test as p<0.05. (Table 3).

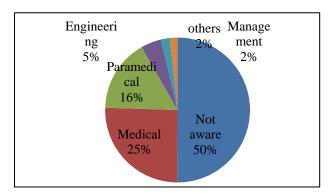


Figure 2: Professional course wise awareness about PCOS in study participants.

Only 50.00% of the girls were aware about PCOS. The awareness was maximum among the students from medical and paramedical profession while level of awareness among the girls from other professions was very less (Figure 2).

DISCUSSION

The community prevalence of PCOS in girls aged 18-30 years in our study was 16.60%, according to the Rotterdam's criteria, which is similar to the study done in Dehradun by Lal et al in which prevalence of PCOS was 16.20%. However, in the studies done by Nidhi et al (9.13%), Singh et al (11.96%) and Gupta et al (8.20%), prevalence rate was much lower than that of our study because these studies were community based like our study but they were done among girls with younger age group and moreover, our study was done among girls doing professional studies who are mostly from effluent section of society and have more stress due to increasing pressure of competition. 3,19,20

In our study, the most common endocrinological abnormality among girls having PCOS was menstrual irregularity present in 46.24% of the girls having PCOS which is quite similar to the study done Choudhary et al, it was present in 40.00% of the PCOS cases.²¹

Among the study participants diagnosed with PCOS, 48.24% were non-obese, 28.14% cases were overweight,

and 43.22% were obese and 48.24% were centrally obese. PCOS cases had significantly higher waist to hip ratio and higher BMI (p<0.00001). BMI was significantly higher in cases confirmed with PCOS in the study done by Joseph et al i.e. 26.3% of the PCOS cases were either overweight/obese.²² In a study done by Joshi et al in Mumbai, among those diagnosed with PCOS, 71.80% were non obese, 7.50% cases were overweight, and 20.70% were obese which is due to the reason that they used WHO criteria for classification of BMI whereas in our study we used Asian Indian criteria.⁵ Thus, we can say that obesity perpetuates PCOS and vice versa. It most likely results from the combined effect of genetic predisposition, poor diet and a sedentary lifestyle, thus compounding pre-existing metabolic derangements.

Thus we can interpret that the factors which are in general associated with obesity and central obesity like non vegetarian diet, eating unhealthy snacks between meals and insufficient physical activity are also significantly associated with PCOS.

In our study, out of the girls having PCOS, self perceived feeling of disturbed emotional health was reported by 61.80% participants and this association was significantly higher than those girls not having PCOS, whereas in the study done by Desai et al and Singh et al, it was present in 34.45% and 14% of the girls having PCOS respectively which is considerably lower than our study as school going girls have lesser stress as compared to those undergoing professional studies and in the latter study only mood swings and depression were reported and other disturbances like stress etc. were excluded.^{20,23}

The family history of PCOS was present in 45.07% of PCOS cases and it was significantly higher among them, which is similar to the Singh et al in which family history was present in 43% participants whereas in another study conducted by Chatterjee et al, it was present in 22% of the participants which can be due to the reason that in their study they took very narrow age group (18-20 years) for data collection and their sample size was too small (N=122).^{20,24}

The awareness of PCOS was present in 50% girls while in the study conducted by Singh et al and Gupta et al, the awareness among the study participants was 13.40% and 21.60% respectively, which is much lower as compared to because our study was done among grown up girls, among them most of them of were from medical and paramedical profession where this topic is covered in their subjects.^{3,25}

Limitations

This was a cross sectional study, thus the absolute etiological factors need to be explored. A follow up study should be conducted among PCOS girls to study the impact of lifestyle modification. Most of the risk factors were self-reported, thus there could be recall bias. The

study time duration was limited and had to be completed in the stipulated time.

CONCLUSION

The under diagnosis of PCOS, which is mostly silent disease is of concern. Early detection and prevention of morbidities associated with PCOS among adolescent girls is of paramount importance. Obesity and overweight are more prevalent in women with PCOS. Obesity and central obesity are risk factors for the development of PCOS. In order to reduce the risk of PCOS and the long-term health consequences which may be related to it. Stress, depression and prehypertension are also significantly raised in PCOS.

Recommendations

The primary management goal of the PCOS in professional college going girls is to reduce the risk of obesity and overweight, central obesity, hypertension and pre-hypertension, control on weight gain if one has irregular menstrual cycles.

To reduce stress and emotional disturbances among professional girls, provision of a student counselors should be there. De-stressing workshops and yoga sessions must be conducted on a regular basis with the availability of a separate room for yoga in hostels and college campus. More such multi centric studies should be conducted to find out more PCOS cases so that complication later in life due to PCOS will be prevented.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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