



Prevalence of Polycystic Ovarian Syndrome among Female Students: A Cross-Sectional Study

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ABSTRACT

Introduction: Polycystic Ovarian Syndrome is an endocrinopathy of reproductive age women and its incidence is increasing due to change in lifestyle and stress. Women with PCOS are at an increased risk for primary or secondary infertility, pre-eclampsia, early pregnancy loss and endometrial cancer. This study has been conducted to assess the prevalence of PCOS among young college girls and various factors associated with it.

Methods: This is an interview based cross sectional study involving 405 degree students from two colleges. Data was collected by direct interview method after obtaining written informed consent.

Results: Girls with menorrhagia or oligo-menorrhoea had PCOS more frequently than girls with normal duration cycles and bleeding for two to four days which was statistically significant. PCOS prevalence was more in the group of girls who did not have habit of working out compared to others who had habit of doing walking or jogging for minimum 30 minutes a day, at least five days a week.

Conclusions: PCOS is one of the non-communicable disorder affecting only women, which needs attention. Presence of oligomenorrhoea, irregular cycles, hirsutism among young girls, two years post menarche, can be a good screening indicator to diagnose a probable case of PCOS.

Key words: Polycystic ovarian syndrome; Female Students; Prevalence; Exercise.

INTRODUCTION

Polycystic ovarian syndrome was originally described in 1935 by Stein and Leventhal. It is the most common endocrine disorder in women affecting around 6-8% of reproductive age women.¹ Its incidence is fast increasing due to change in lifestyle and stress. This heterogeneous disorder is characterised by excessive androgen production by the ovaries mainly. PCOS is multi factorial and polygenic condition characterised by obesity, an ovulation associated with primary or secondary infertility, hirsutism, abnormal menstrual pattern and acne.² It is a common problem among adolescents and manifestations start early but features like anovulatory irregular cycles which is commonly seen immediately after menarche due to immature

hypothalamic-pituitary-ovarian axis leads to confusion of symptoms of PCOS making early diagnosis difficult. It takes about two years post menarche for physiological hyperandrogenism and hyperinsulinemia to settle down to normal.³ Women with PCOS are at increased risk of early pregnancy loss, pregnancy related complications, metabolic syndrome, endometrial cancer, anxiety and mood disorders.

Polycystic Ovarian Syndrome is a diagnosis by exclusion and many organisations have different criteria for diagnosis. Rotterdam criteria constitutes broader spectrum than others and diagnosis is made when individual has two of the following three criteria: oligo and/or anovulation, hyperandrogenism (clinical and/or biochemical) and poly-

cystic ovaries identified sonographically.⁴ Prevalence of PCOS is almost double based on Rotterdam criteria than NIH criteria. It is more sensitive tool and is helpful in early diagnosis to prevent sequelae of syndrome. Women with PCOS may approach dermatologist, endocrinologist or gynaecologist thus every physician must be familiar with PCOS. Insulin resistance or hyperinsulinemia initiates PCOS in 50-70% cases, though HPO axis and adrenal glands are also involved to some extent.⁵Weight loss and dietary management have been associated with improved spontaneous ovulation in women with PCOS likely due to improved insulin sensitivity.⁶Hence the study was conducted to assess the prevalence of PCOS among young adult females and its association with exercise.

METHODS

This is a cross sectional study conducted among female students pursuing degrees at Maharani's College of science and Maharani's College of arts & commerce at Mysore. Study was conducted from June 2014 to August 2014 during which maximum number of students were available in the college. Sample size calculated was 405 considering prevalence as 22%³, precision 20%, non-response rate 15%and using the formula $3.84pq/e^2$.⁷Total number of students were 6627 and 405 were selected by Probability proportion to population size (PPPS) technique. Study was conducted after getting the permission from ethical committee and Principals of the colleges. Data was collected by pretested structured questionnaire after obtaining written informed consent. Girls aged 18 to 35 years who have attained menarche and those who gave consent were included in the study. Girls who attained menarche in the past two years and who are suffer

ing from congenital adrenal hyperplasia, androgen secreting tumors, thyroid disorders and hyperprolactinemia were excluded.Out of 405,396 participated in the study (three were excluded and six did not give consent).PCOS is a diagnosis of exclusion. Probable case of PCOS were those who had any two of three criteria's; menstrual irregularity, hyperandrogenism (clinical or biochemical) and polycystic ovaries on ultrasound.⁴

Data was analyzed using SPSS software 20 version. Pearson's chi-square test was done to find the association between the categorical variables. Probability value less than 5% was considered as statistically significant.

RESULTS

Age of 396 study subjects ranged from 18 to 30 years, mean age was 18.94 years with standard deviation 1.066. The mean age of menarche was 12.91 years ± 1.026 and duration of bleeding ranged from 2 to 8 days with mean of 4.95 days. Maharani's arts college had more (57%) study subjects than Maharani's science college (43%). 84.8% had regular periods and 15.2% had irregular periods and all those who had irregular periods had met doctor. Out of 396 subjects, 42 had oligo-menorrhoea i.e. interval between periods more than 35 days and 24 had menorrhagia i.e. interval less than 21 days. 55.3% subjects experienced mood swings, 60.1% experienced lower abdominal pain and 69.9% had back pain during periods, 24.7% had bloating, 9% had all the symptoms, 3.78% had none. 16.4% had hirsutism i.e. Ferriman-Gallwey score ≥ 8. 23.7% had problem of acne. 11.9% had male pattern hair loss. Prevalence of PCOS was 4.5% (18) and 3.8% had family history of PCOS; majorly it was their aunt who had it.

Table-1:-Association between factors related to menstruation and Polycystic Ovarian Syndrome.

Factors related to menstruation	Polycystic Ovarian Syndrome			OR (Confidence Interval)	p value
	No (%)	Yes (%)	Total (%)		
Menarche Age					
11-13 years	282 (96.9)	9 (3.1)	291 (73.5)	2.938 (1.133-7.615)	0.021*
14-16 years	96 (91.4)	9 (8.6)	105 (26.5)		
Total (%)	378 (95.5)	18 (4.5)	396 (100)		
Regularity of cycles					
Regular	333 (99.1)	3 (0.9)	336 (84.8)	0.027 (0.008-0.097)	<0.001*
Irregular	45 (75.0)	15 (25.0)	60 (15.2)		
Total (%)	378 (95.5)	18 (4.5)	396 (100)		
Frequency of cycles					
Menorrhagia/Oligo-menorrhoea	57 (86.4)	9 (13.6)	24 (16.7)	0.178 (0.068- 0.0467)	0.001*
Normal	321 (97.3)	9 (2.7)	330 (83.3)		
Total (%)	378 (95.5)	18 (4.5)	396 (100)		
Number of bleeding days					
2- 5 Days	306 (99.0)	3 (1.0)	309 (78)	21.25 (5.992- 75.358)	<0.001*
6- 8 Days	72 (82.8)	15 (17.2)	87 (22)		
Total (%)	378 (95.5)	18 (4.5)	396 (100)		

*Indicates significance

Table-2:-Association between risk factors and Polycystic ovarian syndrome.

Risk factors	Polycystic Ovarian Syndrome			Chi square	df	p value
	No (%)	Yes (%)	Total (%)			
Family history of PCOS						
Yes	12 (80.0)	3 (20.0)	15 (3.8)	8.582	1	0.003*
No	366 (96.1)	15 (3.9)	381 (96.2)			
Total (%)	378 (95.5)	18 (4.5)	396 (100)			
Physical activity						
Yoga	28 (7.4)	3 (16.7)	31 (7.8)	24.540	4	<0.001*
Walking	46 (12.2)	0	46 (11.6)			
Aerobics	6 (1.6)	3 (16.7)	9 (2.3)			
Jogging	67 (17.7)	0	67 (16.9)			
Nothing	231 (61.1)	12 (66.7)	243 (61.4)			
Total (%)	378 (95.5)	18 (4.5)	396 (100)			
BMI						
≤ 18.49	49 (90.7)	5 (9.3)	54 (13.6)	5.259	3	0.154
18.5 - 24.99	284 (96.6)	10 (3.4)	294 (74.2)			
25 - 29.99	34 (91.9)	3 (8.1)	37 (9.3)			
≥ 30	11 (100.0)	0 (0)	11 (2.8)			
Total (%)	378 (95.5)	18 (4.5)	396 (100)			
Hirsutism						
Present	56 (86.2)	9 (13.8)	65 (16.4)	15.504	1	<0.001*
Absent	322 (97.3)	9 (2.7)	331 (83.6)			
Total (%)	378 (95.5)	18 (4.5)	396 (100)			
Hyperpigmentation						
Present	80 (87.0)	12 (13.0)	92 (23.2)	19.947	1	<0.001*
Absent	298 (98.0)	6 (2.0)	304 (76.8)			
Total (%)	378 (95.5)	18 (4.5)	396 (100)			

*Indicates significance

Girls who attained menarche after 14 years were at high risk compared to girls who attained menarche before 14 years and it was statistically significant with p value 0.021. 15% girls had irregular periods and 25% of girls with irregular cycles were diagnosed with PCOS. Those with irregular periods were at high risk for developing PCOS with confidence interval 0.008-0.097 and it was statistically significant. Girls with menorrhagia and oligomenorrhoea are at high risk than with normal duration cycles with odds ratio 0.178. Overall 22% of girls had bleeding for 6-8 days and 17% of them were diagnosed PCOS which was statistically significant. Usually oligomenorrhoea is associated with metrorrhagia but not always, even normal duration cycles can have prolonged bleeding. Those who had bleeding for more than six days were at increased risk with odds ratio 21.25 (Table 1).

Fifteen girls had family history of PCOS and out of them three were diagnosed PCOS which was statistically significant. PCOS prevalence was more in the group of girls who did not have habit of working out compared to others who had habit of doing walking or jogging for at least 30 minutes a day for minimum five days a week and it was statistically significant. BMI did not show any association with PCOS. Totally 65 girls had hirsutism out of which nine were diagnosed PCOS and it is statistically significant. Only six girls had both hirsutism and

oligo-menorrhoea among which none were diagnosed with PCOS. 23% had hyperpigmentation indicating possible insulin resistance and 13% among them were diagnosed with PCOS which was statistically significant (Table 2).

DISCUSSION

Many girls neglect oligomenorrhoea, hirsutism and obesity which may in future lead to PCOS. Undiagnosed women with PCOS may seek care from the dermatologist for hirsutism and acne; from the physician for isolated dyslipidemia, obesity, or impaired glucose tolerance; and from the psychiatrist for anxiety and depression. In the absence of communication among these healthcare providers, PCOS may remain undetected, and although some symptoms are treated, the patient may not receive the required treatment. Prevalence of polycystic ovary syndrome in young (18-25 years) degree college girls from North India using the NIH criteria was 3.7% and majority of them were lean similar to this study. Out of these 1520 girls, 11.5% had menstrual irregularity, 1.83% had hirsutism, and 1.6% had both menstrual irregularity and hirsutism.⁸ Azziz Ret.al studied 400 unselected consecutive premenopausal women (18-45 years) seeking a pre-employment physical at the University of Alabama at Birmingham and the cumulative prevalence of PCOS was 6.6%.⁹

An urban community based study among adolescents (15-19 year olds) and young adults (20-24 year olds) in Mumbai showed the prevalence by Rotterdam criteria was 22.6% & 22.4% and using AES criteria was 9.8% & 13% respectively. Irregular cycles were reported by non-obese girls but polycystic ovaries on ultrasound, insulin resistance and abnormal lipid profile was found in obese girls.³ Adolescent girls (15-17 years) with irregular cycles followed up after 2 years showed statistically significant lower percentage of irregularities in menses, acne and enlarged thyroid, but a statistically significant increase in hirsutism. 36.0% were found to be probable cases of PCOS and the results of this study support screening for menstrual irregularity, obesity and signs of clinical hyperandrogenism for early diagnosis of PCOS.¹⁰ The relative utility of diagnostic tools such as persistence of anovulatory cycles, hyperandrogenism (hirsutism, acne, or alopecia), or ovarian findings on ultrasound is not established in adolescents. Some suggest that even using the strictest criteria, the diagnosis of PCOS may not valid in adolescents younger than 18 years. In addition, evidence does not necessarily support that lack of treatment of PCOS in younger adolescents will result in untoward outcomes since features consistent with PCOS often resolve with time.¹¹

Six studies were reviewed to assess the effectiveness of lifestyle treatment in improving reproductive, anthropometric (weight and body composition), metabolic and quality of life factors in PCOS. Lifestyle intervention improves body composition, hyperandrogenism (high male hormones and clinical effects) and insulin resistance in women with PCOS. There was no evidence of effect for lifestyle intervention on improving glucose tolerance or lipid profiles and no literature assessing clinical reproductive outcomes, quality of life and treatment satisfaction.¹² A study evaluating patients with PCOS doing a structured exercise program averaging 92 minutes per week reported an average 5% reduction in BMI and 60% regained normal menses.¹³ There was statistically significant difference in BMI, waist circumference, waist hip ratio and fasting insulin between exercising and non-exercising group of PCOS cases.

Palomba and colleagues¹⁴ examined structured exercise programs compared with hypocaloric hyperprotein diets in women with PCOS and found the group that had a structured exercise program had significantly higher frequency of ovulation and spontaneous menses. They also found that patients with PCOS who failed to ovulate when given 100 mg of Clomiphene Citrate for 5 days (Clomiphene Citrate resistant), had significantly higher rates of ovulation when given Clomiphene Citrate after 2 weeks of a structured exercise program and

low caloric diet, compared with those who did not change their diet or exercise.¹⁵ All women under age 45 from an industrial company who had past history of exercising more than 6 months were studied.¹⁶ The prevalence of PCOS was 8.8%. In obese subjects, mean BMI differed significantly between PCOS and non-PCOS women whereas in lean subjects, there was no statistically significant difference in terms of BMI between PCOS and non-PCOS women. More research is required in the area of prevention and non-therapeutic management of PCOS.

CONCLUSION

Presence of oligo-menorrhea, irregular cycles, hirsutism among young girls two years post menarche, can be a good screening indicator to diagnose a probable case of PCOS. Regular exercise like walking or jogging for minimum 30 minutes at least five days in a week may delay menstrual irregularities which need further research. Weight loss and dietary management have been associated with improved spontaneous ovulation in women with PCOS likely due to improved insulin sensitivity. Awareness creation regarding importance of lifestyle modifications, early diagnosis and adherence to treatment in the management of PCOS among girls is necessary.

IMPLICATION

PCOS is a lifestyle disease which can be prevented by increasing physical activity, healthy diet and stress free life. More widespread and liberal screening for PCOS, education of health care providers in the various disciplines to formulate an interdisciplinary approach, improved access for patients, and planned transition programs from pediatric to adult healthcare providers is required. Awareness regarding adherence to treatment, the importance of yoga and diet in the management of PCOS must be created among young girls.

REFERENCES

1. Azziz R, Marin C, Hoq L, Badamgarav E, Song P. Health care-related economic burden of the polycystic ovary syndrome during the reproductive life span. *J Clin Endocrinol-Metab* 2005;90:4650-8.
2. Disorders of ovary. Padubidri VG, Daftary SN, eds. *Shaw's Textbook of Gynecology*. 15th ed. Pennsylvania: Elsevier; 2013:431-433.
3. Joshi B, Mukherjee S, Patil A, Purandare A, Chauhan S, Vaidya R. A cross-sectional study of polycystic ovarian syndrome among adolescent and young girls in Mumbai, India. *Indian J Endocr Metab* 2014;18:317-24.

4. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. *FertilSteril*2004;81:19-25.
5. Nieuwenhuis-Ruifrok AE, Kuchenbecker WK, Hoek A, Middleton P and Norman RJ. Insulin sensitizing drugs for weight loss in women of reproductive age who are overweight or obese: systematic review and meta-analysis. *Human Reproduction Update* 2009; 15: 57-68.
6. Moran LJ, Pasquali R, Teede HJ, Hoeger KM, Norman RJ (2009) Treatment of obesity in polycystic ovary syndrome: a position statement of the Androgen Excess and Polycystic Ovary Syndrome Society. *FertilSteril* 92: 1966-1982.
7. Bhalwar R. Text book of public health and community medicine, 1st ed. Pune: Department of community medicine, Armed forces medical college in collaboration with WHO, Indian office, New Delhi; 2009. p 251.
8. Gill H, Tiwari P, Dabadghao P. Prevalence of polycystic ovary syndrome in young women from North India: A Community-based study. *Indian J EndocrinolMetab.* 2012 Dec; 16(2):389-92.
9. Azziz R, Woods KS, Reyna R, Key TJ, Knochenhauer ES, Yildiz BO. The prevalence and features of the polycystic ovary syndrome in an unselected population. *J ClinEndocrinolMetab*2004;89:2745-9.
10. Nair MK, Pappachan P, Balakrishnan S, Leena ML, George B, Russell PS. Menstrual irregularity and polycystic ovarian syndrome among adolescent girls: A two-year follow-up study. *Indian J Pediatr* 2012;79(1):69-73.
11. Agapova SE, Cameo T, Sopher AB, Oberfield SE. Diagnosis and challenges of polycystic ovary syndrome in adolescence. *SeminReprod Med* 2014;32:194-201.
12. L.J. Moran, S.K. Hutchison, R.J. Norman, et al. Lifestyle changes in women with polycystic ovary syndrome. *Cochrane Database Syst Rev* 2011Jul; 6(7):CD007506.
13. C. Vigorito, F. Giallauria, S. Palomba, et al. Beneficial effects of a three-month structured exercise training program on cardiopulmonary functional capacity in young women with polycystic ovary syndrome. *J ClinEndocrinolMetab* 2007;92(4):1379-1384.
14. S. Palomba, F. Giallauria, A. Falbo, et al. Structured exercise training programme versus hypocaloric hyperproteic diet in obese polycystic ovary syndrome patients with anovulatory infertility: a 24-week pilot study. *Hum Reprod*2008;23(3): 642-650.
15. S. Palomba, A. Falbo, F. Giallauria, et al. Six weeks of structured exercise training and hypocaloric diet increases the probability of ovulation after clomiphene citrate in overweight and obese patients with polycystic ovary syndrome: a randomized controlled trial. *Hum Reprod* 2010;25(11): 2783-2791.
16. Khademi A, Alleyassin A, Aghahosseini M, Tabatabaefar L, Amini M. The Effect of Exercise in PCOS Women Who Exercise Regularly. *Asian Journal of Sports Medicine.* 2010;1(1):35-40.