

**Original Research Article****A Study of Polycystic Ovarian Syndrome among Adolescent and Young Girls in a Tertiary Care Hospital, GIMSR, Visakhapatnam**

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Abstract**Background:** *Polycystic ovarian syndrome is a common condition in the reproductive age group, previously associated with obesity & high body mass index. It is now seen in significant numbers in the adolescents & younger age group.***Materials & Methods:** *The study is a retrospective cross sectional study conducted in Radiodiagnosis Department, GIMSR, from July 2017 – 2018 in 510 female patients reported with chief complaints of irregular periods/oligomenorrhoea/ amenorrhoea for USG evaluation for PCOS diagnosis based on Rotterdam criteria.***Results:** *Out of 510 patients, 428 (83.9%) were diagnosed with PCOS based on ultrasound criteria. Based on their age among 428 (83.9%) patients, they were grouped into young girls 213 (50%), adolescents 122 (28%) & adults 93 (22%). Within the young age group, the prevalence rate was high in students 113 (53%). Among adolescents, college students 122 (100%) showed highest PCOS. Among the adult age group, high PCOS was identified in professionals 44 (47%). It was also found that, the PCOS prevalence rate in student group was higher in adolescents 78 (50%) with normal BMI.***Conclusion:** *There is an upward trend in the presence of polycystic ovaries in adolescent & younger females who are non-obese and even under obese. This group mostly constitutes school students, students pursuing professional courses & young professionals. The trend could be attributed to the increased mental stress and sedentary lifestyle in this population, which could be important contributory factor in addition to the biochemical changes.***Keywords:** *PCOS, Adolescents, young, obese, Rotterdam criteria.*

Introduction

Polycystic ovarian syndrome or PCOS is a relatively new entrant into the group of lifestyle diseases. It is a common condition in the reproductive age group, previously associated with obesity and high body mass index (BMI). It is now seen in significant numbers in the adolescents and younger age group, mostly comprising the students and young professionals. It is one of the commonest reproductive, metabolic and endocrinal disorders in the females manifesting as increased production of androgen and chaotic secretion of gonadotropin leading to menstrual irregularity, hirsutism, and infertility and affecting nearly 7% of the population^[1]. Behind these significant reproductive manifestations, PCOS has metabolic characteristics which involve major defects in the action of insulin and β -cell functions which leads to increased risk for glucose intolerance and type-2-diabetes. Obesity is one of the most important criteria factor for PCOS and found nearly in 40–80% of women. Familial aggregation of PCOS will sturdily hold up a genetic susceptibility to this disorder. Environmental factors like diet with high calories and reduced exercises are also the most influence factors for the high incidence of obesity in women suffering with PCOS^[2]. The criteria for the diagnosis of PCOS are based on NIH/NICHD and Rotterdam criteria. Polycystic ovary morphology is one of the feature of Rotterdam criteria can be defined by atleast one ovary demonstrating an ovarian volume >10ml or presence of 12 or more follicles measuring 2-9mm size but it is controversial because an established minority of women with the biochemical features of the syndrome do not have PCO morphology. In the women with oligomenorrhoea, 87% have PCO and the women who are presented with a regular menstrual cycle and hirsutism, 92% have PCO^[3, 4]. Nearly 50% of the patients who have recurrent miscarriage have PCOS. In the syndomes like oligomenorrhoea where 40 days or longer between the menstrual periods is there and in case of amenorrhoea there is no menstruation for > 3

months without being pregnant where as in case of erratic bleeding there is loss of the cyclic menstrual pattern. According to Centers for Disease Control and Prevention “2001 Assisted Reproduction Technology Success Rates”, 6% of the women who are receiving different kinds of fertility treatments are characterized with ovulatory dysfunction^[5]. In addition women attending infertility clinics, PCOS accounts for nearly 73% of patients suffering from anovulatory infertility^[6]. In India much of the studies were conducted in hospital set-ups and recently a few studies among adolescents in schools report prevalence of PCOS as 9.13% to 36%. Regardless the availability of huge epidemiological, clinical, laboratory and experimental data, the etiology and pathophysiology of the syndrome still remains a vague and most likely multifactorial^[7, 8]. There is a wide spectrum of clinical and biochemical features associated with polycystic ovary syndrome which spans the spectrum from the presence of PCO only to the syndrome characterized by obesity, hyperandrogenism, and menstrual disturbance, and anovulatory subfertility, that is, Stein-Leventhal syndrome^[9, 10]. However from the available past literature it was found that, 25% of asymptomatic women with regular mensutral cycle were presented with PCO morphology on ultrasound. Many of them have increased androgen or luteinizing hormone (LH) levels, but few of them have normal reproductive function. Additionally, ovulatory women presented with PCOS and hyperandrogenism may not show insulin resistance or may susceptible to increased risk for type-2-diabetes. The current evidences had showed that, regardless of PCOS, pregnancy attainment and safeguarding is affected adversely by obesity and elevated body mass index (BMI). The present study is aimed to study the relative prevalence of PCOS among adolescent, young and adult population in a Tertiary care hospital setup, using Rotterdam criteria (Table-1).

Table-1: Rotterdam criteria for PCOS

Rotterdam Criteria	
S.NO	Diagnosis requires 2 of 3 features:
1.	Oligo and/or anovulation
2.	Hyperandrogenism (Clinical or biochemical)
3.	Polycystic ovary morphology

Materials and Methods

It is a Retrospective study using existing records, conducted at the Department of Radio Diagnosis and imaging of the GIMSR (GITAM Institute of Medical Science and Research), Visakhapatnam. It is a tertiary level hospital. The study was conducted from July 2017 to July 2018, following approval of Institutional Ethics Committee. A purposive and convenient sampling technique was used for the data collection from the study population, who satisfied inclusion criteria to participate in the study.

Inclusion criteria

The patients referred to the Radiology department with complaints of amenorrhea or oligomenorrhea, belonging to the adolescent, young and adult population. The abdomino pelvic scan was performed on PHILIPS HD15 Ultrasound machine, using a 3 MHz curvilinear probe and transvaginal probe in married obese females, where transabdominal visualization was suboptimal, after verbal consent from the patient. The height was measured in meters and weight in kilograms to calculate the BMI in Kg/m^2 , to classify patients into normal, underweight, overweight and obese categories according to World health organization (Table-2). Among the screened individuals, those who had normal menstrual cycles were clinically normal including BMI and no PCO morphology on USG were considered as non PCOS group.

Table-2: BMI Formula and the reference ranges

BMI Formula and the reference ranges
$\text{BMI (kg /m}^2\text{)} = \text{weight (kg) / Height}^2\text{ (m}^2\text{)}$.
Normal BMI Range is 18.5 to 24.9 kg/m^2 .
For Under weight = $\text{BMI} < 18.5 \text{ kg /m}^2$
For Over weight three grades are there.
Grade 1: Overweight – 25 - 29.9 kg/m^2
Grade 2: Obesity – 30 - 39.9 kg/m^2
Grade 3: Morbid Obesity $\geq 40 \text{ kg}/\text{m}^2$

Statistical analysis

Data were analyzed using SPSS software version 22.0. Frequencies and percentages were used for categorical data. Mean, median, and standard deviations were calculated for continuous variables. Pearson's Chi-square test was used to assess differences in the groups for categorical data. The $P < 0.05$ was considered statistically significant.

Results

A total number of 510 female patients were referred to the Department of Radiodiagnosis GIMSR for ultrasound evaluation for chief complaints of amenorrhoea and oligomenorrhoe, during the one year period from July 2017 to July 2018. Out of 510 patients, 428 (83.9%) were diagnosed with PCOS based on ultrasound criteria. Based on their age among 428 (83.9%) patients, they were grouped into young girls 213 (50%), adolescents 122 (28%) and adults 93 (22%) (Figure-1). Each group further had subgroups like students, professionals and others. Within the subgroups they were further segregated into normal weight, overweight and underweight categories based on their BMI ($\text{wt (kg) / height}^2\text{ (m}^2\text{)}$). Among the three age groups, the young age group was the largest group 213 (50%). With in the young age group, the prevalence rate was high in students 113 (53%) (Figure-2). Among adolescents, college students 122 (100%) showed highest PCOS, with most pursuing professional courses, followed by others pursuing degree courses. Among the adult age group, high PCOS was identified in professionals 44 (47%). Table-3 depicts the relation of PCOS with BMI among three different age groups. Among the adolescent age group, the highest PCOS rate was found in students with normal BMI 78 (64%). No PCOS positive cases were reported in the professionals and others. The adolescent group comprised mostly of students, either school or college going. Young professionals were mostly junior residents, interns, nurses, employees and trainees in BPOs, hotels and various other sectors. Others comprised

of non professionals or married women etc. In younger age group, girls with normal BMI 67 (59%) showed highest PCOS prevalence. Whereas the highest prevalence rate in case of professionals 26 (47%) reported with overweight and in others it was 21 (48%). In adults, individuals with normal BMI 10 (50%) showed highest PCOS rate followed by others 15 (52%) and professionals 22 (50%). By comparing the PCOS in three different age groups, the incidence was high in students. The results had showed that there was no

significant difference between the BMI of subjects with or without PCOS. Figure 3-5 represents the PCOS prevalence rate in student, professional and other groups in relation to BMI. It was observed that, the PCOS prevalence rate in student group was higher in adolescents 78 (50%) with normal BMI. In case of professional group, the PCOS prevalence was higher in young girls 26 (60%) with normal BMI. Whereas in others, the highest PCOS rate was noticed in young girls with overweight 21 (58%).

Table-3: Distribution of PCOS cases based on BMI

CATEGORY		STUDENTS			PROFESSIONALS			OTHERS		
		Normal	Over Weight	Under Weight	Normal	Over Weight	Under Weight	Normal	Over Weight	Under Weight
Adolescent (13 – 19 yrs)	122 (26%)	78 (64%)	29 (24%)	15 (12%)	-	-	-	-	-	-
		122 (100%)								
Young Girls (20 – 25 yrs)	213 (50%)	67 (59%)	30 (26%)	16 (15%)	26 (47%)	18 (32%)	12 (21%)	15 (34%)	21 (48%)	8 (18%)
		113 (53%)			56 (26%)			44 (21%)		
Adults (≥ 26 yrs)	93 (24%)	10 (50%)	7 (35%)	3 (15%)	17 (39%)	22 (50%)	5 (11%)	7 (24%)	15 (52%)	7 (24%)
		20 (22%)			44 (47%)			29 (31%)		
		255 (59%)			100 (23%)			73 (18%)		
Chi-square value:		0.93			3.78			1.69		
'p' value		0.63 (Insignificant)			0.15 (Insignificant)			0.79 (Insignificant)		
Total number of patients scanned with complaints of Amenorrhoea / Oligomenorrhoea: 510										
Number of patients with US features of PCOS: 428										

Figure 1: Categories of PCOS patients based on age group

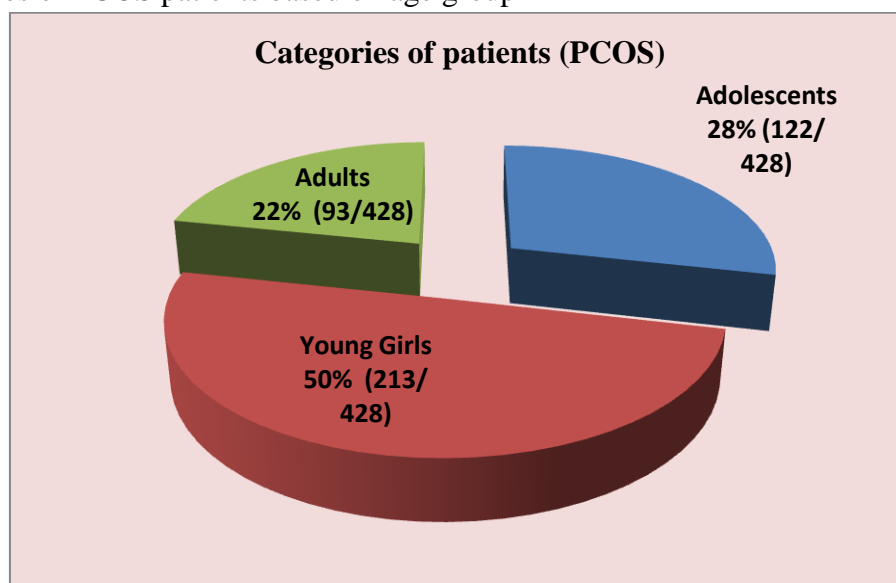


Figure-2: Caterogies of PCOS patients based on their profession

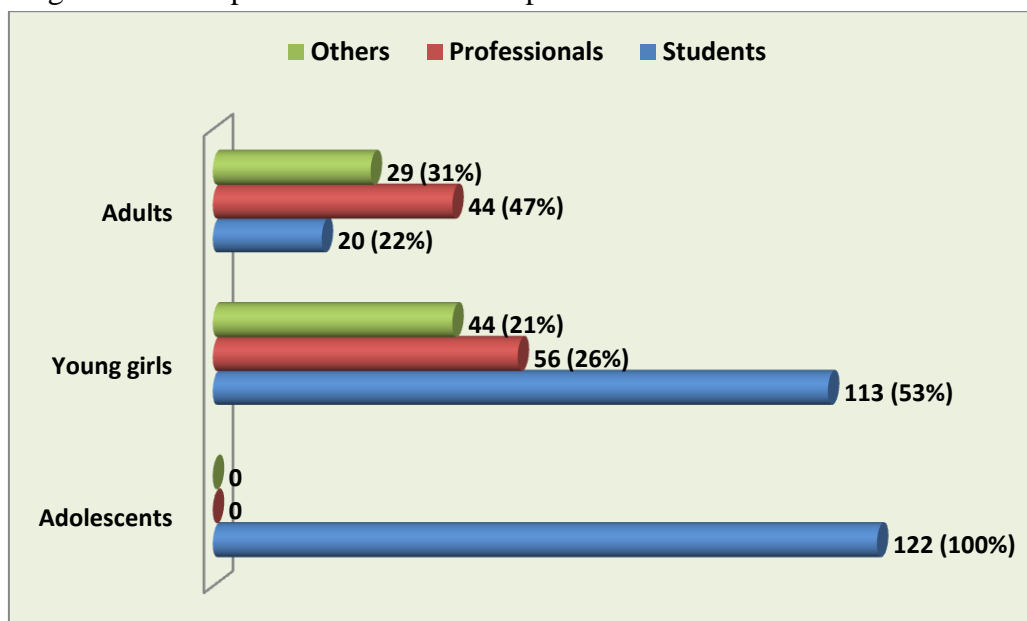


Figure 3: Correlation of BMI in student group

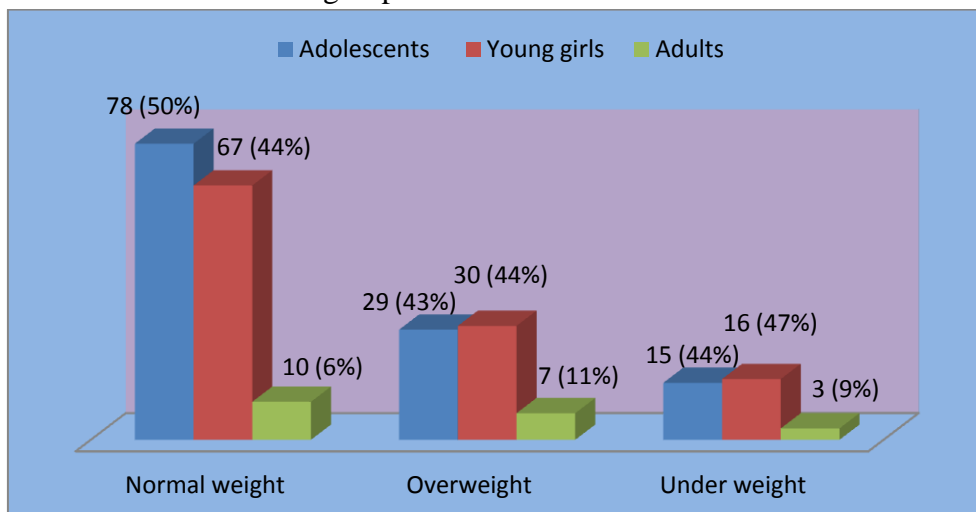


Figure 4: Correlation of BMI in professional group

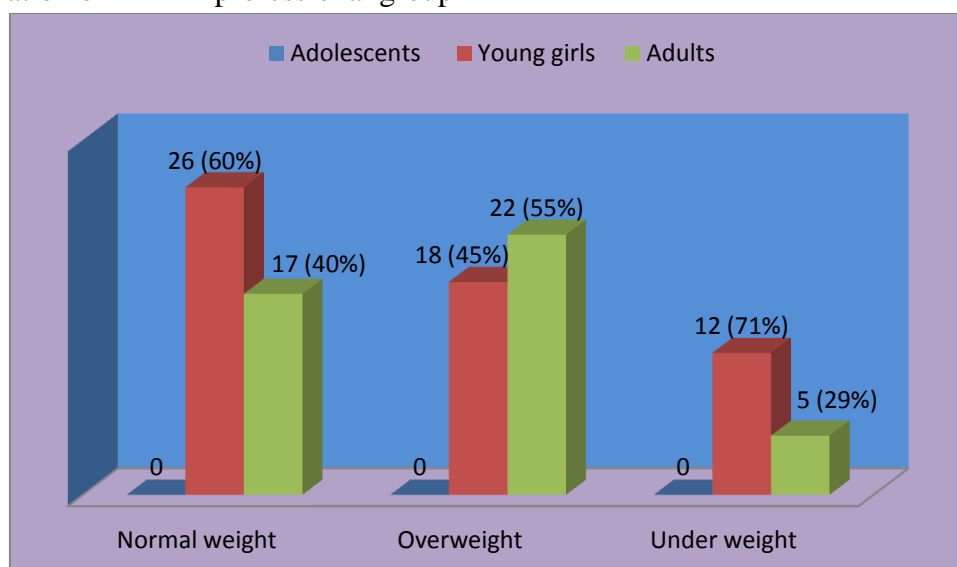
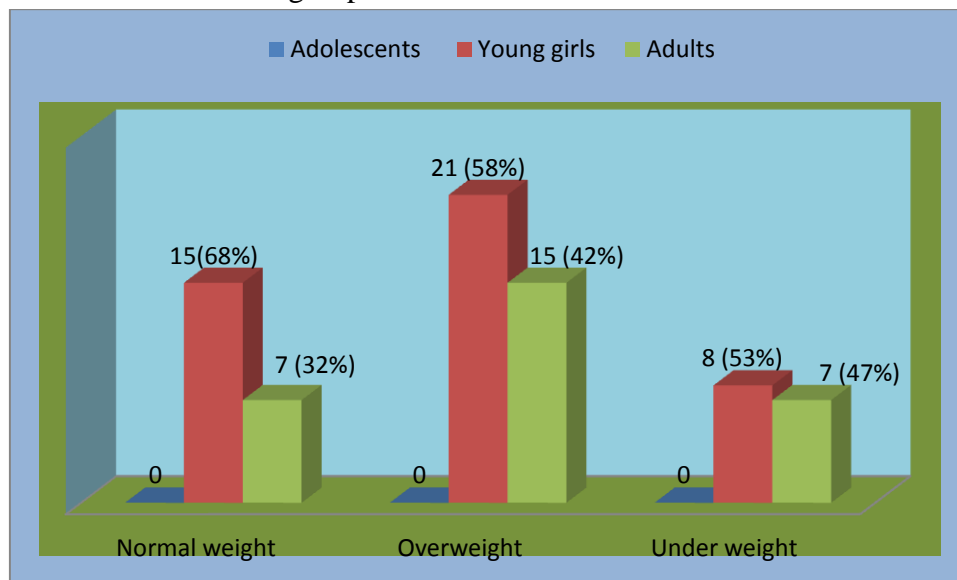


Figure 5: Correlation of BMI in other group

Discussion

PCOS is the most common endocrine disturbance affecting women of reproductive age. The aim of our study was to assess its prevalence among adolescents, young and adult female population with respect to their body composition (BMI) and assess the additional contribution made by stresses of modern life to this already complex syndrome. Among all the patients in our study from the age 14-40 years, majority were adolescents (13 – 19years) and young girls (20 – 25 years) who were either school students, students pursuing professional courses like medicine, engineering, nursing, business etc. or young professionals. Their chief complaint for referral was amenorrhoea or oligomenorrhoea. The polycystic appearance in pubertal age group could be attributed to physiological hyperandrogenism and hyperinsulinemia which may mimic some features of PCOS and may return to prepubertal stage prevalence in pubertal age group. The prevalence of PCOS based on body composition or BMI in our study is consistent with the global trend. PCOS or polycystic ovarian syndrome is fast attaining epidemic proportions worldwide, due to drastic increase in the obesity and diabetes owing to the sedentary and stressful modern lifestyle. Now PCOS is considered however, the most worrisome aspect as highlighted by our study is its

upward trend in adolescent and younger population, constituting the students and young professionals in the most productive and prime periods of their life. A sizeable population of them was not obese. Even in adult population it was more common in professional, as compared to non professionals, irrespective of the BMI. The common factor in these groups, as emerged from our analysis, was the stress faced by individuals in these age groups like the adolescents preparing to embark on to a professional career, in this increasingly competitive world, under the ever increasing parental and peer pressure, or students of professional colleges coping up with the burden of studies or young professional working in stressful and highly competitive environments. The life style in both students and young professionals is more or less sedentary, with lack of any physical activity. The acute or chronic mental stress, combined with sedentary lifestyle with erratic sleep patterns, eating habits and odd working hours is young professionals odd and long working hours, erratic sleeping patterns and faulty eating habits. All of these in combination induce or aggravate the already impaired metabolism and hormonal levels leading to menstrual disorders, weight gain, infertility increased risk of other lifestyle diseases like heart diseases, hypertension diabetes or to psychological problems like insomnia

or depression. The present study correlates with the findings of Joshi *et al.* (2014) ^[11] who done a cross-sectional community-based study on PCOS using Rotterdam criteria and found that the incident rate of PCOS was high in adolescent and young girls specifically individuals with high BMI. Later, Amita Attlee *et al.* (2014) also performed a cross-sectional study on PCOS and found that PCOS was higher in females with oligomenorrhea and also stated that there was no significant difference between the BMI of subjects with or without PCOS ^[12].

Conclusion

Polycystic ovary syndrome is fast attaining epidemic proportion among the adolescent and young girls, which is related to the increasing stress and sedentary lifestyle in students and young professionals in the competitive modern world, either leading to or aggravating the already existing PCOS, hence adding psychosocial dimension to it. Since this group constitutes the future generation, more studies are needed targeting this age group, with aim to providing an early detection, to holistically treat them early on to deal with stresses and long term follow up and management to control PCOS for them to lead a healthy life and avoid long term morbidities associated with the syndrome.

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