Anthropometric and Clinical Characteristics among Young Women with Polycystic Ovary Syndrome

MEGHA M. KATTE AND D. VIJAYALAKSHMI

Department of Food Science and Nutrition, College of Agriculture, UAS, GKVK, Bengaluru - 560 065
E-mail: meghakatte91@gmail.com

ABSTRACT

Polycystic ovary syndrome (PCOS) is a common endocrine disorder among women of reproductive age. The prevalence rate varies from 2.2 per cent to 26 per cent. The objective of the study was to compare clinical and anthropometric measurements of PCOS women with age matched women without PCOS. The results showed that, Classic PCOS (characterized by anovulation, hyperandrogenism and ovarian cysts) women had a family history of PCOS. Compared to control, women with PCOS experienced more of oligomenorrhea requiring medical intervention. Women had mild and severe hirsutism in classic PCOS (31 and 19%, respectively) indicating the condition of hyperandrogenism. Overweight was observed more in normandrogenic women (54%) while obesity was more in classic PCOS women (50%). The study showed that lean PCOS cases (BMI < 23) were also prevalent among PCOS group.

Keywords: Polycystic ovary syndrome, Classic PCOS, Normandrogenic PCOS, Hirsutism, Menstruation

POLYCYSTIC ovarian syndrome (PCOS) is a common endocrine disorder among women of reproductive age and is the leading cause of female infertility worldwide. The syndrome gets its name from multiple ovarian follicles which look like cysts often seen upon a gynecological sonography of women with the condition. World Health Organization (WHO) estimates that PCOS has affected 116 million women (3.4%) worldwide (Kabel, 2016). Globally, prevalence estimates of PCOS are highly variable, ranging from 2.2 to as high as 26 per cent. In India, experts claim 10 per cent of the women are affected by PCOS (Bharathi *et al.,* 2017).

The disease condition is characterised by anovulation, increased male hormones and presence of cysts in the ovaries. Different criterias exist for the diagnosis of Polycystic ovary syndrome (PCOS) as proposed by National Institutes of Health/National Institute of Child Health and Human Disease (NIH/NICHD), the European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine (ESHRE/ASRM) or the Rotterdam Criteria (Pathak and Nichter, 2015). PCOS morbidity may

include, increased insulin levels in the blood, early onset of type 2 diabetes mellitus, and varied lipid profile.

Obesity is a prominent feature of PCOS, occurring in 40-50% of PCOS patients. Also, the prevalence of PCOS is increased in overweight and obese women when compared to their lean counterparts. The prevalence rates of PCOS in underweight, normal-weight, overweight, and obese women are 8.2, 9.8, 9.9, and 9.0 per cent, respectively. Prevalence rates reaches 12.4 and 11.5 per cent in women with BMI 35-40 and greater than 40 (Ahmadi *et al.,* 2013).

The condition exhibits varied symptoms such as hirsutism, acne, obesity, anovulatory cycles and hair loss. Increased male hormones is the major endocrine symptom associated with the amount of fat deposited in abdomen. The prevalence of classic PCOS (characterized by anovulation, cysts in ovaries, increased male hormones) and normandrogenic PCOS (characterized by anovulation and ovarian cysts) are found to be more in Indian population (Nidhi *et al.,* 2011). Hence, this study was taken up with an objective to record the clinical and anthropometric characteristics in women with classic and normandrogenic PCOS and to compare with control.

MATERIAL AND METHODS

The study population consisted of patients who attended the clinic for gynecology and obstetrics at KIMS Hospital. This was a case control study. A self-administered survey questionnaire was prepared based on the available literature on pre-disposing factors for PCOS. Rotterdam criteria was employed in the diagnosis of the PCOS subjects and those without symptoms were taken as controls. Based on the rate of PCOS prevalence young women (18 - 25 years) with classic PCOS, normandrogenic PCOS and age matched women without PCOS were taken as controls for the study (50 members in each group). Information collected includes age (years), educational status, family type and marital status. Data was also collected on age at menarche and family history of PCOS and anthropometric details.

Polycystic ovary assessment: The presence of polycystic ovaries was confirmed using noninvasive, transabdominal ultrasonographic scanning (Bazarganipour *et al.,* 2013). A 3.5 MHz convex probe was employed in this process. Diagnosis for polycystic ovaries was considered positive if 12 or more follicles measuring 2 to 9 mm were found with ovary size of more than 10 cm^3 (Fauser *et al.,* 2012).

Anthropometric measurements: Physical assessment involved measurements of height (m) and weight (kg), following standard procedures. Body Mass Index (BMI) of individual participant was calculated by dividing weight (kg) by height in square meter. BMI classification according to Asian population (Underweight: < 18.5, Normal: 18.5 – 22.9, Overweight: 23 – 24.9, Obese: ≥ 25) was considered to categorize the subjects (Lim *et al.,* 2017).

Clinical assessment: Menstrual pattern was characterized as (i) Regular (cycles recurring every 21–35 days), (ii) Oligommenorrhea (cycle length over 35 days and under six months), (iii) Polymenorrhea (cycles occurring more frequently than every 21 days), (iv) Amenorrhoea (absence of menstruation for six months or longer), (v) Menorrhagia (heavy menstruation requiring intervention) and (vi) Dysmenorrhea (painful periods, cramps). Acne

prevalence was recorded as normal, worsening or absent. Data on hair fall, thinning of hair, male type baldness and absence of hair loss were recorded as reported by the respondents. Hirsutism/Androgen production were assessed using Ferryman-Gallewey model in which study participants selected their degree of hair growth across nine key anatomical sites based on pictographic representations. A total score of less than 8 points, 9 to 15 points and greater than 15 points were considered as normal, mild and moderate to severe androgen production, respectively. Hyperandrogenism (excessive androgen production) was characterized by average scores exceeding 8 points across all anatomic sites (Malik *et al.,* 2014).

Data Analysis: The study data obtained was subjected to statistical analysis with appropriate tools. Descriptive statistics like mean and standard deviation were calculated.

RESULTS AND DISCUSSION

General information of the subjects related to age, education and family type are presented in Table 1. Fifty per cent of women belonged to the age group of 21 - 23 years in classic PCOS. Literacy rate was high as 96 per cent in normadrogenic group and among control. More than 85 per cent of the women in all the three groups were literates. About 84, 88 and 80 per cent of the women belonged to nuclear families in classic, normandrogenic PCOS and control group, respectively. The results are on par with the findings of Balaji *et al.* (2015) who reported that majority (55%) of the PCOS cases belonged to nuclear families. Majority of the women in all the three groups were married. The age at menarche was mostly observed to be during 14 -15 years in classic, normandrogenic and control groups (60, 76 and 80%, respectively). Similar results were obtained in a study conducted by Reddy, (2015) where in 60.8 per cent of PCOS women and 78.2 per cent in the control group reported the age at menarche between 14 -15 years.

Nearly, 46 per cent of the women with classic PCOS reported a family history of PCOS. Whereas, among controls, it was as low as 8 per cent. The percentage of women who were not sure of family history of

TABLE 1

General information of the subjects

Characteristics	Categories	Classic PCOS (n = 50)		Normandrogenic PCOS (n = 50)		Control(n = 50)	
		No.	%	No.	%	No.	%
Age (years)	18-20	10	20.00	13	26.00	16	32.00
	21-23	25	50.00	23	46.00	18	36.00
	24-25	15	30.00	14	28.00	16	32.00
Education	Literate	44	88.00	47	96.00	48	96.00
	Illiterate	06	12.00	03	6.00	02	4.00
Family type	Nuclear	42	84.00	44	88.00	40	80.00
	Joint	08	16.00	06	12.00	10	20.00
Marital status	Single	14	28.00	12	24.00	20	40.00
	Married	34	68.00	38	76.00	30	60.00
	Divorcee	01	2.00	0	0.00	0	0.00
	Widow	01	2.00	0	0.00	0	0.00
Age at menarche (years)	9-10	03	6.00	01	2.00	02	4.00
	11-13	17	34.00	11	22.00	08	16.00
	14-15	30	60.00	38	76.00	40	80.00
Family History of PCOS	Yes	23	46.00	13	26.00	04	8.00
	No	06	12.00	15	30.00	27	54.00
	Not sure	21	42.00	22	44.00	19	38.00

PCOS was more than 38 per cent in all the three groups. Only 12 per cent of the women belonging to classic PCOS did not have family history of PCOS. This indicates that PCOS runs in families and is hereditary. These results are on par with the findings of Bharathi *et al.* (2017) who reported a strong association of family history with the occurrence of PCOS.

Nature of menstruation cycle is depicted in Table 2. Women in both classic and normandrogenic PCOS experienced oligomenorrhea where the cycle length was more than 35 days indicating anovulation (72 and 62%, respectively). Similar results were observed by Lakshmi *et al.* (2015) where in 87 per cent of the PCOS women had the problem of oligomennorhea. Twenty-four and 36 per cent of women in classic and normandrogenic PCOS had problems of

polymenorrhea with cycles more frequent than 21 days. Though the cases of amenorrhea were less, it was observed only among women with PCOS (Fig. 1). Polymenorrhea and amenorrhea are the indicators of anovulatory cycles in PCOS women. Twenty-eight per cent of classic PCOS women and 16 per cent of normandrogenic women experienced painful periods among control group 70 per cent of women reported the same.

Table 3 shows the clinical characteristics of women with and without PCOS. Eight women in the control group had mild hirsutism but did not exhibit the condition of polycystic ovaries and anovulation. Sixty-two and 38 per cent of women had mild and severe hirsutism in classic PCOS, respectively. Nearly 89.7 per cent of the PCOS women are reported to have hirsutism in a study conducted by Saxena *et al.* (2012). This

TABLE 2

Nature of menstruation among subjects[@]

Nature of menstruation	Classic PCOS (n = 50)		Normandrogenic PCOS (n = 50)		Control(n = 50)	
	No.	%	No.	%	No.	%
Regular	0	0.00	0	0.00	50	100.00
Oligomenorrhea	36	72.00	31	62.00	0	0.00
Polymenorrhea	12	24.00	18	36.00	0	0.00
Amennorhea	02	4.00	01	2.00	0	0.00
Dysmenorrhea	14	28.00	08	16.00	35	70.00
Menorrhagia	30	60.00	26	52.00	2	4.00

@ - multiple responses
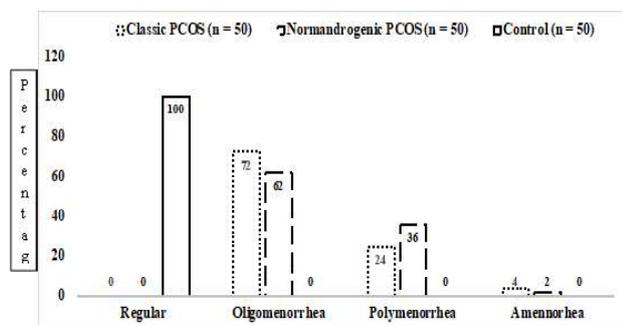
Fig. 1 : Classification of subjects according to BMI

indicates the condition of hyperandrogenism. Fifty per cent of normandrogenic women had mild acne and among control group 24 per cent of women had mild acne problems, whereas, 52 per cent of the classic women reported exacerbated acne and this can be attributed to the condition of hyperandrogenism. Similarly, Reddy, (2015) reported that acne problem persisted in PCOS women and the percentage was found to be 73.2 per cent in PCOS women as against 39.6. per cent in control group.

TABLE 3

Clinical characteristics of the subjects

Clinical signs	Categories	Classic PCOS (n = 50)		Normandrogenic PCOS (n = 50)		Control (n = 50)	
		No.	%	No.	%	No.	%
Hirsutism	Normal	0	0.00	50	100.00	42	84.00
	Mild	31	62.00	0	0.00	08	16.00
	Moderate - Severe	19	38.00	0	0.00	0	0.00
Acne	Mild	14	28.00	25	50.00	12	24.00
	Exacerbated	26	52.00	12	24.00	0	0.00
	Absent	10	20.00	13	26.00	38	76.00
Hair loss	Hair fall	10	20.00	28	56.00	18	36.00
	Thinning of hair	23	46.00	11	22.00	06	12.00
	Male type baldness	14	28.00	0	0.00	0	0.00
	Absent	03	6.00	11	22.00	26	52.00

Similarly, thinning of hair and male type baldness was more prevalent in classic PCOS (46 and 28%, respectively), whereas, hair fall was more in normandrogenic group (56%), followed by 22 per cent of hair thinning in the same group. The percentage of male type baldness reported in the study is much higher as compared to that of results obtained by Ramanand *et al.* (2013) who reported the prevalence to be only 6 per cent.

Mean anthropometric measurements of the subjects are presented in Table 4. Height of the subjects was on par in all the three groups, whereas, there was much variation in the mean weight of the three groups. Women with classic PCOS had a highest mean weight of 61.46 kg. whereas, the lowest was in the control group with a mean weight of 53.87 kg. Mean BMI was in the range of normal weight in case of control group. In classic and normandrogenic PCOS group the mean BMI were the range of overweight (24.92 and 23.24 kg/m^2, respectively).

Distribution of the subjects according to BMI are presented in Table 5. Majority of the women in classic

PCOS were found to be obese (50%) followed by 28 per cent in the overweight. In normandrogenic PCOS group 54 per cent of the women were overweight and only 10 per cent were obese. While in the control group majority of them had a normal BMI (70%) and only fourteen and six per cent of them were overweight and obese, respectively. Also, ten per cent of women in the control group were underweight (Fig. 2). In classic and normandrogenic PCOS also women had underweight and normal BMI who are termed to be the cases of lean PCOS. Lean PCOS cases (BMI < 23) were found to be more in normandrogenic PCOS compared to classic PCOS. In a study conducted by
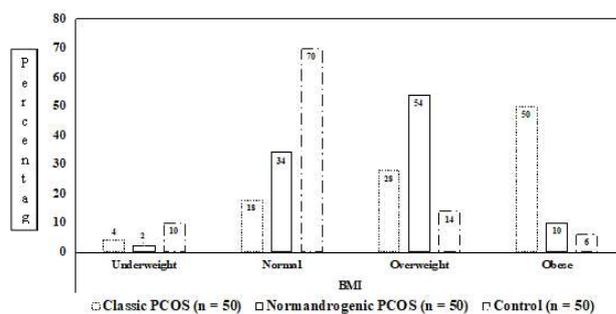
Fig. 2 : Classification of subjects according to BMI

TABLE 4

Mean anthropometric measurements of the subjects

Nature of menstruation	Classic PCOS (n = 50)	Normandrogenic PCOS (n = 50)	Control (n = 50)
	Mean ± SD	Mean ± SD	Mean ± SD
Height (m)	156.90 ± 6.58	157.17 ± 6.67	156.24 ± 6.09
Weight (Kg)	61.46 ± 8.54	57.47 ± 6.34	53.87 ± 6.07
BMI	24.92 ± 2.74	23.24 ± 1.89	22.03 ± 1.86

TABLE 5

Distribution of subjects according to BMI

Clinical signs	Categories	Classic PCOS (n = 50)		Normandrogenic PCOS (n = 50)		Control (n = 50)	
		No.	%	No.	%	No.	%
BMI	Underweight	02	4.00	01	2.00	05	10.00
	Normal	09	18.00	17	34.00	35	70.00
	Overweight	14	28.00	27	54.00	07	14.00
	Obese	25	50.00	05	10.00	03	6.00

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Bharathi *et al.* (2017) majority of the PCOS women were obese and so is the case in the present study but the mean BMI reported was slightly higher (26.5 ± 0.4 kg/m^2) as against 24.92 kg/m^2 in our study.

The present study shows that PCOS cases are diagnosed more in married women. Cases of menorrhagia, oligomenorrhea and polymenorrhea are more in PCOS compared to controls requiring medical intervention. Exacerbated acne, clinical hyperandrogenism and incidence of alopecia are more in classic PCOS women compared to normandrogenic PCOS women. Classic PCOS women had more weight compared to other two groups. Prevalence of obesity was more in Classic PCOS and was least among the control group. Lean PCOS cases were also prevalent among PCOS group. Early diagnosis and nutrition intervention can be a strategy to fight against PCOS.

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