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Nutritional status and complications of women with polycystic ovarian syndrome

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Abstract
Nutritional status and complications of women with Polycystic Ovarian Syndrome (PCOS) were assessed in Hubli – Dharwad cities of Karnataka state. About 102 women suffering from PCOS were purposively selected from four hospitals of Hubli-Dharwad area as study population. Basal data, nutritional and health status were collected by using a pre tested questionnaire. The results showed that majority of PCOS younger women were in the age group of 21-25 years (65.69 %) had PCOS, belonged to sedentary activity category and had general obesity, hirsutism (42.15 %) and abdominal obesity (96 %). Mean nutrient intake of women was lower than the RDA. Irregular menstrual cycle was most common symptom seen in women and complications like infertility and miscarriage were observed in very few of them. Bilateral polycystic ovaries were found in more than half of the patients. Thus PCOS is an emerging disorder in young women and there is a need to educate women of reproductive age about the importance of dietary and life style modification in management and prevention of the complications.

Keywords: Androgens, hyperandrogenism, hirsutism, PCOS, oligomenorrhea

Introduction
Polycystic Ovarian Syndrome (PCOS) is a genetically complex endocrine disorder of women of uncertain aetiology and is a common cause of anovulatory infertility among women. PCOS is currently considered as a lifestyle disorder affecting 2.2-26 % of young girls ad women in their reproductive age in India.

It is a common disorder, often complicated by chronic anovulatory infertility and hyperandrogenism with clinical manifestation of oligomenorrhea, hirsutism and acne. Many women with this condition are obese and have a higher prevalence of impaired glucose tolerance, type 2 diabetes and sleep apnoea than in the general population.

PCOS is frequently diagnosed by gynaecologists and it is therefore important that there is a good understanding of the long term implications of the diagnosis in order to offer a holistic approach to the disorder. Hence, the present study was taken with an objective to assess the nutritional status and complications related to young PCOS women.

Materials and Methods
A hospital based study was carried out in year 2017-2018 at Hubli – Dharwad cities of Karnataka state for a period of 6 months. About 102 young women diagnosed with PCOS, willing to participate and spare time for interview were enrolled in the study by visiting the outpatient department of 4 hospitals. The study was approved by ethical committee and written consent was taken from the participants. A detailed questionnaire was developed to collect the data on nutritional status, symptoms and complications of PCOS. Nutritional status was assessed by measuring height, weight, waist and hip circumference. Body Mass Index (BMI) and Waist to Hip ratio was computed (WHR). Data about the signs and symptoms experienced by women were assessed by interviewing the subjects personally and complications were assessed by making use of hospital records.

Results and Discussion
Table 1 depicts the demographic profile of women with PCOS. Totally 102 women with PCOS were included for study, out of this 65.69 per cent belonged to the age group of 21-30 years, women of young age group were 22.55 % and very few belonged to the age of more than 30 years (11.76 %). Most of the subjects were graduates (40.19 %) and PUC passed with very few post graduates. About half of the women belonged to small family and 71.56 % were married. Most of the women had no family history of PCOS and more than half subjects were

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non-vegetarians (58.83 %). Type of activity showed that all the subjects belonged to sedentary activity group. Table 2 shows the mean values of anthropometric profile of the PCOS women. The mean height, weight, and BMI were 152.29 cm, 62.39 kg and 27.56 respectively. The mean waist circumference, hip circumference, and waist to hip ratio were 81.93cm, 98.71cm and 0.77cm respectively.

Fig 1 represents the classification of PCOS subjects based on BMI. Out of 102 subjects, obesity grade I was noted in 38 % and grade II in 32 %. About 14 % were overweight whereas 12 % were in normal category and very few (3 %) in underweight category. Unhealthy eating habits and lack of exercise have lead to many diseases. PCOS is one of the conditions affecting the functioning of ovaries in women. Sedentary life style (Table 1) and obesity were very common in the present study (Fig 1). Similar results were reported by Kozakowaski and Zgliczynski (2013) [1], who found that more than half the PCOS women were obese and overweight (10 %). The reason for obesity and overweight among PCOS women may be attributed to the higher free androgen index among women that has positive correlation with body weight and BMI.

Women were classified based on waist to hip ratio (Fig 2) which is an indicator of abdominal obesity. Abdominal obesity was observed in 96 per cent of the subjects. Similar results were noted by Ahmadi et al. (2013) [2] and Varghese et al. (2015) who reported that 86.6 per cent of PCOS women had abdominal obesity. The women with android obesity are at greater risk of PCOS because increased visceral fat. This may be the cause of insulin resistance, and higher insulin level can cause the ovaries to make more androgen hormones such as testosterone. This leads to irregular periods and polycystic ovaries.

The daily nutrient intake of PCOS (table 3), showed that the mean intake of all the macronutrients viz energy, protein and fat was less than the requirements. Similarly intake of minerals and vitamins intake was significantly lower than the RDA in all the age groups 13-15y, 16-17 y and > 17years. This may be due to lower consumption of protective foods. The results of study were in line with the investigations of Thara et al. (2017) [4] where intake of calcium, vitamin A and iron was less compared to ICMR requirements.

Table 4 shows the symptoms present in polycystic ovarian syndrome women. Irregular periods was common in majority of women studied (86.27 %) and scanty bleeding was seen in (13.72 %). Hirsutism i.e. presence of facial and body hair was seen in 42.15 %. Very few women had the symptoms of alopecia, acne and acanthosis nigricans which is dark thick velvety patches around neck, armpit and groin regions. These symptoms are due to the increased level of androgens in women. The excessive secretion of androgens in PCOS patients results in a series of skin changes such as acanthosis nigricans and acne. Orsino et al. (2005) [5] and Nair et al. (2014) reported menstrual irregularity and hirsutism as the symptoms present in PCOS women. Ozdemir et al. (2014) and Quinn et al. (2014) [8] found similar symptoms among PCOS women.

Table 5 shows the complications and location of ovarian cysts present in women with PCOS. Complications related to PCOS were present in more than half of the women, out of which infertility (47.05 %) was the most commonly observed. Similar results have been reported by Joham et al. (2015) who noted

infertility in 72 per cent of women with PCOS. This is attributed to the higher level of androgens that interfere with development of eggs and its regular release and make more difficult for women with PCOS to conceive naturally.

Other complications such as hypertension (2.94 %), still birth, diabetes and hypothyroidism (1.96 % each) were also seen in very few of women. The reason for hypertension is attributed to hyperandrogenemia leading to higher proatherogenic lipids that clog the arteries and cause high blood pressure. Thyroid dysfunction also co-exist with PCOS, which is characterized by either subclinical hypothyroidism or acute immune thyroiditis both being involved in latent progression of hypothyroidism. Macut et al. (2013) have noted presence of hypertension and Mitra et al. (2016) reported occurrence of thyroid in the PCOS women. In the present study all the women underwent pelvic ultrasound examination and maximum number of the subjects had bilateral polycystic ovaries and very few having cysts either on left ovary or right ovary. Similar results have been reported by Orisno et al. (2005).

Table 1: Demographic profile of selected polycystic ovarian syndrome women N=102

Demographic profile	Subjects	
Age (yrs)	F	%
13-20	23	22.55
21-30	67	65.69
>30	12	11.76
Education level		
Primary school	2	1.96
High school	18	17.65
PUC	36	35.29
Graduate	41	40.19
Post graduate	5	4.91
Family size		
Small (<5)	54	52.94
Medium (5-6)	47	46.08
Large (7-9)	1	0.98
Marital status		
Married	73	71.56
Unmarried	29	28.44
Family history of PCOS		
Yes	4	3.92
No	98	96.08
Type of diet		
Vegetarian	34	33.33
Non-Vegetarian	60	58.83
Eggtarians	8	7.84
Type of activity		
Sedentary	102	100
Moderate	0	0
Heavy	0	0

F-Frequency% -Percentage

Table 2: Anthropometric profile of polycystic ovarian syndrome women N-102

Anthropometric profile	Mean ± SD
Height (cm)	152.29 ± 4.98
Weight (kg)	62.39 ± 12.05
Body mass index	27.56 ± 5.19
Waist circumference (cm)	81.93 ± 9.58
Hip circumference (cm)	98.71 ± 9.34
Waist to Hip Ratio	0.77 ± 0.06
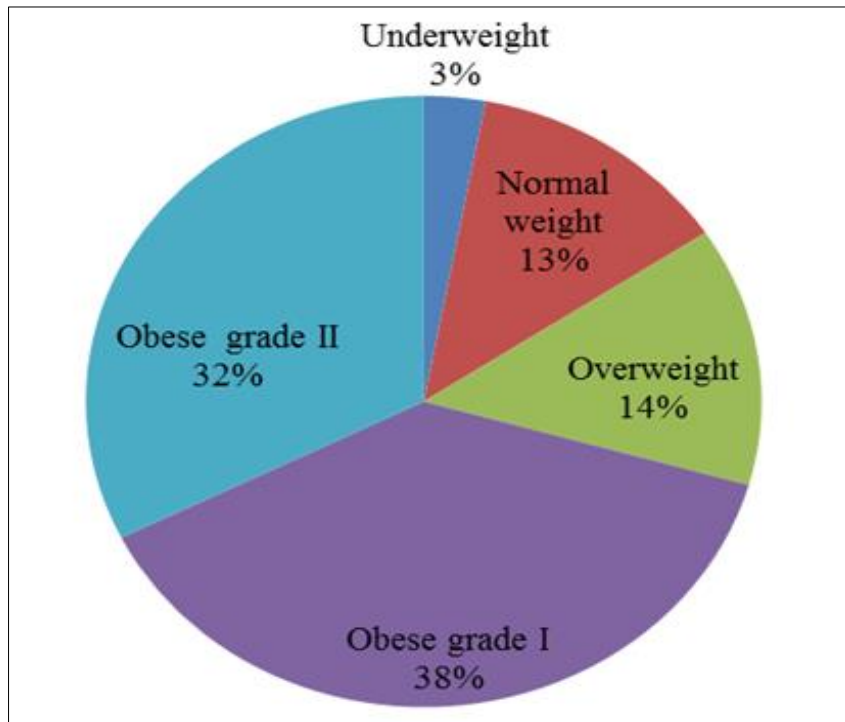
Source: BMI classification for Asian adults (WHO anon, 2002)

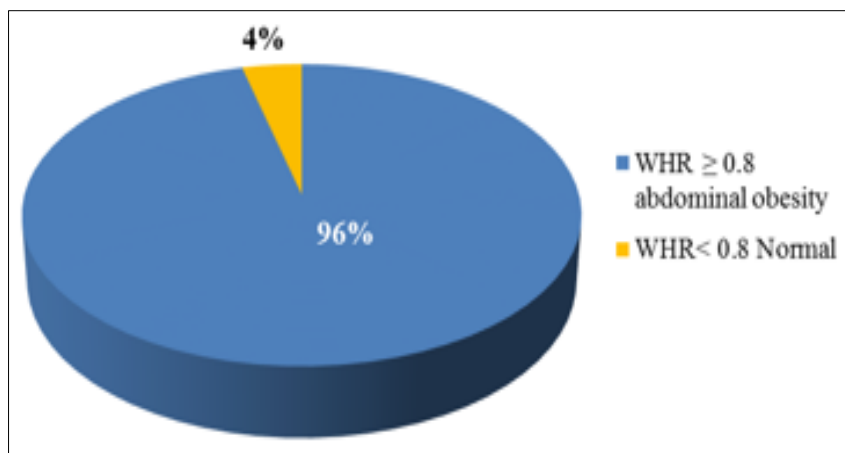**Fig 1:** Classification of polycystic ovarian syndrome women based on Body mass index

Fig 2: Classification of polycystic ovarian syndrome women based on Waist to Hip Ratio

Table 3: Daily nutrient intake of polycystic ovarian syndrome women N-102

Nutrients/day	Adolescent 13-15years (n=1)		Adolescents 16-17 years (n=6)			Adults (n=95)		
	Nutrient intake	RDA#	Nutrient intake	RDA#	't' value	Nutrient intake	RDA#	't' value
Energy (kcal)	1948	2330	1978 ± 131.22	2230	10.72**	2067 ± 681.76	2230	1.83^{NS}
Protein (g)	36.00	51	39.85 ± 3.06	55	12.15**	39.69 ± 2.79	55	51.27**
Fat (g)	24.00	40	23.88 ± 1.30	25	2.61*	24.08 ± 1.57	25	5.13**
Calcium(mg)	412.00	800	392.14 ± 32.43	600	11.34**	404.05 ± 38.30	600	45.63*
Iron (mg)	14.30	27	14.49 ± 0.93	21	16.58**	14.52 ± 1.44	21	40.72**
β carotene(μg/d)	3147.00	4800	3134.19 ± 177.99	4800	17.59**	3254.85 ± 289.83	4800	46.40**
Vitamin A (μg/d)	282.30	600	278.23 ± 13.98	600	96.22**	279.40 ± 24.35	600	113.87**
Thiamine (mg)	0.50	1.2	0.80 ± 0.05	1.1	13.35**	0.80 ± 0.06	1.1	43.93**
Riboflavin(mg)	0.50	1.4	0.54 ± 0.04	1.3	31.30**	0.60 ± 0.32	1.3	17.94**
Niacin (mg)	0.30	14	7.56 ± 0.16	14	80.34**	7.59 ± 0.17	14	326.18**
Pyridoxine (mg)	0.30	2	0.33 ± 0.02	2	459.18**	0.37 ± 0.15	2	87.46**
Cyanocobalamine (mg)	7.70	0.2-1	0.30 ± 0.06	1	19.72**	0.29 ± 0.07	1	86.27**
Vitamin C (mg)	7.80	40	7.65 ± 0.15	40	552.08**	7.63 ± 0.23	40	1.19**

Values are expressed in terms of Mean ± SD
*Significant at 5% level
**Significant at 1% level
RDA- Recommended dietary Allowance
RDA Source: Anon (2010b)

Table 4: Symptoms observed in polycystic ovarian syndrome women N=102

Symptoms*	Frequency#	Percentage
Irregular periods	82	80.39
Scanty periods	14	13.72
Hirsutism	43	42.15
Alopecia	10	9.80
Acne	7	6.86
Acanthosis nigricans	4	3.92

#Multiple responses were noted*Symptoms were recorded from case files of patients

Table 5: Complications observed in polycystic ovarian syndrome women N=102

Complications*	Frequency#	Percentage
Complications Absent	48	47.05
Complications Present	54	52.95
Infertility	48	47.05
Miscarriage	8	7.61
Still Birth	2	1.96
Hypertension	3	2.94
Thyroid	2	1.96
Diabetes	2	1.96
Location of ovarian cyst$		
Left ovary	5	4.91
Right ovary	6	5.88
Both	61	59.80

#Multiple responses were noted, *Complications were recorded from case files of patients
$Recorded from ultrasonography reports

Conclusion
It can be concluded that majority of the PCOS women belonged to sedentary activity category with abdominal and general obesity, mean nutrient intake was lower than the RDA and had symptoms like irregular menstrual cycles along with other complications like infertility and miscarriage with bilateral polycystic ovaries. So, there is a need to create awareness and educate women of reproductive age about the importance of life style modification and healthy well balanced diet for management of the disease and preventing the associated metabolic complications in later part of life.

References
1. Kozakowski J, Zgliczynski W. Body composition, glucose markers and serum androgens –association in women with PCOS. Journal of Endocrinology. 2013; 61:64-100.
2. Ahmadi A, Akbarzadeh M, Mohammadi F, Jafari B, Tolide R. Anthropometric characteristics and dietary pattern of women with polycystic ovarian syndrome. Indian Journal of Endocrinol Metabolism. 2013; 17:672-6.
3. Varghese J, Kantharaju S, Thunga S, Singh P. Prevalence and predictors of metabolic syndrome in women with polycystic ovarian syndrome: A study from southern India. International Journal of Reproduction Contraceptive Obstetric Gynecology. 2015; 4:113-8.
4. Thara M, Divakar S. Assessment of nutritional status of PCOS women in Kerala. International Journal of Applied Home Science 2017; 10:717-2.
5. Orsino A, Evk N, Hamilton J. Clinical features, investigations and management of adolescent with polycystic ovary syndrome. Journal of Paediatric Child Health. 2005; 10:602-8.
6. Nair A, Nambisan B, Radha, S, Jayasree L. Effectiveness of lifestyle modification package among overweight and obese adolescent girls between 15-19 years with polycystic ovarian syndrome. Inernational Journal of Community Medicine Public Health. 2017; 4:84-0.
7. Ozdemir S, Ozdemir M, Bodur S. Specific dermatology features of the polycystic ovary syndrome and its association with biochemical markers of the metabolic syndrome and hyperandrogenism. Journal of Clinical Endocrinology Metabolism/ 2010; 98:211-5.
8. Quinn M, Shinkai K, Pasch L, Kuzmich L, Cedars M and Huddleston H, Prevalence of androgenic alopecia in patients with PCOS and characterization of associated clinical and biochemical featurs. Journal of Reproduction Endocrinology/ 2014; 101(4):1129-1134.