DIETARY PATTERN AND ANTHROPOMETRIC CHARACTERISTICS OF POLYCYSTIC OVARY SYNDROME

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ABSTRACT

Polycystic ovary syndrome is a hormonal imbalance that is common in obese and overweight women, which further increases androgen secretion causing impaired metabolism and reproductive function. Women with PCOS are at increased risk of developing cardiovascular disease,dyslipidemias,hypertension and type II diabetes Mellitus. The objective of the present study was to characterize the anthropometric and dietary profile of women with PCOS and to compare it with that of healthy age matched women.

In this case- control study 30 women with PCOS served as cases. The Control group consisted at 30 age- matched healthy women. For Each participants,dempgraphic,anthropometric and dietary intake data were gathered and compared between the two groups.

There was a significant difference between the mean of the body mass index of the two groups, waist circumference was significantly higher in the PCOS group, than the control group($P= 0.012$).Compared to the normal weight PCOS patients ,a significantly higher percentage of overweight patients had hirsutism(P=0.006).In dietary analysis ,women with PCOS consumed more calories and more fat than healthy women (P=0.002 and P=0.020,respectively).

It is concluded that in PCOS patients, android obesity is a common feature and this abdominal adiposity may be related to the syndrome's complications.Pcos symptoms were more severe in overweight patients then the normal weight. Regarding the dietary pattern, it was indicated that patients with PCOS consume more calories and more fat in their diets and this might have been correlated to their disease.

Keyword: Diet,Hirsutism,Obesity,Polycystic Ovary Syndrome

Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder among women of reproductive age, affecting nearly 8 % of them[1].The endocrine hallmarks are hyperandrogenemia and to a less extent, hypersecretion of luteinizing hormone[2].The characteristic clinical features of PCOS are menstrual irregularity, such as amenorrhea oligomenorrhea ,or other irregular uterine bleeding and signs of excessive androgen production, such hirsutism, greasy skin, acne and obesity[3].The etiology of PCOS largely remains unknown[2].PCOS is considered to be not only reproductive endocrinopathy, but also a metabolic disorder[7],and its morbidity may include hyperinsulinemia, insulin resistance, early onset of type 2 diabetes mellites and dyslipidemia[8].Obesity is a prominent feature of Cooccurring in 40-50% of PCOS patients[9].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% respectively. Prevalence rates reaches 12.4 and 11.5% in women with BMI 35-40kg/m^{2}and greater than 40kg/m^2.[11]

Obesity worsens the clinical ,endocrine and metabolic features of the syndrome, mostly by increasing insulin resistance and hyperinsulinamia[12]. Besides obesity ,the topography of body fat is an important issue. The major endocrine symptom pf PCOS,hyperandrogenicity is clearly associated with the amount of fat localized in the upper body sites.[2]It is suggested that there is a possible association between diet and risks of PCOS.But there are limited data on the dietary history of women with PCOS.[1] The objective of this study was to characterize the anthropometric and dietary profile of women with PCOS and to compare it with that of healthy age matched women.

MATERIALS AND METHODS

The study participants ,materials and methods were approved by the research committee of SDM Naturopathy and yogic science college. This study was case-control. The study population consisted of patients who attended the out-patient department at SDM nature cure Hospital. Thirty women aged between 17 to 35 years, who fit the diagnostic criteria for PCOS served as cases. The PCOS was early diagnosed by the determination of hormonal parameters based on standard Rotterdam Criteria 2003.All of the women suffered from menstrual disorders, such as amenorrhea or oligomenorrhoea. We excluded patients with any other etiology such liver, kidney and heart problems. The control group consisted of thirty healthy women who attended the center along with their patients and were matched for age with the PCOS group. All the controls had regular menstrual cycles(26–33-day cycles). All the participants, PCOS patients as well as controls, were in good health condition and were not on any medication which might affect hormone metabolism or body composition. All the participants were non-smokers and none of them was on excessive physical training.

For each participants , a questionnaire of demographic information (Job, exercise habits, education and socio-economic statuses.) was completed. Each participant was asked to provide a detailed history of menstruation and also signs and symptoms of PCOS such as acne, hirsutism and greasy skin.

Anthropometric information was gathered as follows: Height(in cm) and body weight (in kg) were determined for each participants and BMI was calculated. The waist Hip circumferences were measured and the waist-to-hip ratio(WHR) was also calculated.[14]To evaluate the dietary dietary intake of the participants, three 24-hour dietary recall questionnaires were filled for each person (two weekdays and a weekend). Total energy intake (kcal), levels of carbohydrate (%), protein (%), fat (%), SFA (gr), PUFA (%) and MUFA (%) intake in the participants were also analysed, using Nutritive value of Indian foods table.

STATISTICAL ANALYSIS

Statistical analysis was done using the Statistical Package for the social Sciences, version 13.0 for windows(SPSS,Inc,Chicago).The independent sample t-test and Mann-Whitney U test was used to compare the means of the two groups P value less than 0.05 was considered as statistically significant. All data were expressed as mean ±SD.

RESULTS

The participants of the present study were 30 women with PCOS as cases and 30 healthy women as control group . The average age of the participants in the case and control groups was 26.17±4.3 and 27.13±3.2 years respectively. There was no significance difference between the two means (P=0.58).Besides the age variable, two groups were also matched regarding the education and socio-economic status (P=0.242).There was no significant difference in the percentage of women who exercised regularly between the two groups (22.2% vs 24.3% p=0.045).A significantly higher percentage of PCOS women reported PCOS in their family than healthy women($P < 0.001$).

There was no significant difference between the mean of body mass index of (table-1),but the mean of waist circumference was significantly higher in the PCOS group, compared to the control group(P=0.012).

Table -1

Anthropometric characteristics of the participants

Variable	PCOS	Control	*P* value
Age(year)	26.17±4.3	27.13±3.2	0.58
Weight (kg)	59.21±6.4	56.30±6.9	0.94
Height(cm)	157±4.9	158±4.5	0.350
BMI(Kg/m^2)	24.15±2.5	23.21±2.3	0.543
Waist(cm)	83.63±7.4	81.23±6.9	0.014
Hip(cm)	92.3±8.5	90.3±8.3	0.013
WHR	0.86±0.04	0.85±0.04	0.217

BMI-Body Mass Index,WHR:Waist to hip ratio,PCOS:Polycystic ovary syndrome

The mean intakes of calorie in the PCOS and control group were 1673 ± 532 and 1456 ± 345 kcal,respectively (Table 2).There was a significant difference between the mean calorie intake of the PCOS and Control Groups (P =0.001) so that the PCOS women consumed more calorie than the healthy ones. The mean fat intake(%) was significantly higher in the PCOS group than the control group(P=0.014).SFA and PUFA were also consumed more in the PCOS group (P=0.034) and P=0.018,respectively).

Table-2

Dietary pattern of the PCOS and Control group

Variable	PCOS	Control Group	*P* value
Energy (kcal)	1673 ± 532	1456 ± 345	0.001
Carbohydrate(%)	60.15 ± 7.5	58 ± 6.9	0.219
Protein(%)	20.16 ± 2.4	19.89 ± 2.8	0.453
Fat(%)	23.14 ± 3.5	21.12 ± 2.4	0.014
SFA(g)	7.8 ± 1.8	7.4 ± 1.9	0.034
MUFA(g)	8.3 ± 2.2	7.8 ± 1.9	0.215
PUFA(g)	6.3 ± 1.7	5.2 ± 1.4	0.018

SFA:Saturated fatty acid,MUFA:Monounsaturated fatty acid,PUFA:Ploy unsaturated fatty acid,PCOS:Polycystic ovary syndrome

DISCUSSION

PCOS is the most common endocrine disorder among women of reproductive age, affecting nearly 7% if them[1].PCOS is considered to be not only a reproductive endocrinopathy, but also a metabolic disorder[7] and its morbidity may include hyperinsulinemia, insulin resistance, endometrial hyperplasia and carcinoma, and obstructive sleep apnea[8].

In the present study, the dietary patterns and anthropometric characteristics of a group of women with PCOS and a group of age - matched healthy women were compared. The mean BMI of the two groups was within the normal (24.15kg/m^2),and there was no significant difference between the two means. But different patterns of fat distribution were seen between the two groups, so that the marker of abdominal obesity, mean of waist circumference was significantly higher in the PCOS patients than the healthy controls. Similar results were reached in a study by Kirchengast *et al.,*who showed that lean PCOS patients have a significantly higher amount of fat tissue of the total body and the upper body region compared to the lean controls[2].

The gynoid type of fat distribution develops during female puberty and persists during the fertile phase of adult life[2].Peripheral fat tissue, especially in the lower body region is an important source of extra-ovarian estrogen synthesis, because the aromatization from androgens to estrogens takes place there[2].It is important to note that the major endocrine symptom of PCOS,hyperandrogenicity ,is clearly associated with a preponderance of fat localized in the upper body sites. This sex specific fat distribution,commomly called android fat distribution, is associated with obesity and a variety of metabolic characteristics, but is also mentioned as an indicator of reduced reproductive capability of the woman[2].

Insulin resistance is independent of the effect of obesity; both lean and obese women with PCOS have evidence of decreased insulin sensitivity, but insulin resistance is most marked where there is an interaction between obesity and the syndrome[16].Specially is most marked abdominal obesity in accompanied with the occurrence if insulin resistance and compensatory hyperinosemia. Systemic hyperinsulinism plays a major role in the development of the hyperandrogenism characteristic of the PCOS.

A close correlation exists between adiposity and severity of the symptoms in women with PCOS,[8] and since acne, hirsutism and greasy skin are the most common variable signs of hyperandrogenism[4], the prevalence of these symptoms was assessed in two BMI subgroups of our patients: The normal weight and overweight. Although there were no significant differences in greasy skin and acne between the normal weight and overweight PCOS patients, a significantly higher percentage of overweight women reported hirsutism compared to the normal weight. In a study by Liou *et al.*, the obese women with PCOS did not present with a higher prevalence of hirsutism and in fact they had a lower incidence of acne than non-obese participants[8]. In another cross-sectional study by Tamimi *et al.*, hirsutism, the major clinical feature of PCOS, did not increase significantly from the normal weight subgroup to overweight and to obese subgroups of PCOS patients.

Lifestyle modification focusing predominantly on diet and exercise behaviour is considered the preferred first-line treatment For PCOS management with the primary goal to normalize serum androgens and restore reproductive function.[20]

There are limited data on the diet history of women with PCOS.[1] The reported incidence of obesity and insulin resistance among the women with PCOS [1] led us to hypothesize that patients with PCOS consume foods that contribute to obesity, elevated insulin concentrations, and ultimately, insulin resistance. Our major findings were that women with PCOS had a diet with higher total energy and fat, saturated fat and poly-unsaturated fat compared to the healthy controls. But we did not find any difference between the dietary intakes of normal weight and overweight PCOS patients. Wild *et al.*[21] found that women with PCOS had a diet higher in saturated fat and lower in dietary fibre than age-matched control women. Jeanes *et al.*, investigated the habitual diet and activity patterns of 21 UK women with PCOS. In their study, Mean percentage energy from fat was 38% (12% energy from saturated fat), with 68% of women with PCOS consuming >35% energy from fat.[22] Epidemiological studies suggest an association between a high fat, particularly saturated fat intake and reduced insulin sensitivity.[24]

In most of the dietary studies in women with PCOS, improvements in metabolic and reproductive outcomes have been closely related to improvements in insulin sensitivity, suggesting that dietary modification designed to improve insulin resistance may produce benefits greater than those achieved by energy restriction alone.[16] In an interventional study by Thompson *et al.* on the

effects of energy-restricted high protein diet (5000-6000 kJ/d), weight loss via energy restriction improved reproductive function, cardiometabolic abnormalities, and hormonal parameters in overweight and obese women with PCOS.[20]

As reported, in our participants, fat intake was significantly higher in PCOS patients than healthy controls. This high fat diet might have increased insulin resistance and caused hyperinsulinemia in patients. As we discussed previously, hyperinsulinemia can cause hyperandrogenism.[16]

We conclude that in PCOS patients, android obesity in a common feature and this abdominal adiposity may be related to PCOS complications. We can also report that PCOS symptoms are more severe in overweight PCOS patients than the normal weight. As to the dietary pattern, PCOS patients consume more calories and more fat in their diets and this might have been correlated to their disease. We recommend clinical trials to be designed to assess the effects of different patterns of diet and changes in anthropometric indices on the signs and symptoms of PCOS.

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