Comparison of Anthropometric Profile and Eating Behavior of Polycystic Ovarian Syndrome (PCOS) Patients with Healthy Controls

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Abstract

Introduction: Polycystic ovarian syndrome affects 4% to 23% women, worldwide. Obesity, insulin resistance and uncontrolled eating are usually reported in PCOS. However, there is paucity of data describing associations between eating disorder and PCOS.

Aim: To compare the anthropometric profile and eating behavior polycystic ovarian syndrome cases with those of healthy age-matched women.

Method: Eighty-five PCOS cases and 85 controls were selected for the study from Gyne OPD of PGIMER, Chandigarh. Anthropometric assessments were performed on the cases and controls. Three-Factor Eating Questionnaire (TFEQ-R21) was used for determining the eating behavior. In addition, the frequency of eating processed food from outside was recorded.

Results: The average weight of the cases and controls was 65.16 kg and 57.07 kg, respectively. The average frequency of eating processed food in a month was 15 in cases and 4.41 among controls. The average raw score of uncontrolled eating was 23.26 (cases) in comparison to 18.97 (controls). Average raw scores of emotional eating were 12.67 in cases and 10.76 in controls. The cognitive restraint average raw scores were 11.34 (cases) and 13.62 (controls). The cases had higher BMI than the controls. Monthly consumption of processed food was three times higher than the controls in cases. Uncontrolled eating and emotional eating scores were significantly higher in cases.

Conclusion: More of PCOS cases were overweight/obese with higher BMI, and higher emotional eating and uncontrolled eating scores in comparison to the healthy controls.

Keywords: PCOS, Anthropometry, Eating behavior, BMI, Women’s health, Adolescent health

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Introduction

Polycystic ovarian syndrome (PCOS) prevalence is steeply rising, both in India and worldwide. PCOS is an endocrine disorder that affects various body organs. The features of PCOS include oligomenorrhea/amenorrhea, polycystic ovaries, anovulation, hirsutism, and alopecia. All these signs and symptoms may result in psychological issues among PCOS women. Biochemical changes seen among these women are disordered gonadotrophin (LH and FSH), increased androgen levels, insulin resistance (IR), chronic low-grade inflammation, etc. If the condition is not treated, it can increase the risk of infertility, diabetes, metabolic syndrome, cardiovascular disease, and endometrial carcinoma. Obesity and overweight worsen the symptoms of PCOS women. Majority (50–70%) of women with PCOS are overweight or obese. The etiology behind the disease is still not clear. However, genetic and dietary factors are considered associated with PCOS. PCOS can be managed but not cured. Management of PCOS includes pharmacological and non-pharmacological treatment. The usual medicines prescribed for PCOS focus on blood glucose and hormonal regulation. The most common medicines include birth control pills, metformin, etc. Unfortunately, these are not fully able to deal with all the metabolic parameters. Rather, these may have their own negative effects.

As per PCOS treatment guidelines, the first line of treatment for its management includes lifestyle modification. However, the impetus these days is on pharmacological treatment. Diet modification, increased physical activity, stress management can do wonders. Adopting a healthy lifestyle can improve symptoms and thereby the quality of life of PCOS women.

Diet plays a vital role in PCOS, not just in its aetiology but also in its management. PCOS women generally complain about difficulty in losing weight in OPDs. Still very little information is available regarding the diet, eating habits, pattern, and behavior of women suffering from PCOS. The research in this aspect is greatly lacking. Majority of women with PCOS suffer from insulin resistance. This has many implications. Weight gain is one of them. Hyperinsulinaemia also makes weight loss difficult in overweight and obese PCOS women. It causes the testosterone levels to further rise and increases severity of the symptoms. High androgen levels are further associated with increased carbohydrate cravings, which further increases weight.

Women with the condition had reported significantly higher concerns over body image and weight. PCOS has also been associated with increased eating disorder in comparison to the controls. The reason attributed to these results could be the psychological distress and poor quality of life associated with this condition. However, this aspect has not been studied intensively. Previous studies have also found a positive correlation between emotional eating score and BMI. A study has shown higher EAT scores in PCOS women in comparison to the controls. Limited and contradictory information is available on nutritional intakes of women with PCOS. Eating habits, behavior and meal patterns of PCOS women are still less studied. This means that we need to study all the aspects of eating apart from the dietary intakes to get a clearer picture about the role of diet in PCOS. Through this study, we aimed to compare the anthropometric and eating behavior of PCOS cases and age-matched healthy controls.

Methodology

The study was interview-based cross-sectional data collection and case control study. Calculated sample size was 150 in each group. The sample size was decided at alpha=0.05 and power 80. Here preliminary results of 85 cases and controls are presented.

The cases and the controls for the study were recruited from gynecology OPD, PGIMER, Chandigarh. Female cases aged between 18 and 40 years reporting at Gynecology OPD, who fit the diagnostic criteria for PCOS served as cases. Rotterdam criterion was used for PCOS confirmation of the diagnosis. The exclusion criteria included presence of serious concomitant illness, diabetes mellitus type 1 or type 2, use of insulin-sensitizing or glucose-lowering medications within 6 months.

The control group consisted of healthy volunteer females with regular menstrual cycles. Healthy women were selected who attended the clinic along with their patients, but without menstrual irregularities, evidence of polycystic ovarian morphology, or signs of hyper-androgenism. Age-matched (±2 years) control women were studied.

A 4-item validated clinical tool for diagnosis of polycystic ovary syndrome was used to rule out PCOS in controls. Controls with score <2 were interpreted as not consistent with diagnosis of PCOS. The dietary behavior and anthropometric profile of women with PCOS were compared with that of healthy age-matched women. For each case, one control was recruited.

The tools used were:

- A pre-tested interviewer-administered questionnaire (IAQ) was used for data collection. This emphasized on menstrual regularity, hirsutism and acne, gynecological history, eating habits and meal patterns.
- Anthropometric information was gathered as follows: weight was measured (in kg) using the digital weighing
scale for pre and post readings. Stature was measured (in cm) using a stadiometer. Body mass index (BMI) was calculated using formula: BMI=kg/m². Waist circumference was measured midway between the lowest rib margin and iliac crest. Hip circumference was taken at the point of greatest circumference around hips. Waist-to-hip ratio was calculated as waist circumference divided by hip circumference.

- Three-Factor Eating Questionnaire (TFEQ-R21) was used for determining the eating behavior of the study subjects. The TFEQ is a self-assessment questionnaire with 21 items. It measures cognitive restraint, uncontrolled eating and emotional eating. Cognitive restraint measures dietary restraint, i.e., control over food intake in order to influence body weight and body shape. Higher scores indicate greater cognitive restraint, uncontrolled eating, or emotional eating.¹⁶

Uncontrolled eating means loss of control over food intake generally due to constant feelings of hunger. People with high score or poor control consume more calories and energy-dense foods. Cognitive restraint is consciously restricting food intake for weight management or reduction. People who score high in this domain consume less calories and make better food choices. Emotional eating means eating due to emotional cues.

**Outcome Measures**

1. Anthropometric variables – Height, weight, BMI, waist-to-hip ratio, neck circumference
2. Three-Factor Eating Questionnaire score
3. Eating habits – Food choices, frequency of meals consumed in a day, nutritional supplements consumed
4. Meal pattern – Meals skipped, largest meal consumed, no. of times processed food consumed in a month

Clearance was obtained from the ethics committee of PGIMER for the study. Written informed consent was obtained from participants of the study. SPSS-21 was used for doing all the statistical calculations.

**Results**

Eighty-five cases and 85 controls were selected and data was collected. Anthropometric assessments, eating behavior, habits and meal patterns were analyzed of PCOS cases and controls. The average age of the cases and controls was 21.64±3.71 and 23.30±5.81, respectively. Majority (85.88%) of women with PCOS were unmarried in comparison to 68.24 % of women without PCOS.

**Anthropometric:** The anthropometric characteristics of cases and controls are presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cases</th>
<th>Control</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±S.D.</td>
<td>Mean±S.D.</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>157.71±5.38</td>
<td>158.27±6.315</td>
<td>0.57</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.16±13.18</td>
<td>57.07±9.726</td>
<td>0.001*</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>93.51±11.63</td>
<td>81.07±14.261</td>
<td>0.001*</td>
</tr>
<tr>
<td>Waist-to-hip ratio</td>
<td>0.94±0.25</td>
<td>0.94±0.79</td>
<td>0.95</td>
</tr>
<tr>
<td>Neck circumference (cm)</td>
<td>33.40±2.19</td>
<td>31.36±2.52</td>
<td>0.001*</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.21±5.18</td>
<td>22.78±3.75</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

(¹p-value with significant difference)

Sixty-two women (72.94%) with PCOS were in overweight/obese category while 41 controls (48.24%) were in overweight/obese category. Table 2 depicts categorization of women with PCOS and without PCOS as per the BMI classification.

<table>
<thead>
<tr>
<th>BMI Classification (kg/m²)</th>
<th>No. of Cases</th>
<th>No. of Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underwt [&lt;18.5]</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Normal [18.5–22.9]</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Overwt [23–24.9]</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Obese1 [25–29.9]</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>Obese2 [≥30]</td>
<td>17</td>
<td>2</td>
</tr>
</tbody>
</table>
Food choices, eating habits and meal patterns: Food choice of women with PCOS was vegetarian in 62.8%, 14% eggitarian, and 23.3% non-vegetarians. On the other hand, 42.4% controls were vegetarian, 17.6% were eggitarian and 40% were non-vegetarian.

Some (23.4%) cases never skipped any of the three main meals v/s 4.7% control. For the remaining PCOS women the most frequently skipped meal was breakfast (43.5%) while majority (43.5%) of controls skipped lunch.

Total number of meals consumed in a day, including snacks and excluding liquid drinks, were 4.01±.69 in cases and 4.13±.79 in controls. The difference was insignificant. However, only 7.1% PCOS cases consumed same quantity of food in all the three meals in comparison to 82.5% controls. The heaviest meal consumed by majority of women with PCOS was dinner (41.2%). On other hand, the heaviest meal consumed by controls was breakfast (17.3%). The number of processed foods/meals eaten in a month were 14.53±9.73 in cases and 4.42±4.57 in controls.

Nutritional supplements: Six percent of women with PCOS were currently consuming nutritional supplements in comparison to the 17.6 % without PCOS.

Eating behaviors: There were significant differences in all the three domains of TFEQ-R21 between women with PCOS and controls. The scores for cognitive restraint, uncontrolled eating, and emotional eating are depicted in Table 3.

Table 3. TFEQ-R21 Mean Scores of Cases and Controls for Cognitive Restraint, Uncontrolled Eating, and Emotional Eating

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cases</th>
<th>Control</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±S.D.</td>
<td>Mean±S.D.</td>
<td></td>
</tr>
<tr>
<td>Cognitive restraint</td>
<td>11.34±3.31</td>
<td>13.62±3.60</td>
<td>0.001*</td>
</tr>
<tr>
<td>Uncontrolled eating</td>
<td>23.26±5.35</td>
<td>18.98±4.65</td>
<td>0.001*</td>
</tr>
<tr>
<td>Emotional eating</td>
<td>12.67±7.028</td>
<td>10.76±5.10</td>
<td>0.045*</td>
</tr>
</tbody>
</table>

[*p-value with significant difference]

Discussion

PCOS is not just an endocrine disorder but a metabolic disorder too. Insulin resistance and overweight/obesity, pathophysiological features, are reportedly present in majority of women with PCOS. Both ameliorate the clinical features of PCOS. Even in comparison to the controls, the PCOS women have reported higher BMI, higher insulin concentration and greater concern for weight. Women with PCOS in previous studies have shown inclination towards high GI food items. They have been more susceptible to developing eating disorder. Moreover, insulin has shown to stimulate the appetite and affect their eating behavior and habits. The association between obesity, insulin resistance and PCOS makes weight reduction the most important management strategy for women with PCOS.

In this study also, women with PCOS were younger and heavier compared with controls. The cases had significantly higher weight, waist circumference, waist-to-hip ratio, and BMI in comparison to controls. Our findings give insight into the behaviors, habits and pattern of eating amongst women with polycystic ovarian syndrome and healthy controls. The study shows that the women with PCOS have higher BMI and have higher scores of eating behavior in comparison to the controls. Women with PCOS have less control over eating and eat processed food more frequently. They have heavy dinners and skip breakfast. Such behaviors may be a contributor to poor weight management and worsening of PCOS symptoms.

In contrast to the earlier study done by Larsson et al. on PCOS women, using TFEQ-R21 there was significant difference in the eating behavior of women with PCOS and controls. In our study, Three-Factor Eating Questionnaire (TFEQ-R21) analysis showed that uncontrolled eating and emotional eating scores were significantly higher in PCOS cases. However, the cognitive restraint domain scores were higher in the controls. This shows poor eating behavior of women with PCOS in comparison to healthy controls. A study by Michelmore et al. has reported overeating in PCOS cases.

The eating behavior scores were not significantly correlated with the BMI. Drummond et al. reported 4.4 eating episodes per day in healthy adults which are approximately similar to our findings. The average frequency of eating processed food in a month was 15 in PCOS women and 4.41 among controls. Monthly consumption of processed food was three times higher than the controls in PCOS cases. Barr et al. showed 5.0 as the eating frequency of PCOS women in comparison to our 4.01 eating episodes per day. Our study showed that the healthy individuals had breakfast as their heaviest meals in comparison to cases who had dinner as their heaviest meals.
Conclusion

Our findings give insight that more of cases were overweight/obese with higher BMI. They had higher emotional eating and uncontrolled eating scores in comparison to the healthy controls. In addition, they had lower cognitive restraint over eating. They consumed processed/refined foods more frequently.

Recommendation

The dietary interventions for this condition should not just focus on the calorie restrictions but also on changing eating behavior, habits and pattern of eating to healthier ones. Thus, weight management interventions should not just focus on calorie restriction but also on modifying the eating behavior of women with PCOS.

There is also need for analysis of reason of such behavior. Impact of educational interventions including physical activity and dietary counselling should also be evaluated.

Conflict of Interest: None

References

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13. Larsson I et al., Dietary intake, resting energy expenditure, and eating behavior in women with and without polycystic ovary syndrome, Clinical Nutrition 2015; 1-6.