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Original Research Article

Polycystic ovary syndrome risk: efficacy of self-assessment test

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is a growing morbidity in young women globally. This disease has an association with several exogenous factors like irregularity of menses, hirsutism and obesity. Very few standardized self-assessment tools based on easily observable factors are available for use in the Indian population, which can help them to assess their PCOS risk accurately.
Methods: Undergraduate women of the age group 18-22 years enrolled in a university campus participated in the survey questionnaire. Nineteen questions with binary answers as "yes" or "no" were used for self-assessment test. Each "yes" was scored as one mark, and each "no" scored as zero, leading to the maximum score of 19. Scores of the women with irregular menses (test group) were compared to those of regular menses (control group). Welch's corrected t-test was used to calculate the significance at 5% between the groups. The clinical assessment confirmed the presence or absence of PCOS condition.
Results: One thousand and fifty-four women participated in the study. The study showed that 262 (24.8%) of young women reported irregular menstrual cycle. The average total score of the control group was 3.07±2.35, whereas that of the women with irregular menses was 5.93±2.86. 21 out of 28 participants, who scored high, were diagnosed with PCOS, on clinical assessment by Rotterdam criteria.
Conclusions: The self-assessment test can assess the risk of PCOS. This test has 75% sensitivity and accuracy in predicting the presence of PCOS.

Keywords: Menstrual cycle disorder, Polycystic ovary syndrome, Premenstrual syndrome, Survey, Women's health issues

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a widespread condition that afflicts 2-26% adolescent and young women globally. Several Asian countries have also shown a similar prevalence of this disease/ syndrome.[1-4] This disease is seen to be associated with endogenous factors like cysts in the ovary, ovarian dysfunction, and androgen excess. Irregular menses, hirsutism, obesity, pigmentation on the skin are some of the associated exogenous factors associated with it.[5-8] The etiology of the disease is not clear to date. Several reports have shown that genetics, environmental pollutions, and lifestyle to be the predisposing factors.[9-12] Though the morbidity of disease is seen to rise in recent years, the awareness amongst the parents and students in India remains poor.[13,14]

The seriousness of this disease becomes evident as health complications increase in the later years when they

develop comorbidities. It can be the cause of infertility in 70% of infertile women.[15,16] They have a higher risk of developing metabolic syndrome, diabetes, cardiovascular diseases, ovarian, breast, and endometrial cancer.[17-20] As far as authors know, most of these diseases are non-communicable and lifestyle associated.

It has been postulated that screening and diagnosis could mitigate the problem.[21,22] Weight loss with diet modification or change in physical activity and behavioural management could alleviate the condition.[23-26] Early assessment of the risk of PCOS may help better control of the disease and prevent the development of the co-morbidities. It is thus essential for these individuals to earnestly assess the presence of this disease so that lifestyle management can be incorporated at the earliest. The assessments are possible either with the clinical test by the physician or by a preliminary assessment through available online questionnaires. Unfortunately, the techniques or tools available for early diagnosis are limited. Very few validated questionnaires are available online, which can accurately predict the presence of this condition.[27,28]

Thus, authors surveyed a cohort of women attending undergraduate college to help identify and compare women with regular and irregular menses. Following this, a clinical endocrinological assessment was done to corroborate the validity of the questionnaire. Thus, the present study aimed to find out the accuracy of predicting PCOS risk of an available online survey, based on easily identifiable exogenous factors, in the Indian population.[29]

METHODS

Undergraduate women of the age group 18-22 years, who were enrolled for various courses in the university campus college, participated in the survey questionnaire to ascertain their risk of PCOS. The study details were advertised through event-based announcements and closed social media groups associated with the college. Participants had been instructed to access the google form anonymously through their mobiles or computers.

A returned questionnaire was taken as consent to participate in the survey. At least a tenth of the college students were expected to participate in the study. Authors have adhered to strobes guidelines for case-control studies in this research.

Questionnaire

Nineteen questions based on a survey given by Elizabeth Lee Viet PDF were used for self-assessment test for PCOS, to which they had to provide binary answers as “yes” or “no”.[29] These questions were regarding the predisposing factors of PCOS (Figure 1). The answers were given a score of one to each “yes” response and zero to each “no” response. Scores were summed to give a total score in the range of 0-15 for each candidate. Incompletely filled forms with 10% missing data were not included in the study. The control group was the cohort of women that had regular cycles, and the test group were the ones where women reported irregular (unpredictable) cycles. The personal details of the subjects were concealed for each participant and assigned a code. The validity, scoring, data entry, and statistical analysis was done by outcome assessors who were unaware of the identity of the participants.

Clinical assessments

Women from the test group who were willing to participate in the clinical assessment were tested for the presence of cysts in the ovary by ultrasonography and estimation of biochemical levels of Luteinising hormone (LH), follicle stimulating hormone (LH), prolactin, testosterone, fasting blood glucose, and Insulin in a polyclinic. Rotterdam criteria were used to report the presence/absence of PCOS.[5] Endocrinological assessments were done by investigators who were unaware of the questionnaire scores.

Statistical analysis

The outcome measures were the responses (categorical variable) and total scores (continuous variable). The total score value was found to be normally distributed when checked by Shapiro-Wilks normality test. Lavenes-test found a variance to be different. Hence, Welch’s corrected t-test was used to calculate the significance at 5% between the groups. Missing data was excluded out of the analysis. Statistical product and service solutions (SPSS, version 20; IBM, India) was used for all statistical analysis.

RESULTS

One thousand and fifty-four nulliparous women of the mean age group of 19.8±1.87 years studying in the undergraduate college, who were enrolled for various courses, filled the questionnaire (Figure 1). The participation number represented one fourth of the student strength in the institution. Women who were under medication for PCOS were excluded from the study.

Table 1 gives the comparison of the count and percentage of women responding "yes" to the questions between the control and the test group and also difference in their responses.

Participants differed in responses between the control and test group as follows: do you have sugar cravings? [mean difference 0.117, 95% CI (0.063 to 0.171), df=1031, t-statistics=4.261, p-value=0.000]; do you have continuous weight gain? [0.168, 95% CI (0.102 to 0.235), df=1048, t-statistics=4.964, p value=0.000]; do you have difficulty in losing weight? [0.176, 95% CI (0.118 to 0.233), df=1043, t-statistics=5.966, p-value=0.000]; is your

waistline greater than 35 cm? [0.113, 95% CI (0.020 to 0.206), df=1047, t-statistics=2.379, p value=0.013]; do your periods last longer than a week? [0.196, 95% CI (0.104 to 0.289), df=1049, t-statistics=4.165, p value=0.000]; are your periods heavy and prolonged? [0.241, 95% CI (0.165 to 0.316), df=1048, t-statistics=6.275, p value=0.000]; do you have excess facial hairs? [0.213, 95% CI (0.137 to 0.290), df=1048, t statistics=5.467, p value=0.000]; do you have symptoms of hypoglycaemia? [0.159, 95% CI (0.066 to 0.253), df=1011, t-statistics=3.355, p value=0.000); do you have a family history of diabetes? [0.035, 95% CI [-0.021 to 0.090), df=1051, t-statistics=1.215, p value=0.224]; Do you have a family history of cardiovascular disease? [0.073, 95% CI (0.001 to 0.146), df=1042, t-statistics=2.000, p value=0.048]; do you feel extremely angry, irritable after eating sweets? [0.202, 95% CI (0.119 to 0.284), df=1045, t-statistics=4.811, p value=0.000); do you have pigmentation on the skin? [0.153, 95% CI (0.083 to 0.223), df=1045, t-statistics=4.291, p value=0.000]; Do you have a history of high blood pressure? [0.096, 95% CI (0.028 to 0.163), df=1047, t-statistics=2.793, p value=0.005]; do you have an unusual amount of hair on the breasts? [0.240, 95% CI (0.136 to 0.343), df=1045, t-statistics=4.524, p value=0.000]; do you have premenstrual symptoms (PMS)? [0.094, 95% CI (0.037 to, 0.151), df=999, t-3.231, p value=0.001]; do you have hair on the thighs? [0.102 to 95% CI (0.049 0.155), df=1035, t-3.790, p value=0.001]; do you have thick pubic hair? [0.150, 95% CI (0.092 to 0.208), df=1033, t-statistics=5.067, p value=0.001]; is your acne worst at different times of the menstrual cycle? [0.099, 95% CI (0.032 to 0.166), df=1044, t-statistics=2.900, p value=0.004].

Self Assessment Test for PCOS Risk

S.No	Questions
1	Do you crave for sugars?
2	Do you have difficulty in losing weight?
3	Do you have continuous weight gain?
4	Is your waistline more than 35cm?
5	Are your periods unpredictable?
6	Do your periods last longer than a week?
7	Are your periods heavy and prolonged?
8	Do you have excess facial hairs?
9	Do you have symptoms of hypoglycemia?
10	Do you have family history of diabetes?
11	Do you family history of cardiovascular disease?
12	Do you feel outraged, irritable after eating sweets?
13	Do you have pigmentation on the skin?
14	Do you have account of high blood pressure?
15	Are there an unusual amount of hair on the breasts?
16	Do you have PMS symptoms?
17	Do you have hair on your thighs?
18	Do you have thick pubic hair?
19	Are your acne worst at different times of the menstrual cycle?

Figure 1: The questionnaire used to assess PCOS risk.

Table 1: Comparison of responses of the self- assessment test survey between the control and test group.

Questions	Control group (n=794) %	Test group (n=262) %	p value
Are your period's unpredictable?	75.2%	24.8%	0.000*
Do you crave for sugar?	34%	48.8%	0.000*
Do you have continuous weight gain?	15.2%	28.8%	0.000*
Do you have difficulty losing weight?	22.9%	41.7%	0.000*
Is your waistline greater than 35 cm?	7.5%	12.3%	0.013
Do your periods last longer than a week?	6.6%	14.9%	0.000*
Are your period's heavy and prolonged?	9.8%	24.8%	0.000*
Do you have excess facial hairs?	9.9%	22.9%	0.000*
Do you have symptoms of hypoglycemia?	7.0%	13.9%	0.000*
Do you have a family history of diabetes?	31.6%	35.5%	0.224
Do you have a family history of cardiovascular disease?	14.4%	19.6%	0.048
Do you feel extremely angry, irritable after eating sweets?	8.5%	19.2%	0.000*
Do you have pigmentation on the skin?	13.8%	25.2%	0.000*
Do you have a history of high blood pressure?	16.6%	24.3%	0.005*
Do you have an unusual amount of hair on the breasts?	4.7%	12.7%	0.000*
Do you have premenstrual symptoms (PMS)?	28.9%	39.9%	0.001*
Do you have hair on the thighs?	39.7%	53.1%	0.001*
Do you have thick pubic hair?	23.9%	40.1%	0.001*
Is your acne worst at different times of the menstrual cycle?	16.6%	24.7%	0.004*

Data has been presented as a count and percentage of "yes" responses in each group. The comparison was done using Welch's corrected t-test. Asterisk (*) shows significance at 5%.

The average total score between the control group was 3.07±2.35, whereas in the test group was 5.93±2.86. Additionally, authors postulated that women scoring five and above were presumed to be under the risk of PCOS, and so they were clinically assessed. Only 21 (75%) women out of the cohort of 28 women who had scored more than five confirmed PCOS, by the Rotterdam criterion, on clinical assessment.

This criterion includes the presence of any two of the conditions like oligo/anovulation, polycystic ovary, and high testosterone levels in affected individuals diagnosed with POCS. The mean score of the women who confirmed for PCOS was 7.9±2.13.

DISCUSSION

The self-assessment test survey has shown that 25% of the undergraduate women were suffering from irregular menses. The women with PCOS risk were significantly associated with obesity, irregular menses, heavy, prolonged and painful menses, pigmentation on the skin, the problem of acne, hirsutism, and blood pressure. The clinical assessment showed that only 75% of the high scorers were diagnosed with PCOS. Thus, it appears that the sensitivity and accuracy of this test is 75%. The rest of the 25% could be suffering from conditions other than PCOS, pending further investigations.

The survey has reinforced the findings of Pederson et al, 27 who validated the questionnaire for PCOS assessment based on presence of variable/long menstrual cycle, coarse hair at three or more sites, history of obesity and milky discharge from the nipples unrelated to pregnancy. Similarly, Kumarapeli et al, assessed PCOS cases based on questions about oligo/amenorrhea and /or clinical features of hyperandrogenism.[28] All these studies were done in women above the mean age of 25.

This research is based on women with a mean age of 20 and who are nulliparous. Thus, it was essential to validate a questionnaire which can be used with confidence in the Indian population at that age.

They could easily comment on the hirsutism and pigmentation of skin as these are easily observable features. The entire survey has shown a disease prevalence of 16.9%, which is similar to the previously reported global and Asian studies.[1-4]

The clinical assessment had shown 25% of women with irregular menses were not diagnosed with PCOS. Not all women with irregular menses need to have PCOS. Lifestyle factors weight gain, sedentary habits, alcohol consumption, smoking, psychosocial stresses, eating disorder and excessive physical activity might be the predisposing factor.[11,12,25]

Some other hormonal diseases like thyroidism, hyperprolactinemia, diabetes or medications can also be the triggers for this condition.[30] Regardless of the etiology, irregular menses is a condition that necessitates prompt consultation by the physician and lifestyle interventions.

Self-assessment questionnaire can be an invaluable tool for young women to identify the PCOS risk at their doorsteps. The validation of this questionnaire has provided the strength and limitations of this questionnaire to assess the risk of PCOS. It shows that though the assessment can be only an approximation. If they achieve a score higher than five, they should take the physician advice at the earliest and undertake lifestyle interventions to achieve better health.

The strength of this study is that a considerable section of women has participated in the survey. This survey has helped to obtain scores which can be confidently used in future cross-sectional studies.

Limitation of the study is that clinical assessment validated the self-assessment test of only 28 young women amongst the group of 262 high scorers.

Validation of the self-assessment test for all the affected individuals could give greater accuracy. Future studies may be required to establish the rate of false-negatives in the cohort to develop a ROC type analysis of the questionnaire.

CONCLUSION

Notwithstanding the limitations, the questionnaire can access the risk of PCOS easily. This test has 75% sensitivity and accuracy in predicting the presence of PCOS. This study results indicate that the survey is worthy of future investigation and may be used as a tool to educate young women about PCOS.

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