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Original Research Article

Life style modification regimen on polycystic ovary syndrome among adolescent girls

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is to be a growing problem among adolescent girls. Sedentary lifestyles, lack of exercises and fast-food consumption leading to the risk of developing of polycystic ovarian disease. This Quasi experimental one group pre and post-test times series design aimed to assess the effect of lifestyle modification regimen (LSMR) on PCOS among Adolescent Girls.
Methods: Total 953 Adolescent girls were screened by modified PCOS risk assessment checklist. Study was conducted among 171 Adolescent girls with moderate risk of PCOS and BMI 23 and above. Data was collected on lifestyle habits, body weight, BMI, Acne and Menstrual patterns. Followed that LSMR implemented for four months and monitored by weekly food diary and exercise diary. Post-test-1, post-test-2 and post-test-3 data was collected and analysed using SPSS 27.
Results: Study completed with 153 participants. Significant reduction in the PCOS risk score was observed with mean difference 3.46 and the calculated 't' value was 40.927 at $p < 0.01$. Lifestyle habits show mean difference of dietary habit and Physical activity score was 22.04 &13.90 respectively and calculated 't' value was 37.587 and 36.908 at $p < 0.01$ respectively. Anthropometric measurements shows that mean difference of body weight and BMI score was 4.38 and 1.93 respectively and calculated 't' value was 27.897 and 16.597, at $p < 0.01$ respectively. There was improvement in acne and menstrual pattern after LSMR.
Conclusions: LSMR plays vital role in the control and management of PCOS.

Keywords: PCOS, Risk of PCOS, Body weight, BMI, Lifestyle habits, Adolescent girls

INTRODUCTION

Adolescent stage is the hale and healthy life period, and the health condition of the adolescent period determines the state of health and wellbeing during the later period of life journey. The serious health problems encountered by an adult have its origin in adolescence phase. About 1.3 billion World population comprised of Adolescents and thus it makes up for 16% total population in the worldwide.[1] In India adolescents population comprised of 253 million contribution to the largest adolescent population in the world and every 5thperson is in the age group of 10 to 19 years.[2]

Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine disorder that worldwide affects about one in Fifteen women. Increased production of androgen and impaired insulin function are most common manifestation among the women. PCOS disrupts endocrine, reproductive and metabolic systems which leading to menstrual dysfunction, infertility, hirsutism, acne, obesity, and metabolic syndrome. Women with PCOS

have shown increased risk of developing type 2 diabetes mellitus and cardiovascular disease.[3]

Statistics shows that 1 in every 10 women have PCOS, more than 50% of them do not have PCOS symptoms. PCOS is the common health problem confronted by present generation Female as a result of improper lifestyle, dietary habits, exposure to environmental toxins jointly with hereditary predisposition to metabolic diseases and stress.[4]

Adolescent girls are tagged as at risk when they are not meeting the diagnostic criteria though they have characteristics of PCOS and re-examination is advised to those with persistent PCOS symptoms and significant weight gain at 3 years after menarche joint with irregular menstruation and after 8 years of menarche suggested to the USG pelvis is the advised method to diagnose polycystic ovary during adolescent period. PCOS is diagnosed only when both menstrual irregularity and hyperandrogenism are seen among adolescence. Adolescent' girls are made to be aware about their PCOS risk status and re-examination is advised when menstrual irregularity or hyperandrogenism persist longer than 3 years after menarche.[5]

Prevalence study was conducted on PCOS among 460 girls aged between 15 to 18 years in Andhra Pradesh, India reported that one (0.22%) had oligo/amenorrhea with clinical hyperandrogenism, 29 (6.30%) had oligomenorrhea with polycystic ovaries, one (0.22%) had polycystic ovaries with clinical hyperandrogenism and 11 (2.39%) had oligomenorrhea with polycystic ovaries in the presence of clinical hyperandrogenism. PCOS Rotterdam's criteria was met by 9.13% of the adolescent girls.[6]

Diet and exercise are the first-line management for clinical signs and symptoms of PCOS emphasized by the international clinical practice guidelines. Many other studies also reported Lifestyle change as the first-line of treatment for the PCOS management and it is not an alternative measure to medical management for PCOS.[7]

PCOS is to be a growing problem among adolescent girls. Sedentary lifestyles, lack of exercises and fast-food consumption leading to the risk of PCOS. Most of the adolescent girls ignore the symptoms till the time the problem really worsens. From literature review it is understood that, most of the risk factors for development of PCOS like body weight, diet pattern and physical activity behaviour are modifiable by the way of adopting healthy lifestyle. Hence the study was conducted among adolescent girls.

Objectives of the study

To assess the level of PCOS risk, cardinal clinical features and lifestyle habits of the adolescent girls before and after implementation of life style modification regimen. To correlate the post-test level of PCOS risk with lifestyle habits and BMI of the adolescent girls.

METHODS

This Quasi experimental one group pre and Post-test times series design was conducted among 171 Adolescent Girls in selected colleges, Puducherry between November 2021 to June 2022.The study was approved by the Institutional Review Board (IRB), Pondicherry Institute of Medical Sciences (IRB-PIMS/19/23) and Institutional Ethical Committee Vinayaka Mission Annapoorana College of Nursing (VMACON/IEC/01/2020). Formal permission was obtained from the Directorate of Higher and Technical Education Government of Puducherry and The Principals of selected Arts and Science Colleges to conduct the study.

Inclusion criteria

Adolescent girls, who are at moderate risk for PCOS with BMI 23 and above, attended menarche & unmarried.

Exclusion criteria

Adolescent girls at low risk, moderate risk for PCOS with BMI <23 and high risk for PCOS. Diagnosed with PCOS and are on treatment. History of other co morbidity conditions like thyroid problems, Diabetes mellitus, hypertension and cardiac problems. History of unusual fatigue or shortness of breath with normal activities. History of spinal problems and pain and surgeries in upper and lower extremities. Already engaged in regular sports activities were excluded.

Sample size

The sample size was 143 with the rate of precision 0.5 and confidence interval 95% considering 15% attrition rate to follow up, the sample size was increased to 171. Schematic illustration of sampling procedure is given in Figure 1.

Instruments and tools

Section I Modified PCOS risk assessment check-list

Modified from metropolis India PCOS risk assessment test.8 It consists of 09 items with 'yes' or 'no' options. It was interpreted as the score of "0" no risk, 1-3 low risk, 4–6 moderate risk and 7-9 high risk.

Section II: Self-administered questionnaire on demographic variable

Consisting of 12 sub variables (as per 2016 modified Kuppuswamy urban socio-economic scale9 includes educational status of the father and mother, monthly family Income in Rupees).

Section III: Five-point rating scale on dietary habits

Modified from Dana-Farber eating habits questionnaire.[10] It consists of 17 items.

Section IV

Five-point rating scale on physical activity which was modified from Madras diabetes research foundation-physical activity questionnaire (MDRF PAQ).[11] It consists of 13 items.

Section V: Anthropometric variables

includes height and weight which were monitored by Omron weighting scale and wall mounted stadiometer respectively after calibration. BMI was calculated using adolescent girls' height and weight and the formula is BMI=kg/m^2 following WHO classification.[12]

Section VI: Structured interview questionnaire on menstrual patterns.[13]

It consists of three items. Item No. 01 and 02: Frequency and duration menstrual cycle item no. 03: Perceived menstrual blood loss adopted from four-point rating scale on perceived daily menstrual blood loss by IS Fraser et al.[14]

Global acne grading scale[15]

Researcher assessed the level of acne by careful clinical examination of the adolescent girls after ensuring the privacy. Observation was marked by the researcher in the GAGS as follows no lesions=0, comedones=1, papules=2, pustules=3, nodules=4. The score for each area was calculated as local score=Factor x Grade (0-4).

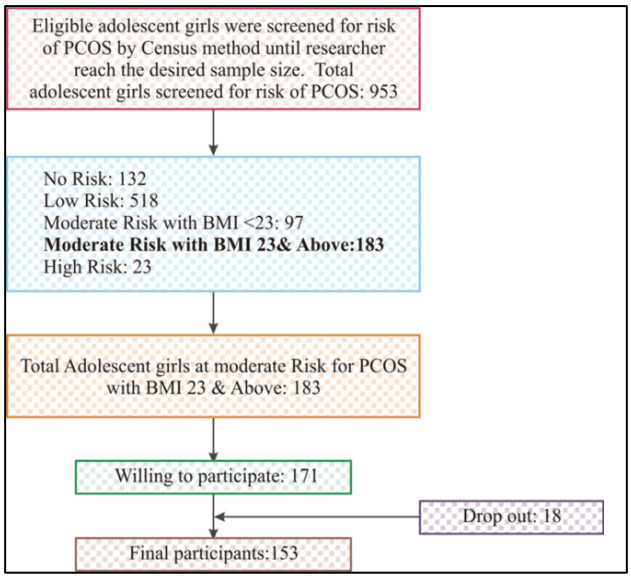

Figure 1: Schematic illustration of sampling procedure and follow up.

Data collection procedure

Pre-test

Adolescent girls were screened for the risk of PCOS and study participants were recruited after obtaining informed consent and assent. Pamphlet on PCOS and importance of LSM were given along with Parent's information sheet. Pretest data was collected on demographic variable, life style habits (diet and physical activity), body weight, BMI, Acne and menstrual pattern using pretested tools and instruments.

Intervention

Group counselling was given to all the 171 adolescent girls as 10 to 12 in one group spending one hour for each group. Training on two set of aerobic exercise was given to the adolescent girls with the help of self-demonstrated video by the researcher for one hour for five days at two months interval. Followed that first set of Aerobic exercises for one to two months and second set of Aerobics exercise for three to four months was practiced by adolescent girls for weekly three days for 40 minutes including five minutes of warm up and five minutes of cool down as two groups at the end of the class hours between 4.30 to 6.30 pm in each selected college under the supervision of researcher. Structured PCOS dietary guidelines were designed under the guidance of expert from nutrition and dietetics based on PCOS dietary guidelines.[16] Adolescent girls were given printed copy of the dietary guidelines for their reference and follow up. It consists of foods recommended (taken regularly), restricted (taken with limit) and avoided (not recommended to take).

Post-test

Body weight, BMI, Acne & Menstrual pattern were assessed at the interval of two months (Post-test 1), four months (Post-test 2) and five months (Post-test 3). PCOS risk and Lifestyle habits were assessed once at five months after intervention.

Statistical analysis

The analysis of data for the study was processed on the basis of the objectives and hypothesis formulated for the purpose of the study. Total 153 participants data was entered in excel sheet and analyzed using statistical package for social sciences (SPSS) software version 27. Descriptive statistics and Inferential statistics including Karl Pearson correlation co efficient, Chi-square test, Paired t test were used in data analysis. One-way analysis of covariance was used to compare Acne between groups followed by Tukey post hoc test. P value <0.05 & <0.01 was considered statistically significant & highly significant.

RESULTS

Table 1 describes demographics characteristics of the participants. Lifestyle habits show that mean dietary habit score during post-test was 56.63±4.62 with mean difference 22.04 and the calculated 't' value was 37.587 at p<0.01 level.

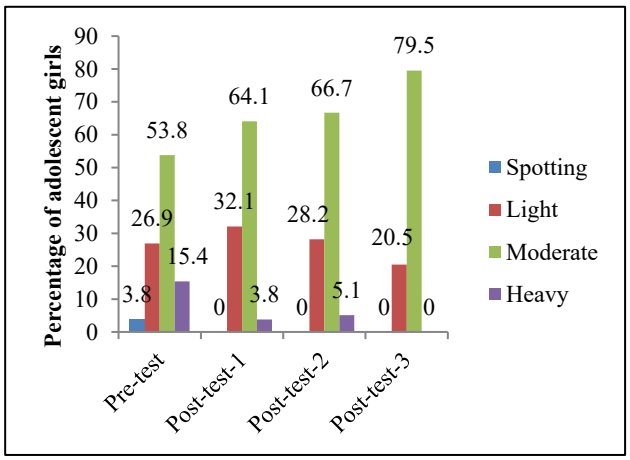

Figure 2: Perceived menstrual blood loss.

Post-test mean physical activity score was 30.16±3.95 with mean difference 13.90 and calculated 't' value was found to be 36.908 at p<0.01 level. During post-test mean PCOS risk was 1.26±0.72 with mean difference 3.46 and the calculated 't' value was found to be 40.927 at p <0.01 level. Table 2 describes the effect of LSMR on clinical variables including body weight, BMI, acne and menstrual pattern. Figure 2 & 3 shows the perceived blood loss and level of Acne respectively. The one-way analysis of covariance showed the effect of LSMR on Acne was significant F (3,308) =19.613, p=0.000.

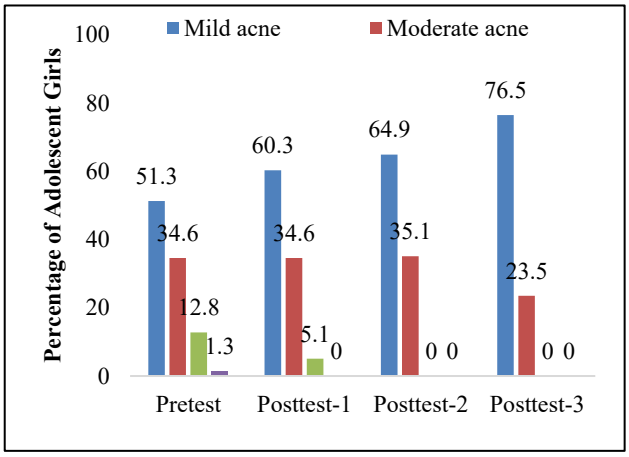

Figure 3: Level of acne.

A Tukey post hoc test revealed statistically significant lower after Post-test-2 (14.38±7.280, p=0.000) and post-test-3 (11.42±6.912, p=0.000) compared to the pretest (20.15±8.041, p=0.000). Negative correlation found between Post-test level of PCOS risk and dietary habits (r=-0.020) at p < 0.05 and physical activity (r=-0.050) at p <0.01 and positive correlation found between Post-test level of PCOS risk and BMI (r=0.326) at p<0.01.

Table 1: Description of demographic variables of the adolescent girls (n=153).

S. no.	Demographic variable	Frequency	Percentage
1.	Age (in year)		
	17	14	9.2
	18	45	29.4
	19	94	61.4
2.	Age at menarche in years		
	≤10	10	6.6
	11-12	44	28.7
	13-14	82	53.5
	≥15	17	11.2
3.	Dietary pattern		
	Vegetarian	25	16.3
	Non-Vegetarian	128	83.7
4.	Religion		
	Hindu	131	85.4
	Muslim	9	6.0
	Christian	10	6.6
	Others	3	2.0
5.	Monthly family income in Rs		
	≥40,430	10	6.5
	20,210–40,429	21	13.7
	15,160–20,209	30	19.6
	10,110–15,159	30	19.6
	6060–10,109	29	19.0

Continued.

S. no.	Demographic variable	Frequency	Percentage
	2021–6059	26	17.0
	≤2020	7	4.6
6.	Residence		
	Urban	97	63.2
	Rural	56	36.8
7.	Family history of PCOS		
	Yes	22	14.4
	No	131	85.6
8.	Family history of DM		
	Yes	66	43.0
	No	87	57.0

Table 2: Description of the effect of LSMR on clinical variable.

Clinical variables		Mean	SD	MD	t value	P value
Body weight (n=153)	Pre-test	62.62	7.14	-	-	
	Post-test-1	61.05	6.85	1.57	14.466	0.000
	Post-test-2	59.32	6.51	3.30	26.092	0.000
	Post-test-3	58.24	6.26	4.38	27.897	0.000
BMI (n=153)	Pre-test	25.63	2.81	-	-	
	Post-test-1	24.84	2.541	0.79	7.331	0.000
	Post-test-2	24.14	2.34	1.49	13.678	0.000
	Post-test-3	23.70	2.21	1.93	16.597	0.000
Acne (n=78)	Pre-test	20.15	8.04	-	-	
	Post-test-1	17.22	7.61	2.93	8.282	0.000
	Post-test-2	14.38	7.28	5.77	13.669	0.000
	Post-test-3	11.42	6.91	8.73	16.590	0.000
Menstrual pattern (n=78)						
Frequency of menstrual cycle	Pre-test	2.94	1.073	-	-	
	Post-test-1	2.92	1.029	0.02	0.445	0.658
	Post-test-2	2.73	0.963	0.21	7.132	0.000
	Post-test-3	2.12	0.36	0.82	3.076	0.003
Duration of menstrual blood flow	Pre-test	1.62	0.54			
	Post-test-1	1.65	0.53	-0.03	1	0.320
	Post-test-2	1.65	0.577	-0.03	2.478	0.015
	Post-test-3	1.76	0.514	-0.14	0.725	0.470

N- No. of participants, SD- Standard Deviation, MD-Mean Difference

DISCUSSION

PCOS is the most common cause for infertility and number of women are in queue at fertility clinics. Early identification of PCOS risk will give insight to the adolescent girls to follow health lifestyle practices to prevent PCOS and related complications like fertility and Diabetes mellitus. Awareness on PCOS and self-efficacy to follow healthy lifestyle means a lot in primordial prevention among adolescent girls.

Even though PCOS is a common problem among women, its complex trait and unclear etiology has due concern in its diagnosis and management. Most of the cases are diagnosed only after marriage, when the need for child arises. Identification of PCOS risk during adolescents is the ideal time to seek health advice and follow healthy lifestyle thereby reduce unwanted health care expenditure. Counselling on PCOS and its control and prevention helps them to develop insight on their health risk status. In the presents study LSMR was implemented for four months among adolescent with risk of PCOS. Significant improvement was observed in the lifestyle habits of adolescent girls after implementation of LSMR with Dietary habit (MD 22.04, $p<0.01$) and physical activity (MD 13.90, $p<0.01$). It was supported by Karine Paiement et al reported that significance improvement in the post-test lifestyle habits after fit spirit participation among 73 adolescent Girls in Quebec and Ontario.[17] LSMR brought down the risk of PCOS (MD 3.46 at $p<0.01$). Results were endorsed by Selvaraj et al, found that in experimental group MD of PCOS risk was 10.63 at $p<0.001$.[18]

Significant improvement was observed in body weight (MD 4.38, $p<0.001$), BMI (MD 1.93, $p<0.001$), Acne

(MD 8.73, F (3,308) =19.613, p<0.001), and Frequency of menstrual cycle (MD 0.82, p=0.003) and Duration of menstrual blood flow (MD -0.14, p=0.470) after LSMR. Nair et al conducted study among 144 overweight and obese adolescent girls observed significant difference in pre and post-test weight (MD 6.410 p<0.001) and BMI (MD 6.021 p<0.001) also reported that during pre-test 93% of girls had abnormal cycles whereas in post-test 58.4% had normal menstrual cycles, 93.8% had duration of blood flow was between 3-7 days.[19] Somaya et al found significant difference in the Acne grade (t 8.35p<0.001) among obese girls after lifestyle measures.[20] Negative correlation was observed as the dietary habits (r =-0.020 p <0.01) and physical activity (r =-0.050 p <0.01) improves, the risk of PCOS reduces and Positive correlation found as the reduction in the BMI leads to reduction of the PCOS risk (r=0.326 p<0.01). In line with this result Behera et al also reported negative correlation between PA and BMI (r=-0.13) at p<0.05 among 390 adolescents in Dhenkanal district, Odisha. It concludes that increase in the Physical activity decreases the BMI.[21] obesity is the important risk factor for PCOS. Hence the study results indirectly support the present findings. Rosenberg studied the relationship between PCOS and obesity reported that elevated BMI during childhood increases the risk of PCOS in early adulthood. Overweight and obese females were at a higher risk of developing PCOS comparatively normal body weight woman.[22]

Limitations

LSMR limited only for four months with aerobic exercise practised only three days in a week for 30 minutes. For better results it is recommended five days in a week. Small number of sample (153) limits the generalization of the study. Long-term follow-up could not be carried out due to limited study permission from the Colleges. Sustaining adolescent girls throughout the study was challenging and it was managed by constant motivation and support.

CONCLUSION

Lifestyle plays important role in prevention and control of PCOS. Most of the risk factors for development of PCOS like body weight, diet pattern and physical activity behavior are modifiable by the way of adopting healthy lifestyle. The findings of the study revealed that reduction in the risk of PCOS, improvement in the cardinal clinical feature of PCOS and lifestyle habits among adolescent girls. Present study concludes that lifestyle modification regimen had positive effect on risk of PCOS, Lifestyle habits and cardinal clinical feature of PCOS among adolescent girls.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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