

Effect of Lifestyle Modifications on Reliving Menstrual Dysfunction among Women Suffered from Polycystic Ovarian Syndrome

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Abstract: Polycystic ovary syndrome (PCOS) is a complex heterogeneous endocrine disorder associated with reproductive morbidity, including menstrual dysfunction and infertility. A quasi experimental intervention study aimed at assessing the effect of lifestyle modification counseling on menstrual dysfunction. The study was conducted in outpatient gynecological/infertility clinic at Ain Shams Maternity University hospital. Purposive sample of 86 cases were enrolled, inclusive criteria; Women medically diagnosed with polycystic ovarian syndrome, reproductive age (18-40yrs), Married Women, overweight & obese women and women with menstrual dysfunction. Tools used for data collection consisted of Arabic Structured Interviewing questionnaire, Two Arabic Weekly logs to record regularity of diet & exercise, Woman's follow up card to record measures changes pre/post intervention. Results revealed that there is a significant improvement in menstrual function and highly significant in weight loss, waist and hip ratio and hip waist circumference. In conclusion present study drew attention to critical point that lifestyle modification with weight loss leads to improve hormonal profile, which restores ovulation resulting in improving menstrual function & relieving PCOs symptoms. The study recommended detect center for PCOs cases inside infertility/gynecological clinics to ensure lifestyle modification, Future research should focus on the optimal dietary strategies and exercise regimens for PCOs treatment and the relative efficacy and appropriate use of lifestyle management versus anti-obesity pharmacologic agents and surgery, study brochure dissemination in gynecological and infertility clinics to increase women awareness about menstrual dysfunction and lifestyle modification.

Keywords: Polycystic ovary syndrome (PCOs), lifestyle modifications, Menstrual Dysfunction.

1. INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the most common yet complex female endocrine disorders that offer no cure. It begins during puberty and affects population of 4-18% of reproductive women at (12-45 years old) (*Silva et al., 2018*). Some of Patients with PCOS have abnormal menstruation patterns attributed to chronic anovulation. (The patient usually has a history of menstrual disturbance dating back to menarche). Some women have oligomenorrhea (ie, menstrual bleeding that occurs at intervals of 35 days to 6 months, with < 9 menstrual periods per year) or secondary amenorrhea (an absence of menstruation for 6 months). Dysfunctional uterine bleeding and infertility are the other consequences of anovulatory menstrual cycles. The menstrual irregularities in PCOS usually present around the time of menarche (*de Zegher, 2018*).

Irregular menstruation can be a symptom of PCOS. Although some women with PCOS have regular menstruations, high levels of androgens (also known as 'male-type hormones') and too much insulin in their bodies can disrupt the monthly cycle of ovulation and menstruation of many women with PCOS. The average menstrual cycle is 28 days – with one ovulation when an egg is released – but anywhere between 21 and 35 days is considered normal (*Day et al., 2018*).

Being overweight makes the symptoms of PCOS more pronounced because excess fat causes the body to produce more insulin) and not physically active. Obesity and quality of diet are two environmental factors that may interact with an underlying genetic susceptibility to cause PCOS. Obesity and stress tend to increase the negative effect of PCOS on cycle regularity (*Kokosar et al., 2016*). Conversely, PCOS and its clinical features are more common in women who are overweight and obese compared to those of normal weight. Even though, there is differential expression of PCOS by considerable ethnic variation, including the prevalence and severity of obesity, metabolic disturbances, and their correlates. There are differences in psychosocial aspects affecting quality of life and health-seeking behaviors (*Marti et al., 2017*) & (*Lee et al., 2020*).

Menstrual irregularities due to anovulation or severe oligoovulation are a key feature of polycystic ovary syndrome for many women. First-line intervention should entail dietary and lifestyle modifications for overweight or obese polycystic ovary syndrome women. For women not seeking fertility, combination low-dose hormonal contraception is the most effective and first-line choice for regulating menstrual cycles. This option, as well as progestin-only options, has the important added benefit of reducing risks of endometrial hyperplasia and cancer. Metformin is an appropriate medical option to improve ovulation rates for women who cannot take combined hormone contraception or whom are attempting conception (*Dumesic et al., 2019*).

Lifestyle counseling and weight loss alone appears to improve menstrual frequency, Weight loss. The use of physical exercise and/or hypocaloric dieting seems to be efficacious in overweight or obese women with PCOS suffered from menstrual dysfunction. In these women, we also found a significant direct correlation between the weight reduction and the improvement in metabolic parameters that could be attributed to decreased insulin resistance or to other factors (*Miller et al., 2019*).

Nurses can have a positive impact on women with PCOS through counseling and education. This can also provide support for women dealing with negative self-image secondary to the physical manifestation of PCOS. This kind of education helps women understand the syndrome and its associated risk factors to prevent long-term health problems. It encourages women to make positive life-style changes makes community referrals to local support groups to help women build their coping skills (*Kurth, 2013*).

Significance of the Study

Women with menstrual dysfunction face serious problems and complication if they are not resolved well through early intervention for life style modification and the use of various medications and counseling program on psychological adaptation on changes associated with menstrual dysfunction (*Hickey et al., 2020*).

The management of menstrual dysfunction is directed towards improving the women's quality of life by means of symptomatic alleviation. Obesity worsens the presentation of PCOS and weight management (weight loss, maintenance or prevention of excess weight gain) is proposed as an initial treatment strategy, best achieved through lifestyle changes incorporating diet, exercise and behavioral interventions (*Bordewijk et al., 2020*). So, this study will have done to evaluate the effect of lifestyle modification (diet& exercise) on menstrual dysfunction.

Aim of the study

To evaluate the effect of lifestyle modification on relieving menstrual dysfunction through the following: -

1. Assessing criteria of menstrual dysfunction among studied women.
2. Implementing counseling concerning lifestyle modification for relieving menstrual dysfunction.
3. Evaluating the effect of diet and exercise program on relieving menstrual dysfunction.

Hypothesis

Counseling concerning lifestyle modification relieved menstrual dysfunction among women suffered from polycystic ovarian syndrome.

2. RESEARCH DESIGN

Quasi experimental Intervention study

Setting

The study was conducted at gynecological and infertility outpatient clinics in Ain Shams University Maternity Hospital.

Sampling

Sample type: A purposive sample was used with the following

Inclusion criteria: -

- Women medically diagnosed with polycystic ovarian syndrome (according to specific medical criteria).
- Women suffered from menstrual dysfunction.
- Married Women.
- Body mass index over 25kg (overweight & obese women).
- At reproductive age (18-40yrs).

Sample size

The specified sample size 86 was women that represent 10% according to sensitive test of total women (860) visited outpatient clinic at maternity hospital Ain Shams university in the year 2020 suffer from PCOS included in the study.

Sample technique

- The researcher was attended in the outpatient of the gynecological and infertility clinics, 3 days/week started from 10 am to 2 pm.
- Patients were being obtained from hospital registration book with the previous mentioned sample criteria.
- The aim of the study was being explained to gain the patients confidence and trust to participate in the study then their consent was obtained orally.
- Patients was being interviewed 2 times (first time and after 6 month followed the program) to collected needed data at the outpatient of the gynecological and infertility clinics and followed up weekly by phone.

Tools of data collection

Tool (1):

(Arabic Structured interviewing questionnaire) Adapted from (mostafa E el al, 2012 divided into three parts: Part I: It covered the general characteristics of the sample. Part II: This part is concerned with women menstrual, reproductive/ gynecological history. Part III: This part is concerned with women lifestyle habits; number of meal/day, components of meal, consumption of caffeine, type and rate of exercise.

Tool (2):

Two Arabic Weekly log was used by researcher to follow the compliance of the study subject, one log to record how many minutes' women exercised per week and type of exercise. The other to record the regularity of diet program.

Tool (3):

Woman's follow up card to assess the outcome measures: change in menstrual cycle; change in anthropometric measurements (waist and hip ratio, hip waist circumference).

Ethical Considerations

An official approval was obtained from the Maternal & Neonatal Health Nursing department counsels that were approved by the Faculty of Nursing, Ain Shams University Counsel. The aim of the study was explained to each woman before

applying the tools. An oral consent was obtained from each woman to participate in the study, after ensuring that data collected will be treated confidentially. Women were informed that they have the right to withdraw from the study at any time without giving a reason.

3. FIELD WORK

Phase 1:

There was introductory phase for researcher with cases to explain the aim of study and obtain the oral approval to participate in the study. Every case was interviewed to assess women personal, menstrual, reproductive and gynecological history, in addition to follow up card was used to assess baseline measures related to menstrual dysfunction in a time ranged from 10 to 15 at from the first session.

Phase 2:

The session was conducted for patient on small groups (7-8 subjects) with an emphasis on lifestyle modifications (dietary and exercise) interventions, for a mean duration of 25 minutes' range (20-30 min). Patient were asked to follow the instructions diet and daily exercises, moderate exercise on a regular basis (≥ 30 min/day) e.g Aerobic exercise &/or walking. Dietary modification, heart-healthy diet/an energy-restricted diet (1200-1600 kcal/day according to cases' weight) through either a low or high protein diet e.g. increase vegetables, fruits, nuts, beans, and whole grains, limits foods that are high in saturated fat, such as meats, cheeses, and fried foods. (fat $\leq 30\%$ daily intake, decrease saturated fat and glycemic load, increase fibers and polyunsaturated fat). Video tape and an educational Arabic booklet constructed by the researcher, reviewed and modified by gynecologist and nutritionist professional was distributed after instructions to guide the women.

Phase 3:

Weekly follow up was done by telephone and /or meeting in outpatient clinics. The follow up regularity were recorded in Two Arabic Weekly log; one to record how many minutes' women exercised per week and type of exercise and the other to record the regularity of program diet, to ensure program diet & exercise. Reinstruction& referral for nutritionist /gynecologist if indicated.

A home phone call system was used to facilitate follow up and tracing cases.

Phase 4:

After 6 months, researchers evaluated the women anthropometry measures, menstrual cycle feature& criteria.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean \pm standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (χ^2) test of significance was used in order to compare proportions between qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
 - Probability (P-value)
 - P-value ≤ 0.05 was considered significant.
 - P-value ≤ 0.001 was considered as highly significant.
 - P-value > 0.05 was considered insignificant.

4. RESULTS

Table (1):

This table shows that, the majority of cases age ranged between 18-25 years, in educational level 29.1% of cases completed secondary education and 72.1% housewife.

Table (2):

This table illustrates that, history of menstrual cycle, in 65.1% of cases have menarche at age 12years, 68.6 % of cases have last menstrual cycle from 2month, frequency of menstrual more than 3month in 54.7% of cases and 50% have duration of period from 5-7 days. The majority of cases have abdominal pain / back / head regarding menstrual discomfort.

Table (3):

This table shows that, 39.5% of cases were nulligravida, 53.8% of cases experienced pregnancy complication, 51.2% of pregnant cases were nullipara.

Table (4):

This table revealed that, about two third of cases suffered from uncontrolled bodyweight. in symptoms of PCOs, Decrease the amount of menstrual cycle (Oligomenorrhea) was major complain of cases. 50% of cases went to medical examination when symptoms of PCOs, appeared. 65.1% cases taken previous treatment.

Table (5):

This table shows that, there was highly statistically significant difference between data for habits and lifestyle of the pre intervention and post intervention after 6months regarding free time activity (p-value <0.001 HS), Number of meals / day (p-value <0.001 HS), Meal components (p-value <0.001 HS), tea / coffee intake (p-value <0.001 HS), carbonated beverages (p-value <0.001 HS), a previous diet (p-value <0.001 HS) the time of meal (p-value <0.001 HS).

Table (6):

This table shows that, there was highly statistically significant difference between pre and post intervention regarding Menstrual cycle (p-value <0.001 HS), Duration of the period (days) (p-value <0.001 HS), dysmenorrhea (p-value <0.001 HS).

Table (7):

This table shows that, there was highly statistically significant difference between pre and post intervention regarding Weight loss (p-value <0.001 HS), Waist circumference (CM) (p-value <0.001 HS), Hip circumference (CM) (p-value 0.023 S), Waist and hip ratio (p-value <0.001 HS).

Table (1): Socio- demographic Characteristics for study sample (n=86).

Socio-Demographic data	Study Group (n=86)	
	No.	%
Age (years)		
18-25 years	34	39.5
>25-30 years	26	30.2
>30-35 years	17	19.8
>35-40 years	9	10.5
Mean±SD	27.66±8.02	
Education level		
Read and write	7	8.1
Completed primary education	23	26.7
Completed preparatory education	22	25.6
Completed secondary education	25	29.1
Higher education	9	10.5
Occupation		
Housewife	62	72.1
Work for a fee	24	27.9

Using: Chi-square test; p-value >0.05 N

Table (2): History of the menstrual cycle for study sample (n=86).

History of the menstrual cycle	Group I: Diet ex. (n=86)	
	No.	%
Date of first menstrual cycle		
11 years	11	12.8
12 years	56	65.1
13 years	19	22.1
Mean±SD	12.09±3.51	
Date of the last menstrual cycle		
1 months	9	10.5
2 months	59	68.6
3 months	18	20.9
Mean±SD	2.10±0.61	
Frequency of menstrual cycle (months)		
≤1 months	5	5.8
>1-3 months	34	39.5
>3 months	47	54.7
Mean±SD	3.02±0.88	
Duration of the period (days)		
3-5 days	11	12.8
5-7 days	43	50.0
>7 days	32	37.2
Mean±SD	6.26±1.81	
Menstrual discomfort		
Abdominal pain / back / head	77	89.5
Nervousness	52	60.5
Vomiting and nausea / loss of appetit	16	18.6

Using: Chi-square test; p-value >0.05 NS

Table (3): gynecological and obstetrical history for study sample (n=86).

Gynecological and obstetrical History	Study Group (n=86)	
	No.	%
Number of pregnancies		
Nillgravida	34	39.5
G1	10	11.6
G2	33	38.4
G3	9	10.5
Previous pregnancy complications	n=52	
Yes	28	53.8
No	24	46.2
Number of delivery		
Nillypara	44	51.2
P1	31	36.0
P2	10	11.6
Previous delivery complications	n=41	
Yes	6	14.6
No	35	85.4

Using: Chi-square test; p-value >0.05

Table (4): History of polycystic ovarian Syndrome study sample (n=86).

History of polycystic ovarian syndrome	Study Group (n=86)	
	No.	%
Symptoms of polycystic ovarian syndrome.		
Uncontrolled body weight	52	60.5

Skin changes (oily skin - acne)	26	30.2
Hirsutism	30	34.9
Menstrual symptoms		
Severe cramps during the menstrual cycle (dysmenorrhea)	56	65.1
Increase the amount of menstrual cycle in the form of bleeding (polymenorrhea)	34	39.5
Decrease the amount of menstrual cycle (Oligomenorrhea)	70	81.4
Irregular menstrual flow of menstrual cycle	39	45.3
Time symptoms appeared.		
Less than one year	22	25.6
1-5 years	39	45.3
More than 5 years	25	29.1
Reaction when symptoms appeared.		
I went to the medical examination	43	50.0
I did not do anything	6	7.0
Consulted relatives or friends	33	38.4
Another answer	4	4.7
Previous treatment		
Yes	56	65.1
No	30	34.9

Using: Chi-square test; p-value >0.05

Table (5): Pre and post 6 months regarding to their lifestyle in study group

Data for habits and Lifestyle	pre (n=86)		Post (after 6months) (n=71)		Chi-square test	
	No.	%	No.	%	x2	p-value
Free time activity						
Exercise	9	10.5	73	84.9	25.347	<0.001**
Exit from the house	30	34.9	56	65.1		
Reading	13	15.1	15	17.4		
Sit with the family at home	26	30.2	30	34.9		
Number of meals / day:						
One meal	13	15.1	4	4.7	29.658	<0.001**
2-3 meals	39	45.3	13	15.1		
More than 3 meals	34	39.5	69	80.2		
Meal components:						
Balanced nutrients elements (carbohydrate / protein / fat / vitamins).	22	25.6	69	80.2	49.376	<0.001**
Imbalanced nutrients elements.	64	74.4	17	19.8		
Tea / coffee intake						
No	7	8.1	34	39.5	50.350	<0.001**
once a day	28	32.6	43	50.0		
More than once	51	59.3	9	10.5		
Carbonated beverages						
No	13	15.1	65	75.6	63.980	<0.001**
once a day	52	60.5	17	19.8		
More than once	21	24.4	4	4.7		
Previous diet regimen						
No	64	74.4	0	0.0	110.687	<0.001**
Yes irregularly	13	15.1	17	19.8		
Yes regularly	9	10.5	69	80.2		
Regular meals						
Regular	17	19.8	64	74.4	49.376	<0.001**
Irregular	69	80.2	22	25.6		

Using: Chi-square test; p-value >0.05 NS

Table (6): Pre and post 6 months regarding to their menstrual symptoms in study group

Items	Group I: Diet ex.				Chi-square test	
	Pre (N=86)		Post (N=71)		x2	p-value
	No.	%	No.	%		
Menstrual cycle						
Regular Normal	5	5.8	53	74.6	83.669	<0.001**
Severe cramps during the menstrual cycle (dysmenorrhea)	56	65.1	29	40.8		
Increase the amount of menstrual cycle in the form of bleeding (Polymenorrhea)	11	12.8	2	2.8		
Decrease the amount of menstrual cycle (Oligomenorrhea)	70	81.4	16	22.5		
Duration of the period (days)						
3-5 days	11	12.8	19	26.8	25.352	<0.001**
5-7 days	43	50.0	49	69.0		
>7 days	32	37.2	3	4.2		

Using: Chi-square test and Independent Sample t-test P-value >0.05 NS

Table (7): Pre and post 6 months regarding to their anthropometric measurements in study group

Items	Group I: Diet ex.				Chi-square test	
	Pre (N=86)		Post (N=71)		x2	p-value
	No.	%	No.	%		
Weight loss						
Normal weight	3	3.5	29	40.8	41.632	<0.001**
Overweight	42	48.8	33	46.5		
Obese	41	47.7	9	12.7		
					t test	p-value
Waist circumference (CM)						
Range	101-138		84-103		t=	<0.001**
Mean±SD	117.60±14.70		92.12±7.84		10.815	
Hip circumference (CM)						
Range	115-156		112-146		t=	0.023*
Mean±SD	134.65±18.62		121.72±15.68		2.304	
Waist and hip ratio						
≤0.75	4	4.7	32	45.1	34.116	<0.001**
>0.75-<0.85	22	25.6	28	39.4		
≥0.85	60	69.8	28	39.4		

Using: Chi-square test and Independent Sample t-test P-value >0.05 NS

5. DISCUSSION

Some women with PCOS experience heavier or lighter bleeding during their menstrual cycle. Regular periods help to prevent excess thickening of the lining of the uterus (womb). Not having regular periods can lead to abnormal cells building up inside the womb. It is important women have at least four cycles a year to avoid a build-up that might include abnormal cells (Kim et al., 2017) & (Caldwell et al., 2017).

Weight loss for PCOS patients may be difficult, but it's not impossible. A combination of regular cardiovascular exercise and resistance training is recommended. At least three to four times per week for at least 30 minutes each session In addition to nutritional counseling will help to keep body fat low and improve menstrual dysfunction (Benham et al., 2018).

On trial to assess the effectiveness of exercise and nutritional counseling (lifestyle modifications) on Wight loss, menstrual dysfunction, and reproductive function on women with PCOS. Our study found highly significant difference regarding Weight loss, anthropometric measures (waist and hip ratio, hip waist circumference) and highly significant improvements regarding menstrual function.

The results of this study support the hypothesis that it is possible to improve menstrual function and fertility in overweight/obese women with PCOS. By using a lifestyle program that sets realistic weight loss and exercise goals, subjects were able to sustain an improvement in carbohydrate metabolism over a 6-month period and hence improve their likelihood of pregnancy. 15 cases out of 86 enrolled cases, some of them have got pregnant and the majority difficult to contact due to changes in the cell phone. Following the 6-month intervention, the instruction done at the present study showed a direct positive effect on women's menstrual & reproductive features. The regularity of the menstrual cycle over the time-course of the study shows significant improvements in menstrual frequency and significant reduction in menstrual problems. This is related to improvement in ovulation, which leads to improved menstrual function.

In the present study, there was a highly statistically significant difference between data for habits and lifestyle modification of the pre and post intervention after 6 months. High-protein diets seem to be as effective as high-carbohydrate diets, provided that fat and total calories are comparable. While lifestyle changes are difficult to maintain, women seeking pregnancy are highly motivated, making this a first-line intervention for menstrual dysfunction in overweight PCOs patients.

These results are in agreement with (Hill *et al.*, 2018). However, 5%–10% of body weight loss can improve nearly all abnormal reproductive, menstrual dysfunction, metabolic, hormonal and lipid profile in PCOs patients. However, it is understood that the diet alone cannot change or improve in short duration for above factors effectively. So, researchers might have believed on the physical activity for PCOS women, specifically reproductive hormones balance.

These results are supported by Borzan *et al.* (2021), reported several studies have shown that weight loss can lead to resumption of ovulation within weeks. Those studies demonstrated that even a 5% reduction in body mass restores ovulation and fertility and devised a program of exercise and sensible eating that has become a model across the world for treating PCOS. Rapid changes in body composition and fat mass can be shown during lifestyle change.

In two randomized control trials done by (Peña *et al.*, 2018) and (Gayta *et al.*, 2015), reported significant difference regarding data for habits and lifestyle of the pre and post intervention regarding free time activity, Meal components after 9 months of intervention.

In the present study, regular physical activity helps to maintain weight loss and prevent weight regain. Lifestyle change is an important therapeutic strategy in all overweight or obese patients with PCOS. Lifestyle modification programs with an emphasis on behavioral management, dietary and exercise interventions have been successful in improving reproductive, anthropometric measurement, and spontaneously restore menstrual cycles. Although as yet there is limited evidence for specific dietary and exercise approaches and guidelines for use in PCOS. Weight loss occurs when energy expenditure exceeds energy intake. Physical activity is an important component of any weight management program. Although energy restriction by dieting is largely responsible for initial weight loss (George *et al.*, 2016).

In the same line with the study done by Al Khalifah *et al.* (2016) & Cree-Green *et al.* (2017), reported Patients with polycystic ovarian syndrome (PCOs) who have impaired glucose tolerance should start a comprehensive program of diet and exercise to reduce their risk of developing diabetes mellitus. Encourage moderate physical activity, provided the patient has no contraindications. Discourage smoking because of the increased risk of cardiovascular disease. In addition, obese women with PCOS can benefit from a low-calorie diet for weight reduction.

In contrast to the results of this study Escobar- Morreale *et al.* (2018), reported that Lifestyle + metformin is associated with lower BMI and subcutaneous adipose tissue and improved menstruation function in women with PCOS compared with lifestyle alone over 6 months. Metformin alone compared with lifestyle showed similar BMI at 6 months. These results suggest the combination of lifestyle modification with metformin has a role to play in weight management: a key concern for women with PCOS.

Contrariwise to the results of the study done by Boyle *et al.* (2017), Reproductive failures in women with polycystic ovarian syndrome (PCOS) are common due to endocrinal disorders. The clinical expression of PCOS varies. They are oligo-ovulation, anovulation (lead to menstrual dysfunction) and hyperandrogenism with polycystic ovaries. The conventional medicines (eg: Metformin) are usually recommendable for routine use for improvement in menstrual dysfunction and reproductive health.

In summary, our results indicate that lifestyle modification through exercise and sensible eating patterns can lead to improved menstrual function and reproductive features in PCOS women.

6. CONCLUSION

The present study drew attention to critical point that lifestyle modification with weight loss leads to improve menstrual function. Accepting that study hypothesis confirm lifestyle modifications are the best initial management for overweight & obese women seeking to improve their reproductive function.

7. RECOMMENDATIONS

In the light of the study findings, the following recommendations are suggested:

1. Didactic center for PCOS cases inside infertility/gynecological clinics to ensure lifestyle modification.
2. Future research should focus on the relative efficacy of lifestyle management versus anti-obesity pharmacologic agents and surgery to relive menstrual dysfunction.

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