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Effect of Structured Nursing Intervention on Obese Adolescents' Girls with Polycystic Ovarian Syndrome

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Abstract Polycystic Ovarian Syndrome (PCOS) increased during the reproductive age as an endocrine disorder which affects one in each 15 women worldwide. The prevalence rate of obesity is high among the female with PCOS. **The purpose** of the study was to assess the effect of structured nursing intervention on obese adolescents' girls with polycystic ovarian syndrome. **Method**: A quasi-experimental design (pre-post) was used. **Sample:** A purposive sample of (84) adolescents' female students with polycystic ovarian syndrome were recruited. All adolescents' female students with polycystic ovarian symptoms screened by the obstetrician through abdominal ultrasound. **Setting:** The study was carried out at Faculty of Nursing, Menoufyia University at Menoufia Governorate, Egypt. **Instruments:** Three instruments were used by the researchers; (1) A structured interviewing questionnaire (2) Arabic log monthly to record the regularity of diet & exercise; (3) Follow up checklist. **Results**: This study showed that there was a highly statistically significant improvement in girl' level of knowledge between pre intervention and post intervention regarding poly cystic ovarian syndrome. After the intervention there was significant weight reduction from the baseline value and regularity of menstruation. **Conclusion**: According to the findings of the present study it can be concluded that: After intervention of the study there was significant improvement of level of knowledge about polycystic ovarian syndrome and reduction of body weight and symptoms of polycystic ovarian syndrome. **Recommendation**: Self-management programs should be identified among adolescents with PCOS to encourage increased independence in health behavior decisions while they are still living at home.

Keywords: *polycystic ovarian syndromes, obesity, structured nursing intervention on adolescents' girls*

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1. Introduction

Polycystic ovary syndrome was known before as Stein-Leventhal syndrome. The disorder is related to series of disturbances in the hypothalamic –pituitary –ovarian axis and with androgen –creating tumors to difficulty of getting pregnancy [1]. Disturbances leads to decrease secretion of follicle stimulating hormone (FSH) and elevated levels of estrogen, testosterone and luteinizing hormone (LH). The disease occurs during the reproductive age as increases among the adolescent females and the young women [2] and may be occur at birth but does not cause symptoms until puberty [3]. The clinical features of this disorder may change through the lifespan starting from adolescence to post-menopausal age.

Diagnosis is assured when at least 2 of the following present: clinical and/or biochemical hyperandrogenism; ovulatory dysfunction; or polycystic ovarian morphologic features [4]. Basic characteristics of this disorder is menstrual abnormality in 80% of patients and ovulatory dysfunction-related infertility, or androgen-related symptoms such as hirsutism, acne [3]. The common menstrual abnormalities are oligo menorrhea or secondary amenorrhea and occasionally primary amenorrhea or excessive menstruation. Though, 20% of females may have actually regular menstruation in spite of an ovulation. Clinical distribution of hirsutism in about 50-60%, acne in 15-20%, and androgenic alopecia in 5% of females with PCOS. Psychological effects of this disorder as women more probable to suffer from anxiety, sadness, low self-confidence, change the coping capabilities, straining relations, reduction quality of lifetime and disordered ingestion [5]. About 30-75% of females with PCOS are overweight, and the majority of them have an android dissemination of fat, with features of insulin resistance like acanthosis nigricans and skin tags [6].

Obesity may play a pathogenetic role in the development of the syndrome in susceptible individuals. In fact, insulin possesses true gonadotrophic function and an increased insulin availability at the level of ovarian tissue may favor excess androgen synthesis [7]. Obesity, particularly the abdominal phenotype, may be partly

responsible for insulin resistance and associated hyperinsulinemia in women with PCOS. Therefore, obesity-related hyperinsulinemia may play a key role in favoring hyperandrogenism in those women.

1.1. Significance of the Study

World Health Organization (WHO) indicated that PCOS affected 116 million (3.4%) of women worldwide in 2016 [8]. In another study conducted on Saudi females, the estimated prevalence of PCOS was observed to be 53.7% which is extremely higher [9]. There is increasing proportions of overweight, amongst the Egyptian people by 63% at the age of twenty or more have inactive way of life [10]. About 38-88% of women with PCOS are estimated to be overweight or obese.

Raise the awareness and self-control in form of changing of standard of living adjustments, containing dietary counseling and exercise are the only way to control PCOS from increasing and affecting more females. Successful weight loss from 5 to 10 percent of body weight is most effective method of restoring normal ovulation, menstruation decreasing weight and body composition and improvements pregnancy rate. Through education, adolescent girls can become knowledgeable about the disease and available treatment choices and prevention of future complications, which can help by providing structured nursing intervention to obese adolescent's girls with polycystic ovarian syndrome. Consequently, this study was intended to assess the effect of structured nursing intervention on obese adolescent's girls with polycystic ovarian syndrome.

1.2. Purpose of the Study

The purpose of the study was to assess the effect of structured nursing intervention on obese adolescent's girls with polycystic ovarian syndrome.

1.3. Research Hypotheses

1. Adolescents' girls with PCOS will have higher knowledge scores in posttest than pretest.
2. Structured nursing intervention reduces body weight among adolescent girls with polycystic ovarian syndrome.
3. Structured nursing intervention reduces symptom among adolescent girls with polycystic ovarian syndrome.

2. Method

Research Design*:* A quasi-experimental design was utilized to achieve the purpose of the present study (one group pre-test, post-test).

Setting: This study was conducted at the Faculty of Nursing, Menoufia University at Shebin El-Kom in Menoufia Governorate, Egypt.

2.1. Sampling

A purposive sample of (84) adolescent girls was selected according to inclusion and exclusion criteria as follows:

2.2. Inclusion Criteria

1- Female nursing students diagnosed with polycystic ovarian symptoms.

2-Age of female students was from 18 to 25 years and not taken any medications.

3-Students have history of irregular menstrual cycles for more than one year.

4-Their body mass index (BMI) ≥25 and ≤30.

5-Students girls with no history of endocrine disease or medical conditions.

2.3. Data Collection Instruments

Instruments 1: A structured interviewing questionnaire construed and developed by the researchers to assess the general characteristics of the study sample .It was divided into two parts. After reviewing the related literature and with suggestions and guidance from the experts in the field of obstetric and gynecological medicine and nursing,

i) **Structured questionnaire for the purpose of the current study.**

a. Part one to assess the general characteristics of the female students such as age, religion, and residence, age of menarche, menstrual patterns, and menstruation interval.
b. Part two to assess the girl's nutritional habits; number of meals/day, constituents of the meals, duration and procedure of the exercise and intake of caffeine.
c. Part three to assess the level of knowledge about POCS. It consisted of items related to the knowledge about polycystic ovary such as polycystic ovary definition, causes, signs, symptoms, complications, treatment, adverse effects and preventive measures. Scoring of the questions: The questions were corrected, each correct answer was given a score =2 the wrong answer was given a score =0 Scoring key for the knowledge regarding poly cystic ovary

ii) Ferriman and Gallwey scoring system (1961) [11] (Assessment of hirsutism): This includes lips, chin, hands and legs, breasts, abdomen, pubic area, lower and upper back. It was done to indicate the androgen excess and maintain reliability of the collected data. Hirsutism score was assessed only by the primary health care provider. This assessment was done in a separate room and the client's privacy was firmly sustained.

iii) The Global Acne Grading Scale (GAGS) [12] **for acne assessment**: Clinical assessments of the existing spots lesions were done on the face and back of the girls The GAGS studies six positions on the face and the chest/upper back, with a factor for each position centered approximately on the surface area, dissemination, and density of PSUs.

iv) Site of acne grades × factors

Site	grades × factors
Forehead	×2
right cheek	×2
left cheek	×2,
Nose	×1
Chin	×1
Chest and upper back	×3

v) Scoring system

Type of acne	Score
no active zits lesions	(score = 0),
mild lively pimples lesions	(rating = 1–18)
moderate active zits lesions	(rating = 19–30)
intense active acne lesions	(rating = 31–38)
very severe zits lesions	(rating > 39)

vi) Psychological assessment instrument [13]: It is issued to evaluate the adolescent's teenager's psychological wellbeing before & after the interference. The scale used to assess the effect of complications related to PCOS. It was translated to Arabic language and revised by the investigator Scoring system

Scoring items	Score	QOL
Sever problem response	1	(1-10)poor
Some problem	2	(>10-20)average
No problem response	3	(>20-30)Good

vii) **Arabic Monthly log for Follow up** [14]:

A. The investigator used the Arabic monthly log to monitor the study participants ' compliance with the exercise & dietary schedule;-One log to chart how many moments the teenager exercised per week and the type of exercise.The other to record the consistency of the program, regime and standard of living modification program.
B. Modifications in the menstrual cycle;
C. Modification in anthropometric measurements (body mass index (BMI) [15]: Normal BMI= 18.5-24.9kg/ M2, overweight BMI= 25.0-29.9 Kg/M2, obesity BMI= 30.0-39.9kg/M2 and the life-threatening obesity BMI=40.0kg/M2

(3) During expiry of the National Health and Nutrition Examination Survey anthropometric manual waist circumference was measured at the narrowest point between the lower rib and the iliac crest.

2.4. Validity and Reliability

Validity and reliability of the instruments were done by panel of expertise in the field of Maternal and Newborn Health Nursing and Obstetrics and Gynecology medicine. The instruments were reviewed for simplicity of language, comprehensiveness and understandability. Test-retest reliability was applied by the researcher for testing the internal consistency of the instruments. It is the administration of the same instruments to the same participants under similar conditions on two or more occasions. Scores from repeated testing were compared. The reliability was done by Cronbach alpha coefficient test equal 0.95.

2.5. Piloting the Instruments

The piloting was conducted on 10 % (8 girls) of the female nursing students to test the applicability of the instruments and to estimate the time needed for data collection. On the basis of the piloting results the researcher determined the feasibility of data collection procedures, developed an interview schedule. The results of the piloting help in refining the interview questionnaire.

2.6. Ethical Consideration

Official steps were taken to obtain a permission to conduct the study, with explanation of the purpose and the importance of the study to the centers authorities. An informed verbal consent was obtained from all students before participation in the study. Students were assured that their information were confidential and only used for study process. Also the students were informed that the collected data would be used only for the purpose of the present study, as well as for their benefits of the study

2.7. Field work

1-Preparatory phase and assessment

Implementation phase

The first steps

1. The researcher disseminates the questionnaires for four weeks in all four years to determine the general characteristics of the person with PCOS, then apply the analysis according to the inclusion criteria.
2. The investigator then greeted the girls during the interview, introduced herself to all adolescent girls involved in the study. To collect the overall characteristics, menstrual and gynecological history, and dietary habits, each teenage daughter was interviewed.
3. In addition to the questionnaire, the assessment of the clinical factors relevant to PCOS during the first session ranged from 20 minutes to 40 minutes.The overall and clinical assessment was measured by a scale for anthropometric measures as weight. The following formula was used to measure the body mass index for each girl: BMI= (weight in kilograms / height in metres.

The second steps

The investigator administered a psychological evaluation of the hirsutism score and acne rating.

1- The hirsutism was finished through the scoring class of Ferriman and Gallwey, 1961. This form ranks hair growth in more than 9 primary anatomical regions consisting of lower and upper back lips, chin, arms, legs, breasts, abdomen, and pubic area. Every region's rating of hirsutism is measured using a 4-grade scale ranging from zero to 4. This measure has evolved into a separate room and the patient's privacy was strictly maintained

2. Acne Evaluation:

According to the Global Acne Grading Scale (GAGS), clinical examinations of existing acne lesions were conducted on the face and back of participants.

3- Psychological screening tool: provided earlier than and after the intervention to assess women's mental fitness. The measurements used to assess the impact of PCOS-related issues. It was translated into Arabic and checked as a researcher (it consists of 10 statements each girl had 3 answers to select from each announcement, no problem, some trouble, serious trouble, and the scored 3. Then ordinary females evaluated the rating range from (10-30); girls with overall score from (1-10) were sure as leaving negative mental QOL, females with overall rating from (> 10-20) were precise as leaving common mental QOL and females with typical rating from (> 20-30) were one-of - a-kind as leaving acceptable psychological QOL.

Third steps

1. *Making plans and Implementation segment*

1. The study participants were provided with a dietary software package for three academic meetings in small businesses (n-15 female) on three consecutive days at Menoufia University's nursing college with a time of approximately 60 minutes each.
2. PCOS signs, symptoms, and concerns were discussed during the first meeting in addition to the importance of weight reduction, while the 2nd and 3rd meeting involved coaching the females on the energy-limited weight loss plan, the food plan (1200-1600 kcal / day energy-limited diet in line with the weight of the case), eating habits, and physical movement. All classes had been presented in a strength factor presentation by using the research team.
3. An instructional booklet was given to all study participants to be used as a guide for allowed and prohibited nutrients and behaviors as well as physical pastime. They were asked as their dietary intake should be reported day by day for the week preceding the allocated visit; monthly log use.

2- The dietary program

1. This fast food and caffeine system planning was discouraged as part of the healthy diet plan. Participants in the study were recommended to change their ingestion habits (e.g. avoiding ingestion during TV viewing hours, or staying away from drinking immediately before bedtime via / directly after meals; instead drinking earlier than mealtime). Therefore, beginning at 10 minutes a day, at least 5 days a week, and gradually increasing to 30 minutes to 60 minutes a day for 5 days a week over a period of 365 days.
2. The food dietary intake program included the caloric intake limit of 1200 to 2000 calories in accordance with the day based on the weight of the participants and was divided into specific common foods.
3. Caloric meal content included at least 15% protein content, less than 10% fat content, and ultimate carbohydrate energy.
4. In addition to the power-limited weight-reduction method, wholesome healthy weight-loss program transformed into encouraged by informing individuals to devour four-five servings of sparkling vegetables and culmination, whole grains, fiber-rich meals material.
5. In addition to the power-limited weight-reduction method, wholesome healthy weight-loss program transformed into encouraged by informing individuals to devour four-five servings of sparkling vegetables and culmination, whole grains, fiber-rich meals material.e.polyunsaturated fat).

3) Outcomes evaluation

1. Follow-up was done by meeting once a month in the nursing faculty with the females. The regularity of compliance with up was documented in a monthly log; one to file the regularity of the dietary plan and the other to track how many minutes the girls exercised in accordance with week and exercise form.
2. The researchers measured the weight of the child, BMI, wrist circumference, measurements of anthropometry, menstrual cycle and alteration in total score of hirsutism after one year.

2.8. Statistical Analysis

The data collected were tabulated & analyzed by SPSS (statistical package for the social science) software, statistical package version 20 on IBM compatible computer. Quantitative data were expressed as mean & standard deviation (X±SD) and analyzed by applying student t test for the comparison of two groups of normally distributed variables and two groups of not normally distributed variables by applying student t test for the comparison of two groups of normally distributed variables.

Qualitative data were expressed as number and percentage (No & %) and analyzed by applying chi-square test, and whenever testing proportions Z test was applied.

3. Results

Table 1. Sociodemographic Characteristics of the Study participants before the intervention (N.=84)

Items	No.	(%)
Age		
< 20 years	35	41.7
20-25 years	49	58.3
M ± SD	20.47±1.93	
Range	18-25	
Median	20.5	
Grade		
1st grade	18	21.4
2nd grade	24	28.6
3rd grade	19	22.6
4th grade	23	27.4
Residence		
Urban	55	65.5
Rural	29	34.5

Regarding socio-demographic characteristics of the study participants, the findings of Table 1 showed that, the mean age of the study participants was 20.47±1.93 as more than half of them were aged 20-25 years old. The majority of the study participants live at urban area.

Table 2. Anthropometric measurements of the study participants

Items	No.	(%)
Height(cm)		
M ± SD	163.3±6.87	
Range	146-172	
Median	165	
Body Weight (Kg)		
M ± SD	71.4±10.01	
BMI (kg/m2)		
M ± SD	26.8±4.1	
Waist circumference (cm)	85±7.97	
Hirsutism score		
M ± SD	17.44(± 5.18)	
Grade of Acne		
•Mild	10	11.9
•Moderate	65	77.4
•Severe	9	10.7

Table 2 represents the mean score of the girls' height was 163.3±6.87.The mean body weight was 71.4±10.01kg, The mean BMI was 31.99 ± 0.79 kg/m2, The mean waist circumference was 85±7.97cm as they are all under terms of obesity. The mean hirsutism score was 17.44(± 5.18) and finally the mean grade of acne was 20.41± 6.3. This means that the three main features of PCOS are evidenced.

Table 3. Menstrual & gynecological history of the Study participants before the intervention (No. =84)

Items	No.	(%)
Menarche	M ± SD (14.48±1.99)	
Menstrual duration	M ± SD (5.1±1.3)	
Menstrual rhythm in last year *Number of menstrual cycles	8.5±2.8	
*Amenorrhea	4	4.8
*Oligo menorrhea	57	67.9
Family history of diabetes mellitus	25	29.8
Family history of PCOS	44	52.4

Table 3 demonstrates that the mean age of menarche was (14.48±1.99), their mean duration of menstruation was (5.1±1.3) and also the mean menstrual rhythm in the last year was (8.5±2.8). According to the gynecological history, more than two thirds of the study participants (67.9%) had oligo menorrhea and more than half of them have family history of PCOS (52.4%).

Table 4 reveals that there was highly significant difference between females' level of knowledge definition, causes, symptoms, signs, complications and treatment of PCOS ($P \leq 0.001$) before and after the intervention.

Table 5 reveals that there is decrease in body weight as the mean was highest at before the intervention (71.35±10.01) while it was lowest after the intervention (61.97±5.9) respectively. It also shows that the mean waist circumference was highest before the intervention (85 ± 7.97) while it was lowest after the intervention (78.9±7.6). In addition, it shows that the mean BMI was lowest after the intervention (8.6±1.7). It also shows that there were statistically significant differences between before the intervention and after the intervention regarding grade of acne.

Table 4. Distribution of the study participants according to their level of knowledge regarding PCOS

Items	Pre intervention						Post intervention						X^2	P value
	Poor		Average		Good		Poor		Average		Good			
	No	%	No	%	N	%	N	%	N	%	No	%		
Anatomy and Physiology of Ovary	78	92.9	5	6	1	1.2	3	3.6	10	11.9	71	87.5	139.2	0.001 <0.01
Definition of PCO.	74	88.1	8	9.5	2	2.4	3	3.6	25	29.8	56	66.7	124.5	0.001 <0.01
Causes of PCOS	79	94	4	4.8	1	1.2	3	3.6	17	20.2	64	76.2	139.5	0.001 <0.01
Signs and Symptoms of PCOS	61	72.6	20	23.8	3	3.6	3	3.6	16	19	65	77.4	109.5	0.001 <0.01
Complicationsof PCOS	73	86.9	10	11.9	1	1.2	3	3.6	13	15.5	68	81	129.9	0.001 <0.01
Treatment	76	90.5	7	8.3	1	1.2	3	3.6	19	22.6	62	73.8	132.1	0.001 <0.01

Table 5. Distribution of the study participants according to their Body Weight, BMI, Waist Circumference, Hirsutism Score and acne degree before and after application of the intervention program

Items	**At baseline**		**After one year**		**T.test**	**P value**
Body weight (kg)	71.35±10.01		61.97±5.9		7.4	<0.01
BMI (kg/m2)	26.8 ± 4.1		23.3±2.6		6.7	<0.01
Waist circumference (cm)	85 ± 7.97		78.9±7.6		5.07	<0.01
Hirsutism score	12.7 ± 1.98		8.6±1.7		14.5	<0.01
Grade of Acne	No	%	No	%	X^2	P.value
Mild	10	11.9	55	65.5	50.85	<0.001
Moderate	65	77.4	25	59.8		
Severe	9	10.7	4	4.8		

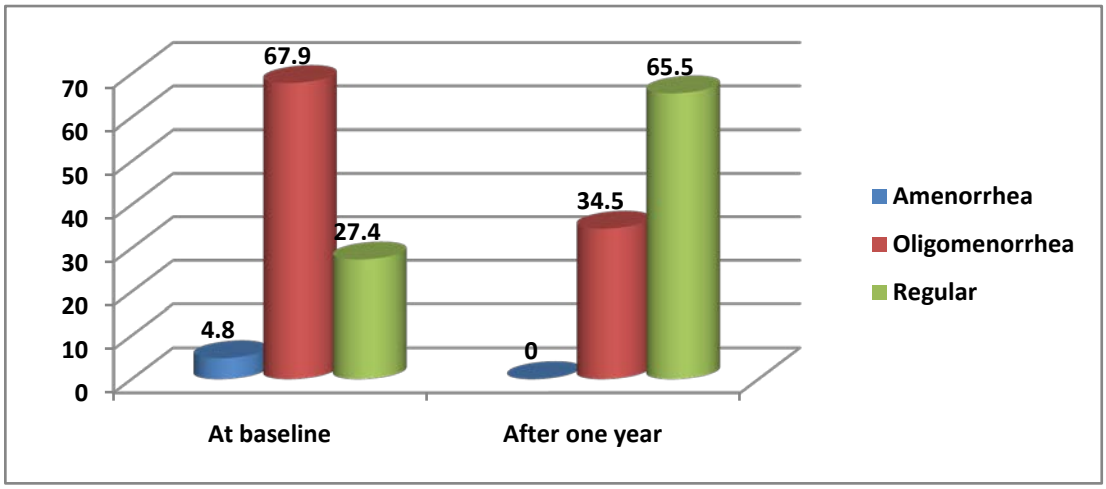

Figure 1. Distribution of the study participants according to rhythm of menstrual cycles before and after the intervention

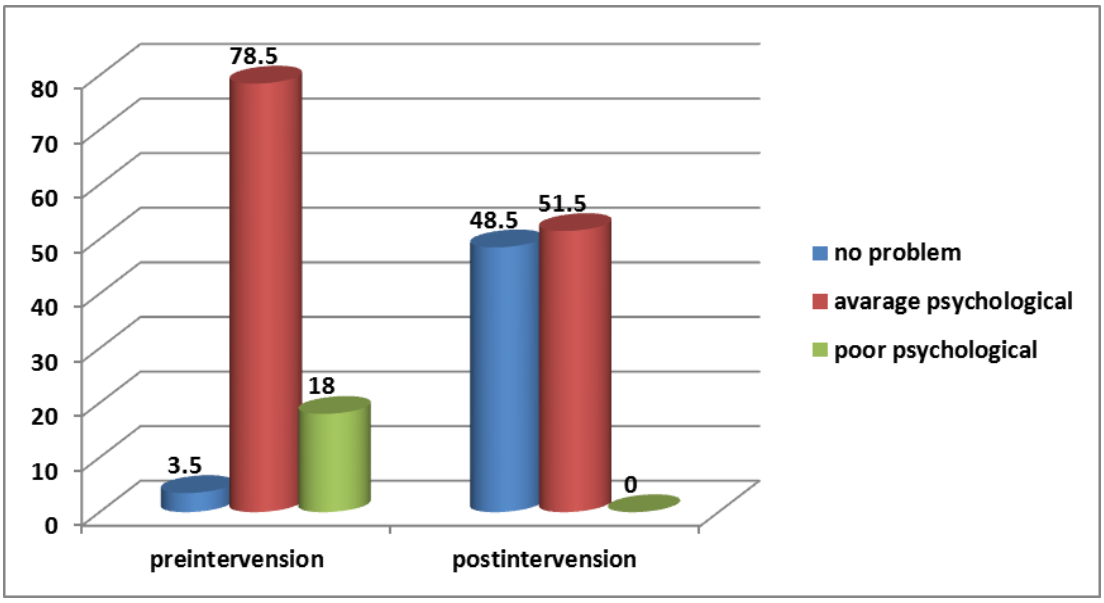

Figure 2. Distribution of the study participants regarding the psychological problem before and after the intervention

Figure 1 reveals that before the intervention, oligo menorrhea status was 67, 9% with significant improvement after the intervention was 34, 5. It also showed that the regular menstruation cycle after one year of application of the program at baseline was 27, 4 and after one year was 65, 5.

Figure 2 reveals that the intervention, no problem was 3, 5 before the intervention with significant improvement after the intervention to be 48.5%. It also showed that average psychological before the intervention (78.5) and after the intervention (51.5). As regards the female's psychological and emotional quality of life, there was significant difference before and after the intervention

4. Discussion

Regarding the menstrual and gynecological history of the study participants before the intervention, more than two thirds of them (67.9%) had oligo-menorrhea and more than half of them have family history of PCOS (52.4%). This is in congruent with a study [16], the researchers reported that irregular cycles were reported by 92% of non-obese girls compared to only 47% of obese girls with PCOS. The presence of oligo menorrhea among the adolescent girls, 2 years post menarche, can be a good screening indicator to diagnose a probable case of PCOS as reported earlier. A diagnosis is confirmed if all three signs/symptoms of PCOS are present. It was observed in 27.4% of PCOS cases in the study, and they mentioned that the diagnosis may be considered but not confirmed among those who have two signs/symptoms.

About the level of knowledge of the females about PCOS, this study showed that there was a substantial difference in the level of knowledge of the females after the intervention in relation to the nature, causes, symptoms, signs, complications and treatment of PCOS before the intervention. This is in line with [17] as there was a significant difference between the mean levels of PCOS knowledge after formal teaching programmed in this respect at the level of knowledge of polycystic ovarian syndrome among adolescent girls. It was also reported that the PCOS girls felt they had more awareness and determination to adopt the preventive health strategy. In the same line with 18, as shown by an overall gain on knowledge level and a significant increase in knowledge level in the areas and concluded that the curriculum is an effective strategy to boost people's knowledge level. This can be explained by the fact that teenagers ' general public desired a better body image and conceived it in the destiny consequently, they had a stronger incentive to follow the protocol.

Regarding the body weight, waist circumferences and BMI the current study illustrated that the mean body weight was highest before the intervention (26.8 ± 4.1) while it was lowest after the intervention (23.3±2.6). This was the same with waist circumference and the mean of BMI. It also showed that there were statistically significant differences between before the intervention and after the intervention regarding degree of acne. This was supported by [19]. They found that, there was significant reduction in their anthropometric measures/weight loss; more than three quarter of the study participants was obese, the intervention decreased this percent to less than one half, this means that the intervention successes to decrease the percentage of obesity by more than one third. The effect of exercise and nutritional counseling among women with polycystic ovary syndrome which conducted by [20] and the study provided suggestion that lifestyle modifications in the form of endurance and resistance exercise may provide beneficial effects with regard to the biochemical profile of obese women with PCOS.

Regarding the rhythm of the menstrual cycles before and after the intervention program, the present study showed that after application the intervention program, there were significant differences between before and after the intervention regarding amenorrhea, oligo menorrhea and regular of menstrual cycle (P value <0.01). The present study results agreed with study conducted by [21]. The researchers found a significant change in the mean menstrual cycles over the study period from 0.6±0.6 before the intervention to 1.6±1.3 after the intervention

(p = .003), with a weight loss of 6.5% (p < .001) in both dietary regimens. Also, the effect of a rigorous lifestyle modification program on menstrual irregularities among 59 obese German girls with PCOS was entitled in accordance with [22] a previous study. Because a history of menstrual irregularity is considered normal in the first 1-2 years following menarche due to anovulation, researchers agreed to study only adolescent girls with oligo menorrhea more than 2 years after menarche, this period of time being considered a good screening predictor for diagnosing PCOS. The reported significant decline in the prevalence of amenorrhea and oligo menorrhea from baseline (by 42% and 19% respectively) among the successful weight loss group after one year of lifestyle modifications.

National Institutes of Health (NIH) [23] guidelines for reduction of weight emphasized the importance of behavior therapy and attention to psychological adjustment, any lifestyle modifications program should address the behavior therapy and a better understanding of the psychological background of the participants with PCOS. Regarding the effect of the intervention program on the psychological problem before and after the intervention, the present study showed that there was significant difference in females' psychological and emotional quality of life after the intervention program. This finding was similar to [14] and they mention that there was significant difference before and after application of the intervention regarding the psychological problem. Also in the same line with [24] who mentioned that lifestyle modifications through the exercise, stress management and sensible eating patterns can lead to improvement of the reproductive/hormonal features among PCOS women. PCOS have higher levels of stress and a more negative self-image and mentioned that, life-style changes now not best have an effect on a woman physically, however it additionally impacts her mentally.

Finally, the findings of the present study supported the research hypotheses and clarified that there was high level of knowledge after the nursing intervention among girls with PCOS. Also, the structured nursing intervention reduce obesity and symptoms of polycystic ovarian syndrome.

5. Conclusion

According to the findings of the present study it can be concluded that:

After intervention of the study there was significant improvement of level of knowledge about PCO and reduction of body weight and symptoms of polycystic ovarian syndrome.

6. Recommendation

According to the findings of the present study, the following recommendations can be concluding that:

1. Self-management programs should be identified among adolescents with PCOS to encourage increased independence in health behavior decisions while they are still living at home.
2. The role of dietary composition and its interactive effects with exercise training in achieving and maintaining weight loss and achieving and maintaining the optimal reproductive and metabolic improvements in polycystic ovary.

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