

## ORIGINAL RESEARCH

# Effect of educational program on the level of knowledge regarding polycystic ovarian syndrome among adolescent girls

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## ABSTRACT

**Background:** Polycystic Ovarian Syndrome (PCOS) is one of the common health problem which increase in adolescent girls in addition young women during their reproductive years. It is one of the most endocrine disorders with prevalence of 5%–10% in different ethnic populations and 22% of women in general population. PCOS is a heterogeneous endocrine disorder which affects one in 15 women worldwide. The aim of the study is to evaluate the effect of educational program on the level of knowledge regarding PCOS among adolescent girls.

**Subject and methods:** This study was conducted at the Faculty of Nursing at Minia university using quasi experimental research design on ninety six female students. Interviewing questionnaire and knowledge assessment tool (pre/post educational program) are used for data collection.

**Results:** After the educational program, majority (94.69%, 95.85%, 94.79%, 97.31%, 95.42%) of the students have correct knowledge regarding to diagnosis, causes, risk factors, complications and management respectively after education program. Majority (92.7%) of the students had good knowledge, average knowledge observed on the (6.25%) from student and only (1.04%) had poor knowledge after educational program. Mean scores of posttest were significantly higher after educational program compared to their values at pretest ( $p < .0001$ ). Statistically significant difference was found between demographic characteristics such as age of the students and family history with students' knowledge at pre-test ( $p < .02$  and  $p < .05$ ) respectively.

**Conclusion and recommendations:** Based on the results of the present study it can be concluded that, before utilization of educational sessions, most of the students (84.4%) had poor knowledge regard polycystic ovarian syndrome. After the educational sessions there was enhancement of knowledge score on polycystic ovarian syndrome. It was found that the post-test score were significantly higher after educational program compared to their values at pre-test in all variable. Also the overall score post-test mean value (54.66) was higher than the overall pretest score mean value (25.5). So it can be concluded that, educational program is effective in improving the knowledge of adolescent girls. Based on the results, the current study recommended that: Application of educational program for adolescent girls in different setting should be conducted in order to increase level of knowledge regarding PCOS, Nursing curriculum should be updated to include comprehensive information about PCOS to improve the awareness of other women once in practice. Study can be replicated on a larger sample for generalizing the findings.

**Key Words:** Educational program, Polycystic ovarian syndrome, Adolescent

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## 1. INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) is a common health problem which increase among adolescent girls and young women during their reproductive years. It is a problem in which a woman's hormones are out of balance leading to menstrual disturbance as well as multiple abnormal cysts in enlarged ovaries, so they do not produce the normal number of eggs and normal ovulation which leads to difficulty of getting pregnant. If it is not treated over time, it can lead to serious health problems such as diabetes and heart disease.<sup>[1]</sup> PCOS may be occur at birth but does not cause symptoms until puberty. In addition, the clinical features of this disorder may change through the lifespan starting from adolescence to post-menopausal age.<sup>[2]</sup>

PCOS is one of the common endocrine disorders of women in reproductive age, with prevalence of 5%-10% in different ethnic populations and as much as 22% of women in general population have polycystic ovaries on ultrasound examination.<sup>[3]</sup> Generally, prevalence estimates of PCOS are highly variable, ranging between 2.2% to 26%.<sup>[4]</sup> World Health Organization (WHO) indicated that PCOS affected 116 million (3.4%) of women worldwide in 2012. In another study conducted on Saudi girls, the estimated prevalence of PCOS was observed to be 53.7% which is extremely higher.<sup>[5]</sup> One of the explanations may be high incidence of obesity in Saudi Arabia which has an established association with PCOS.<sup>[5]</sup> Infertility is the most common cause of anovulatory, it affects 40% of women with PCOS. Around 90%-95% of anovulatory women coming to infertility clinics have PCOS.<sup>[6]</sup> High prevalence of PCOS observed among first-degree relatives.<sup>[7]</sup>

In adolescent girls with PCOS, the ovaries usually produce higher amounts of androgens more than normal which interfere with ovum development. Irregular menstruation, infertility, increasing in hair growth in a male distribution pattern (e.g., on face and chest), acne and obesity are the most common symptoms of PCOS.<sup>[8,9]</sup> Menstrual irregularities were considered the main clinical presentations that are positively associated with PCOS diagnosis in young women. These cases should be recognized and managed early to avoid associated metabolic complications.<sup>[10]</sup>

Women with PCOS are at risk of mental health disorders such as depression, anxiety, eating disorders, poor self-esteem, and reduced quality of life.<sup>[11]</sup> A study done by Hollinrake (2007)<sup>[12]</sup> reported that 35% of women with PCOS have depression ( $p < .0001$ ). Management of PCOS should be emphasis on education and provide support with focusing on healthy lifestyle in order to manage and prevent major negative consequences of PCOS.<sup>[13]</sup> Nurses can have a positive impact on woman with PCOS through counseling and

education also providing support for women with negative self-image as a result of their physical manifestation of PCOS. Through education, nurses help women to understand the syndrome and its associated risk factors to avoid long-term health problems, also encouraging women to make positive and healthy life-style changes. Nurses may also make community referrals to local support groups to help women build their coping skills.<sup>[15]</sup> Studies have shown that lifestyle modification leads to decreased the levels of depression and anxiety and also increasing self-esteem and health related quality of life scores among women with PCOS.<sup>[14]</sup>

Health education is one of the effective health promotion strategies used with adolescent. Educating adolescent girls on PCOS helps them to acquire knowledge, early detect and prevent the PCOS as well as enabling them to be responsible for their health and protect it.<sup>[16]</sup> So there is a need to increase awareness among adolescent girls to prevent its clinical implications. Increase awareness and self-control are the only way to control PCOS from increasing and affecting more girls.

### 1.1 Significance of the study

PCOS is very common, and affecting more than one in five women during reproductive period. PCOS is a hormonal disorder that involves various organ systems in the body and it is believed to be fundamentally caused by insensitivity to the hormone insulin. If it is not treated on time, it can lead to serious health problems such as reproductive (hyper androgenism, infertility, hirsutism), metabolic (insulin resistance, cardiovascular disorders, diabetes mellitus) and psychological features (anxiety and depression). Proper management and treatment can help to control this symptoms and avoid long-term problems.<sup>[6,17]</sup> Gynecological diseases are common but most women ignore its symptoms. They're unaware of the problem until the problem become worse.<sup>[18,19]</sup>

The lack of awareness and negative lifestyle attitude towards PCOS among adolescent girls and not trying to take any measures to improve their lifestyle behaviors are observed by the researcher. Adolescent girls can be helped through assessing their knowledge and opinion to change their lifestyle behaviors also providing needed necessary information. Through education, the adolescent can become knowledgeable about the disease and available treatment choices. They also will feel empowered to make informed health care decisions toward her own behalf. So the researcher decided to educate adolescent girls regarding PCOS.

### 1.2 Aim of this study

It was to evaluate the effect of educational program on the level of knowledge regarding PCOS among adolescent girls.

### 1.3 Research hypothesis

Utilization of the educational program will be effective in increasing the knowledge level of adolescent girls about PCOS.

### 1.4 Conceptual framework

The current study was based on self-care theory of Dorothy Orem's (1985). This model focuses on that each individual has ability to perform self-care, and demonstrate responsibility for their own health and the health of their dependents. Self-care is the practice of activities that help individuals on maintaining their health and life. A person's knowledge of potential health problems is necessary for promoting self-care behaviors.

Self-protective measures of any disease can be done by health education. It is one of the effective health promotion strategies used with young students. It extends students with knowledge and empowering them to be responsible for their health and protect it.<sup>[20]</sup>

## 2. SUBJECTS AND METHODS

### 2.1 Research design and setting

Quasi-experimental research design was used in the present study which is suitable for the nature of existing research problem. Current study was conducted at Faculty of Nursing at Minia University.

### 2.2 Subjects

Ninety six (96) female students recruited from previous mentioned setting were selected using simple random sampling technique according to the following inclusion criteria: Adolescent girls between 17-22 years old, second or third year's students and students accepted to participate in the study.

### 2.3 Tools of data collection

**Tool 1:** Interviewing sheet: This tool designed by the researcher to collect data related to socio-demographic characteristics of the students such as, students' age in years, family history of polycystic ovarian syndrome, level of father's education and mother's education, age of menarche, menstrual regularity and source of information.

**Tool 2:** Knowledge assessment tool (pre/post educational program): it is Self-Administered assessment tool developed by the researcher after revising relevant literatures and it consists of two parts as the following:

*Part I:* Concerned with students' knowledge regarding anatomy and physiology of ovary and it was consisted of 10 multiple choice questions.

*Part II:* Concerned with students' knowledge regarding PCOS (definition-causes-risk factors, signs and symptoms,

complications, diagnostic criteria, goals of management, the treatment strategies and nursing role) and it was consisted of 54 multiple choice questions.

### 2.4 The scoring system

The students' answers related to knowledge were scored and calculated. According to the answers, students' responses are evaluated using the model key answer sheet which prepared previously by the researcher. Students' scoring of knowledge regarding PCOS was classified as follows: Each correct answer was given a score of 'one' and wrong answer a score of 'zero' respectively. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for each area. The total items of knowledge were 64 items given 64 scores. These scores were converted into a percent score. Whereas poor knowledge scored < 32 grades (< 50%); average knowledge scored 32-48 (50%-75%); good knowledge was considered if the percent score was 75% or more (48-64 grades).

### 2.5 Validity and reliability of the tools

The present study tools were submitted to three academic nursing in the obstetrical and gynecological nursing field to test the validity of the tools. All modifications were carried out according to the academic nursing decision on the clarity of sentences and the relevance of the content. In addition reliability of tools was tested by using Alpha Cronbach test. Its result was 0.86 which indicates an accepted reliability of the tool.

### 2.6 Pilot study

It was conducted on 10 (10%) female students. It was selected from the previously mentioned study setting according to previous inclusion criteria to test the present study tools for its validity, clarity, applicability and the time required to complete it. All required and necessary modifications of the tools were done. The students who participated in the pilot study were excluded from the study sample.

### 2.7 Procedure

The current study was achieved through three phases: assessment (pre-test), implementation (conducting education program), and evaluation (post-test).

#### 2.7.1 Assessment

During assessment phase data related to demographic, menstrual characteristics and source of information were assessed. In addition students' knowledge regarding to polycystic ovary syndrome was assessed through asking multiple choice questions.

### 2.7.2 Implementation

First, the researcher divided all students into small groups according to their academic schedule. Then the researcher held a meeting with each group in their faculty during one of their free classes or between lectures to introduce herself and briefly explained the nature and the purpose of the study. They were informed that participation in this study was voluntary and they had right to withdraw at any time. Oral approval of students to share in this study was achieved. After obtaining the acceptance from the students to participate in the current study, the researcher provided an overview and clarification about the assessment tools questions to the whole class. Then, the Self-Administered Questionnaire was distributed to each student to assess their knowledge regarding to polycystic ovary syndrome (pre-test). The questionnaire took about 20-25 minutes to be completed.

After assessing the students' knowledge, the total sample divided into equal four groups, each group ranged from (20-25 students). The program was implemented for successive four weeks (2 days/week) and the content was divided on two interactive sessions for each group of students for one week. Each session was conducted for one hour started from 12 a.m. to 1 p.m. Health education sessions were given to the students in the form of lectures and group discussion by using audio-visual aids, it emphasized on improving student's knowledge regarding to PCOS. The lectures included information about anatomy and physiology of ovary, definition of PCOS, signs and symptoms, risk factors, causes, prevention and treatment. An additional 15 minutes were assigned at the end of the lecture for an open discussion with the students about this topic. Brochures containing brief points about PCOS were distributed to students at the end of session.

### 2.7.3 Evaluation

For each student two evaluation were done, the first one was at the beginning of the study as a baseline data (pre-test). The second evaluation was conducted after one month from the education program in order to detect the level of students' knowledge after health education regarding to PCOS (post-test). The same assessment tools were used during the first and second evaluations. The data collection lasted over two month starting from the beginning of September to the end of October 2015.

### 2.8 Administrative design

An official permission was obtained from the dean of the faculty of nursing at Minia University requesting his approval for data collection.

### 2.9 Ethical considerations

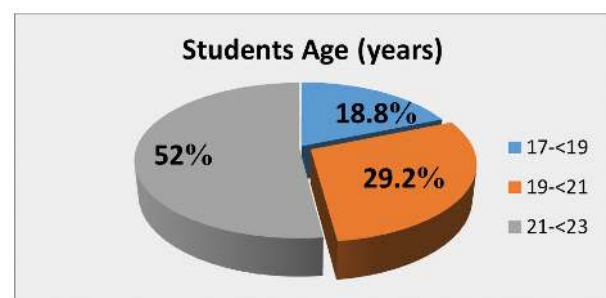
All official permissions to carry out the study were secured from pertinent authorities. All students were informed about the important and aim of this study. Oral consent was obtained from all the participants. All students were informed that their participation is voluntary and their rights to withdraw at any time, and confidentiality of the information obtained. 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 benefit.

### 2.10 Statistical analysis

For this current, study Statistical Package for Social Sciences (SPSS) version 20.0 was used for data analyzing. Descriptive statistics in the form of frequencies and percentages was used for qualitative data, while means and standard deviations were used for quantitative data. Cronbach alpha coefficient was used to test the reliability of the tools through their internal consistency. Qualitative variables categorical were compared using chi-square test. Quantitative continuous data were compared using independent samples *T* Test. A significant was considered when *p* value less than .05 and it considered highly significant when *p*-value less than or equal .01.

## 3. RESULTS

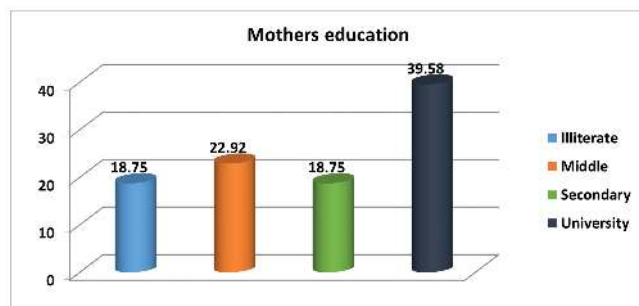
As shows in Figure 1 slightly more than half (52%) of the students between the ages of 21-23 years.



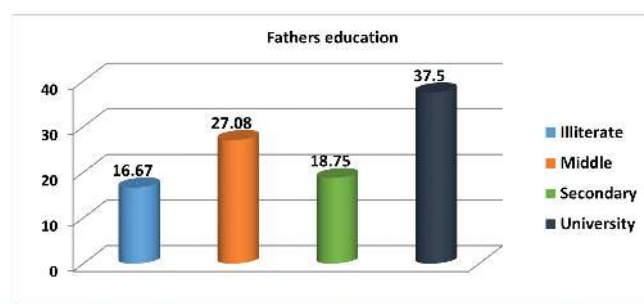
**Figure 1.** Percent distribution of the study sample by their ages (n = 96)

Figure 2 shows that, more than one third (39.58%) of students' mothers' education were university educated while (18.75%) of them had primary and or illiterate education.

Figure 3 shows that, more than one third (37.5%) of students' fathers' education were university educated while (16.67%) of them were illiterate education.



**Figure 2.** Percent distribution of the study sample by their level of mother's education (n = 96)



**Figure 3.** Percent distribution of the study sample by their level of father's education (n = 96)

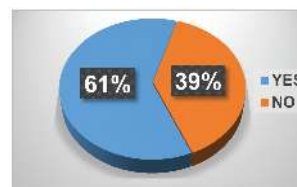
Table 1 shows distribution of the sample by their menstrual cycle characteristic, regarding to age of menarche, (45.8%) of the students were the age group range from 9-12 years.

More than three quarters (77.08%) of the students have regular menstrual cycle.

**Table 1.** Percent distribution of the sample regarding to menstrual cycle characteristics (n = 96)

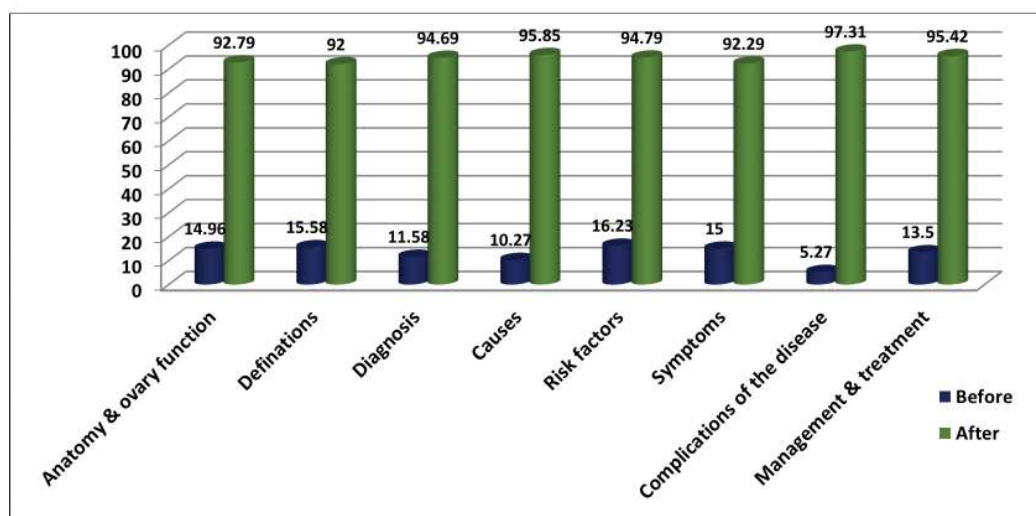
Characteristics	No.	%
<b>Age of menarche (years)</b>		
9-12	44	45.83
13-16	38	39.58
17-20	14	14.58
<b>Menstrual state</b>		
Regular	74	77.08
Irregular	22	22.92

Figure 4 shows that more than half (61%) of the students' have family history of PCOS.

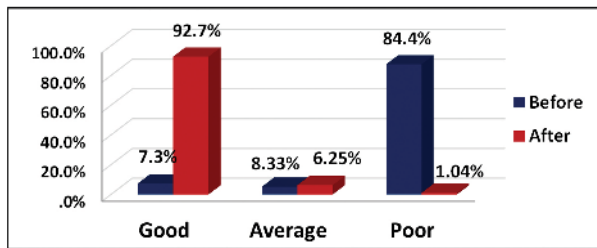


**Figure 4.** Distribution of the study sample regarding family history of polycystic ovary syndrome

The Figure 5 illustrates that, majority (94.69%, 95.85%, 94.79%, 97.31%, 95.42%) of the students' have correct knowledge regarding to diagnosis, causes, risk factors, complications, and management respectively after educational program.



**Figure 5.** Percent distribution of the study sample by their correct knowledge about polycystic ovary syndrome before and after educational program (n = 96)



**Figure 6.** Distribution of the sample by their level of knowledge before and after education program (n = 96)

As shown in Figure 6 significant improvement was observed in the level of knowledge after educational program compared to its level before ( $p < .001$ ). More than three quarters (92.7%) of the students had good knowledge, average knowledge observed on the (6.25%) from students, and only (1.04%) had poor knowledge after educational program.

Table 2 shows that the mean scores of post-test were significantly higher after educational program compared to their values at pre-test ( $p < .0001$ ).

**Table 2.** Total knowledge scores before and after educational program (n = 96)

Knowledge scores	Max. possible scores	Min. score obtained	Max. score obtained	Mean	$\pm SD$	t. test	Sig.
Pre-test	64	10	35	25.5	8.25	27.50*	0.0001
Post-test	64	29	63	54.66	6.60		

\*: highly statistically significant at  $p \leq .001$

As shown in Table 3 there was statistically significant difference between demographic characteristics such as age of the students and family history with students' knowledge at

pre-test ( $p < .02$  and  $p < .05$ ) respectively. While there is no relation between pre-test knowledge and level of father education.

**Table 3.** Relationship between demographic characteristics of students and their Knowledge at pretest (n = 96)

Items	Level of knowledge (%)						$\chi^2$	Sig
	Good (n = 7)		Average (n = 8)		Poor (n = 81)			
	No	%	No	%	No	%		
<b>Age</b>								
17-<19	0	00	0	00	18	18.75	11.29*	0.02
19-<21	2	2.08	6	6.25	20	20.83		
21-<23	5	5.2	2	2.08	43	44.79		
<b>Family history</b>								
Yes	7	7.3	6	6.25	46	47.9	5.75*	0.05
No	0	0.0	2	2.08	35	36.5		
<b>Mother education</b>								
Illiterate	0	00	0	00	18	18.75	11.26	0.08
Middle	0	00	3	3.12	19	19.79		
Secondary	3	3.12	0	00	15	15.62		
University	4	4.17	5	5.2	29	30.21		
<b>Father education</b>								
Illiterate	1	1.04	0	00	15	15.6	7.84	0.25
Middle	2	2.08	0	00	24	25		
Secondary	2	2.08	2	2.08	14	14.6		
University	2	2.08	6	6.25	28	29.2		

\* statistically significant at  $p \leq .05$

## 4. DISCUSSION

PCOS is a condition lead to enormous health problems and affects the reproductive health if it is not treated well. Increase awareness of girls about PCOS can helps them to gain knowledge, early detect and prevent the PCOS. The aim of the current study was to evaluate the effect of educational program on the level of knowledge regarding PCOS among adolescent girls. The present study results revealed

that there were improvements of all variables of knowledge. So, the research hypothesis is accepted and indicates that the educational program was effective.

Regarding to the students' knowledge at the pretest on PCOS, the study revealed that most of the students had poor knowledge and only 7.3% of students had good knowledge. This lack of knowledge regarding PCOS may be due to that students did not receive the needed information about PCOS. As

regards to the scores of the post-test of students about PCOS, results of the present study showed that an enhancement in knowledge which observed after the educational program in which mean posttest score was higher than mean pre-test score knowledge. Also majority of the students had good knowledge in all variables. Highly statistically significant difference was found between pre and post-test ( $p = .001$ ) regarding knowledge scores of polycystic ovarian syndrome. This may be due to clarity and consistency of the educational program and suitable media used, also this indicated that students gained knowledge regarding PCOS after implementing the educational program.

Theses study results were supported by Sowmya and Philomena (2013)<sup>[21]</sup> who reported that teaching program on polycystic ovarian syndrome was effective and statistically highly significant at 0.001 level. Moreover, these results also were congruent with Rao *et al.* (2008)<sup>[22]</sup> in their study which was done to determine the effectiveness of reproductive health education program among rural adolescent girls whom stated that there was increase in overall knowledge and their educational program achieved the desirable outcome regarding knowledge of adolescent girls.

Also, the current study results were supported by Kalpana (2013)<sup>[19]</sup> who studied the effectiveness of structured teaching program regarding knowledge on polycystic ovaries among the students. It showed that before program the majority of students had inadequate knowledge, whereas (9.17%) of them had moderate knowledge. As well as Shanmugasundaram (2011)<sup>[23]</sup> who studied the effect of structured teaching program on PCOS awareness among adolescent girls in a selected rural area and reported that improvement in the knowledge level on PCOS among adolescent girls was detected after implementing their teaching program. As same as Dhital and Badhu (2005)<sup>[24]</sup> in their study which was done to evaluate the effect of structured teaching program in improving knowledge and attitude of school going adolescents on reproductive health and reported that using teaching program was an effective method to improve knowledge and attitude of the adolescent girls regarding reproductive health.

Moreover, study results are consistent with Shobha *et al.* (2014)<sup>[25]</sup> it was found that the found effectiveness of awareness program regard PCOS and also found that the awareness program was effective in improving the knowledge on PCOS. In additional to Hadayat *et al.* (2014)<sup>[26]</sup> who studied the effectiveness of educating program for upgrading nurses' knowledge regarding polycystic ovarian syndrome and showed that the highest improvement of knowledge regarding all the program content and mean post-test score

was higher than the mean pre-test knowledge score. Also the present study results were supported by those in a study conducted by Simu (2013)<sup>[27]</sup> who evaluated the effectiveness of self-instructional module on knowledge regarding polycystic ovarian syndrome among adolescent and reported that adolescent girls have remarkable increase in knowledge due to the effectiveness of self-instruction module.

The results of the current study showed that there was highly statistically significant relationship between age of the students, family history and their mother education with level of knowledge at pre-test. These results were congruent with Sowmya and Philomena (2013)<sup>[21]</sup> who showed that there was relation between the age in years with pre-test knowledge scores. While results of a study done by Kalpana (2013)<sup>[19]</sup> were incongruent with the results of the present study, that indicated that there is no relation between pre-test knowledge scores and age of students.

## 5. CONCLUSION AND RECOMMENDATIONS

PCOS is a condition which can lead to several health related problems and affects the reproductive adolescent if not treated properly. Teaching adolescent girls on PCOS helps them to gain knowledge, hence helps to early detect and prevent the PCOS. The current study assess knowledge of adolescent girls regarding polycystic ovarian syndrome before and after the education program. According to the results of the present study before utilization of educational sessions, most of the students (84.4%) had poor knowledge regard polycystic ovarian syndrome. After the educational sessions there was enhancement of knowledge score on polycystic ovarian syndrome. It found that the mean scores of post-test were significantly higher after educational program compared to their values at pre-test in all variable. Also the overall score post-test mean value (54.66) was higher than the overall score pre-test mean value (25.5). So it can be concluded that, educational program is effective in improving the knowledge of adolescent girls. Based on the results, the current study recommended that: Application of educational program for adolescent girls in different setting should be conducted in order to increase level of knowledge regarding PCOS, Nursing curriculum should be updated to include comprehensive information about PCOS to improve the awareness of other women once in practice. Study can be replicated on a larger sample for generalizing the findings.

## CONFLICTS OF INTEREST DISCLOSURE

The author has no potential conflicts of interest, financial or otherwise, to disclose. No funding has been received to conduct this study.



## REFERENCES

- [1] Sirmans SM, Pate KA. Epidemiology, diagnosis, and management of polycystic ovary syndrome. *Clinical Epidemiology*. 2014; 6: 1-13. Published online 2013 Dec 18. <http://dx.doi.org/10.2147/CLEP.S37559>
- [2] Hamzeh R, Balen A. Up-to-date Definition of the Polycystic Ovary and Polycystic Ovary Syndrome. *Ultrasound*. 2006; 14(3): 142-144. <http://dx.doi.org/10.1179/174313406X120477>
- [3] Osman HG, El-Refaeey AAA, El-Sokkary AMA, *et al.* A Study on Fat Mass and Obesity Associated (FTO) Gene Variant in Egyptian Women with Polycystic Ovarian Syndrome. *Australian Journal of Basic and Applied Sciences*. 2014; 8(13): 98-104.
- [4] Vos T, Flaxman AD, Naghavi M, *et al.* Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012; 380(9859): 2163-96.
- [5] Guraya SS. Prevalence and ultrasound features of Polycystic ovaries in young unmarried Saudi females. *Journal of Microscopy and Ultrastructure*. 2013; 1: 30-34. <http://dx.doi.org/10.1016/j.jmau.2013.06.002>
- [6] Teede H, Deeks A, Moran L. Polycystic ovary syndrome: a complex condition with psychological, reproductive and metabolic manifestations that impacts on health across the lifespan. *BMC Med*. 2010; 30(8): 41.
- [7] Franks S, McCarthy MI, Hardy K. Development of polycystic ovary syndrome: involvement of genetic and environmental factors. *International Journal of Andrology*. 2006; 29(1): 278-285.
- [8] Unfer V, Proietti S, Gullo G, *et al.* Polycystic Ovary Syndrome: Features, Diagnostic Criteria and Treatments. *Endocrinol Metab Syndr*. 2014; 3(3): 1-12.
- [9] Nicandri KF, Hoeger K. Diagnosis and treatment of polycystic ovarian syndrome in adolescents. *Curr Opin Endocrinol Diabetes Obes*. 2012; 19(6): 497-504. PMID:23076041. <http://dx.doi.org/10.1097/MED.0b013e32835a1a03>
- [10] Ekhzaimy A, *et al.* Clinical Characteristics of Polycystic Ovary Syndrome Among Saudi Women, The Endocrine Society's News Embargo Policy. 2015. Available from: <https://www.endocrine.org/news-room/endo-annual-meeting>
- [11] Garad R, Teede HJ, Moran L. An evidence-based guideline for Polycystic Ovary Syndrome. *Australian Nursing Journal*. 2011; 19(4): 30.
- [12] Hollinrake E, Abreu A, Maifeld M, *et al.* Increased risk of depressive disorders in women with polycystic ovary syndrome. *Fertil Steril*. 2007; 87: 1369-1376. PMID:17397839. <http://dx.doi.org/10.1016/j.fertnstert.2006.11.039>
- [13] Sheehan MT. Polycystic ovarian syndrome: diagnosis and management. *Clinical Medicine & Research*. 2004; 2(1): 13-27. <http://dx.doi.org/10.3121/cmr.2.1.13>
- [14] Thomson RL, Buckley JD, Brinkworth GD. Exercise for the treatment and management of overweight women with polycystic ovary syndrome: a review of the literature. *Obesity reviews*. 2011; 12(5): e202-e210. PMID:20546140. <http://dx.doi.org/10.1111/j.1467-789X.2010.00758.x>
- [15] Ricci SS. Essential of maternity newborn and women's health nursing, benign disorders of the female reproductive tract, second edition, wolters Kluwer, Lippincott; 2009. p. 185-186.
- [16] Price N, Knibbs S. How effective is peer education in addressing young people's sexual and reproductive health needs in developing countries? *Children & Society*. 2009; 23: 291-302.
- [17] Mohamed E. Metformin in the management of infertility. *Middle East Fertility Society Journal*. 2008; 13(1): 19-21.
- [18] Feldman R. Understanding polycystic ovarian disease. New Delhi: Graw Hill publishers; 2014.
- [19] Kalpana SP. A study to evaluate the effectiveness of structured teaching program (STP) regarding knowledge on polycystic ovaries among the students of selected preuniversity college in Bangalore. Degree of Master of Science in nursing in community health nursing. 2013.
- [20] Price N, Knibbs S. How effective is peer education in addressing young people's sexual and reproductive health needs in developing countries? *Children & Society*. 2009; 23: 291-302.
- [21] Sowmya MA, Fernandez P. Effectiveness of structured teaching Programme on knowledge of polycystic ovarian syndrome among adolescent girls. *Nitte University Journal of Health Science NUJHS*. 2013; 3(3).
- [22] Rao RS, Lena A, Nair NS, *et al.* Effectiveness of reproductive health education among rural adolescent girls: a school based intervention study in Udupi Taluk, Karnataka. *Indian J Med Sci*. 2008 Nov; 62(11): 439-43.
- [23] Shanmugasundaram S. Effectiveness of structured teaching program on PCOS awareness among adolescent's girls in a selected rural area. Chennai. India. Abster Academy Health Meet. Accessed on 8 Nov 2011. Available from: <http://www.google.com>
- [24] Dhital AD, Badhu B. Effectiveness of structured teaching program in improving knowledge and attitude of school going adolescents on reproductive health. *Kathmandu University. Medical Journal*. 2005; 4(12): 380-383.
- [25] Shobha, Devi ES, Prabhu A. An exploratory survey to identify the adolescents with high risk for Polycystic Ovarian Syndrome (PCOS) and to find the effectiveness of an awareness program among students of selected pre university colleges of Udupi District. *IOSR Journal of Nursing and Health Science*. 2014; 3(3): 66-69. <http://dx.doi.org/10.9790/1959-03326669>
- [26] Amasha HA, Heeba MF. Implementation and Evaluation of Effectiveness of Educating Program for Upgrading Nurses' Knowledge Regarding Polycystic Ovaries Syndrome. *IOSR Journal of Nursing and Health Science*. 2014; 3(1): 1-8. <http://dx.doi.org/10.9790/1959-03140108>
- [27] Simu S. A study to evaluate the effectiveness of self-instructional module on knowledge regarding polycystic ovarian syndrome among adolescent girls in selected PU colleges at Hassan, Master thesis, obstetrics and gynecology Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore; 2013.