

PREVALENCE OF POLYCYSTIC OVARIAN SYNDROME WITH ASSOCIATED RISK FACTORS AND IMPACT ON WELL-BEING AMONG WOMEN IN REPRODUCTIVE AGED (18-45) YEARS IN AL - MADINAH 2017

Shayan M. Alraddadi*¹, Khadija A. Borzangi², Eman M. Almuher¹, Amjad F. Albaik¹, Lujain A. Aljawad¹, Asrar A. Shaqroon¹ and Dr. Jehan Alhazmi³

¹Medical Intern from Taibah University.

²Fifth Year Medical Student from Taibah University.

³Consultant Obstetrics and Gynecology , RTP, at Obstetrics and Gynecology Maternity and Children hospital , Al Median.

Article Received on
02 Jan. 2018,

Revised on 22 Jan. 2018,
Accepted on 12 Feb. 2018

DOI: 10.20959/wjpr20184-11222

***Corresponding Author**

Shayan M. Alraddadi

Medical Intern from Taibah
University.

ABSTRACT

Background: Polycystic ovary syndrome (PCOS) is a common endocrine disorder in women worldwide. There a shortage of recent data about its prevalence and epidemiologic features in Saudi Arabia.

Objectives: The study aimed to assess the prevalence of PCOS among women from 18-45 years, in Madinah City, Saudi Arabia during 2017, and to investigate its associated symptoms and the possible risk factors associated with PCOS among the studied women. **Methods:** A cross-sectional study was conducted in Madinah City, Saudi Arabia. The study analysis included data from 719 women living in Madinah city.

A convenient nonrandom sampling technique was used. The data were Collected by an electronic self-administered structured questionnaire The questionnaire included 5 sections related to the socio-demographic data, PCOS symptoms for diagnosis, PCOS risk factors, reproductive and medical history. The collected data were analyzed using the appropriate statistical methods. **Results:** The prevalence of PCOS among the studied women was 32.5% (95% CI= 29.2-36.1%). The prevalence was significantly varied by women's age, marriage, job and educational level. Menstrual irregularities were found in 54.9% of PCOS women. PCOS was associated with hirsutism in almost all body areas, weight gain, acne, oily skin, milky nipple discharge, and dyslipidemia. The risk of PCOS in this study was found to significantly increase among women aged from 25 to less than 32 years (OR= 2.40), married

(OR= 3.65) and high socioeconomic level (OR= 4.90). The risk, however, was significantly decreased among secondary and highly educated women, not employed, and students with the estimated OR was 0.45, 0.25, 0.40 and 0.15, respectively. **Conclusions:** The study revealed a considerable high prevalence of PCOS among women in Madinah city. Increasing awareness of women in the city about the value of early diagnosis and intervention is beneficial to reduce its related health complications, and to reduce the magnitude of this problem in future.

KEYWORDS: Polycystic ovarian syndrome, Prevalence, Hirsutism, Saudi Arabia.

1-INTRODUCTION

Polycystic ovary syndrome is hormonal disturbance affect the women.^[1] about 5-10% at their reproductive age, and cause multiple complication to them.^[2] The evidence of recent study suggest to some genetic and environmental factor which leads to hormonal disturbance as the form of high androgen and estrogen level , but the exact cause is still unknown.^[3]

According to the new Rotterdam criteria formulated by the European Society for Human Reproduction and Embryology and the American Society for Reproductive Medicine, we should have two out of three criteria that include anovulation, androgen excess and polycystic by ultrasound.^[4] Also, the ultrasound criteria for the diagnosis of polycystic ovaries characterized by presence of 12 or more follicles measuring 2-9 mm in diameter and/or increased ovarian volume (>10 cm).^[5]

The diagnosis of Polycystic ovary syndrome by clinical exclusion and early diagnosis is mandatory to prevent early and late sequel of the syndrome.^[6]

2-Rational

- It is an area of interest and it is a common disease. despite its popularity, no study was done locally about it. So, the estimated impact on the local population cannot be determined.
- The researcher noticed PCOS is commonly seen at Al-Madinah Al-Monawerah citizen and it is more clustered in certain families. Which usually affect the patient life style

3-RESEARCH OBJECTIVES

3-1 General objective

To estimate the prevalence of PCOS among women in reproductive aged 18–45 years in Al-Madinah, and to identify the associated risk factors, besides detecting the impact on the wellbeing.

3-2 Specific objectives

1. To explore the sociodemographic status of the participants.
2. To determine the relationship between PCOS and the demographic data (age, sex, and duration) in Al-Madinah.
3. To detect symptoms implicated in PCOS development.
4. To identify the relationship between family history of PCOS and it It occurs.

4-LITERATURE REVIEW

A study was done at Riyadh region, Saudi Arabia on Mars 2017. Aim of the study was to investigate whether patients with polycystic ovarian syndrome display increased expression of inflammatory markers in adipose tissue and the results was There were no effects of PCOS on the expression of any of the adipocytokines genes measured in subcutaneous adipose tissue.^[7]

A retrospective –cohort study was carried of women aged 18–40 years with PCOS undergoing IVF during 2006–2012 at a University Hospital in Riyadh, Saudi Arabia 2017, and result was a total of 210 women with PCOS, 109 of them received metformin in addition to gonadotropins. Patients who received metformin were 16% less likely to be pregnant in comparison with those who did not receive metformin.^[8]

Also a group study was comprised 50 Saudi women (aged 24 to 31 years), who had been diagnosed as having PCOS. Were attending the outpatients infertility clinic at the Department of Obstetrics and Gynecology of Safa Al-Madinah Hospital, Al-Madinah, Saudi Arabia, from September 2008 to March 2009. Also, 40 healthy Saudi women volunteers (control group, aged 25 to 30 years. the results was Women with PCOS had significantly higher fasting insulin, LH, lipid profile and free androgen index than healthy controls and) and women with PCOS had significantly lower nitric oxide and high-density lipoprotein cholesterol compared with healthy controls , so study revealed that Saudi women with PCOS had a significantly different levels of plasma markers of cardiovascular disease compared with normal controls.

Therefore, clinicians who manage women with PCOS should follow up on these markers to reduce the risk of cardiovascular disease.^[9]

5-METHODOLOGY

5-1 Study design

This is a descriptive cross-sectional among women in reproductive aged (18-45) years.

5-2 Study area

Madinah is a city in the Hejaz, and the capital of the Al Madinah Region of Saudi Arabia. The city contains al-Masjid an-Nabawi] "the Prophet's Mosque"[, which is the burial place of the Islamic prophet Muhammad, and is the second-holiest city in Islam after Mecca.^[10]

Al Madinah Al Munawarah is located at Eastern Part of Al Hijaz Region in the Kingdom of Saudi Arabia on longitude 39,36,6 and Latitude 24,28,6.^[10] Madinah is located in the north-western part of the Kingdom, to the east of the Red Sea, which lies only 250 km (155 miles) away from it.^[10] As of 2013, the city of Medina has a population of about 1.180.770 million.^[11]

5-3 Study Period

This study will be conducted during 3 months from October to December in 2017

5-4 Study Population

Subjects of this study were women who living in Al-Madinah, aged from 18 to 45 years old regardless of nationality.

Where Population size of women aged 18–45 years in Al-Madina is 340711.^[12]

5-4-1 Inclusion criteria

- 1- Follow up women only in group aged 18–45 years.
- 2- Patients who speak Arabic or English only.
- 3- All nationality.

5-4-2 Exclusion criteria

- 1- Patients doesn't speak Arabic or English.
- 2- Women not in group aged 18-45 years.
- 3- Women not resident in AL-Madinah.

4-Women have hyperthyroidism.

5-Women have hyperprolactinemia.

5-5 Sampling method

5-5-1 Sampling Size

- Population size is 340711.
- Expected frequency is 50%.
- Confidence level is 99%.
- Sample size is 663.
- The calculated sample size by using Epi info.

5-5-2 Sampling technique

Participants for this study were selected by convenient nonrandom sampling technique. In which the people who were available to the data collection until the size of the sample of the study was achieved.

6- Data management

6-1 Data Collection Tools

Electronic self-administered semi structured questionnaire was used for data collection. A questionnaire form, consisted of 5 main sections related to the general demographic data, PCOS symptoms for diagnosis, PCOS risk factors, obstetric history and medical history. The risk factors assessed included age, obesity (BMI) and family history, as well as the presence of other co-morbid diseases such as diabetes mellitus, dyslipidemia and hypertension. Questionnaire needed 5 minutes to be completed.

6-2 Data analysis

The data were analyzed using the statistical analysis system (SAS) software package. The prevalence of polycystic ovary syndrome (PCOS) among the studied women was assessed and its 95% confidence interval was calculated. The data were tabulated and presented in frequency number and percent. Chi square and Fischer exact tests were used as appropriate to compare the studied categorical variables, by PCOS status of the studied women. The level of P value ≤ 0.05 was considered as an indicator for statistical significance. Logistic regression analysis was used to examine the association of PCOS with number of affecting risk factors among the studied subjects where women with PCOS were considered as cases and those without PCOS were considered as controls. The participation was voluntary and anonymous.

Also, the confidentiality and privacy of the collected data were assured, and the data were only used for the research purpose.

7-Pilot Study

The questionnaire will be administered by researcher to 10 cases to test for applicability and feasibility of the questionnaire, time taken to finish and to test for process of conducting the study. The data collected from those subjects will not be included in the main study.

8- Study variables

The questionnaire contains the following groups of variables:

1. Demographic information.
2. Symptoms regarding to PCOS.
3. Obstetric history of patient.
4. Medical history of patient.
5. Risk factors of PCOS.

9- Limitation of study

- Time.
- response from the patient

10- Ethical consideration

There was a brief introduction in the first page of the questionnaire assuring the confidentiality of individual's answers and then written consent was taken from the participants for approval.

11- RESULTS

A total of 719 women from Madinah city, Saudi Arabia were included in the study. The prevalence of PCOS among the studied women was 32.5% (95% CI= 29.2-36.1%).

Table 1 presented the distribution of PCOS among the studied women by their socio-demographic characteristics. A statistically significant difference, however, was found by age groups, educational level, job, socioeconomic level and marital status of the studied women where the highest prevalence of PCOS was found among women aged from 25- <32 years (43.3%), low educated (59.4%), employed (58.9%), and high socioeconomic level (64.5%) women. Although not significant, PCOS was also high among overweight women (35.6%)

with BMI of 25- < 30 kg/m² and obese women (33%) with BMI of \geq 30 kg/m² and among those reported to have had positive family history of PCOS, particularly first degree relative (36.3%). The distribution of PCOS was nearly similar among Saudi and non-Saudi women as it was 32.6% among the studied Saudi women and 31% among non-Saudi women.

Table 2 showed the reproductive and medical characteristics of the studied women by PCOS. The menstrual cycle was irregular in 54.9% of women with PCOS with a statistically significant difference compared with women with no PCOS ($p < .0001$). Also, the duration of the cycle was significantly prolonged among PCOS women. The reported pregnancy and abortion, however, was more among women without PCOS, and the duration since last birth was significantly more among them. Contraceptive use was significantly higher among PCOS women where 51.5% of them reported contraceptive. The PCOS women have also showed significant higher prevalence of DM (15.4), hypertension (10.6) and thyroid diseases (23.5%) among them.

Table 3 displayed the PCOS associated symptoms of the studied women by polycystic ovary syndrome (PCOS) status. There have been statistically significant difference of PCOS associated symptoms among the studied women by PCOS status. Hirsutism was significantly more among PCOS women in almost all body areas. Also, a significant higher percentage of PCOS women reported to increase in weight (69.2%), presence of acne (52.6%), to have oily skin (55.1%), milky nipple discharge (31.6%) and dyslipidemia (39.3%) compared with women without PCOS.

Table 4 showed the association of PCOS with risk factors among the studied women. There have been positive associations between PCOS and number of these studied factors. The risk with significantly increased 2.4 times among women aged from 25 to less than 32 years with odds ratio (OR) of 2.40 (95% CI= 1.70-3.41), 3.6 times (OR= 3.65; 95% CI= 2.60-5.14) among married women, and about 5 times among women reported high socioeconomic level (OR= 4.90; 95% CI = 2.70-8.78). On the other hand, however, the risk was significantly decreased among secondary educated (OR= 0.45), university and highly educated (OR= 0.25), not employed (OR= 0.40), students (OR= 0.15) and retired (OR= 0.55) women. Positive family history was found to positively associate with an increased risk of PCOS among the studied women, particularly for first degree relatives; although weak and not significant. In contrast to these findings, body mass index has appeared to have no effect on the risk of PCOS among this cohort of women.

Tables of the study

Table 1: Distribution of the studied females by polycystic ovary syndrome (PCOS) status and their personal characteristics.

Characteristics	PCOS (n= 234)	No PCOS (n= 485)	P value
Age in years			
18-	78 (24.2)	244 (75.8)	
25-	106 (43.3)	139 (56.7)	
32-	33 (32.7)	68 (67.3)	
39- 45	17 (33.3)	34 (66.3)	<.0001*
Nationality			
Saudi	221 (32.6)	456 (67.4)	
Non Saudi	13 (31.0)	29 (69.0)	0.86
Educational level			
Less than secondary	38 (59.4)	26 (40.6)	
Secondary	72 (38.9)	113 (61.1)	
University and higher	124 (52.9)	346 (47.1)	<.0001*
Job			
Employee	89 (58.9)	62 (41.1)	
None employee	76 (34.1)	147 (65.9)	
Student	65 (19.4)	271 (80.6)	
Retired	4 (44.4)	5 (55.6)	<.0001*
Socioeconomic level			
Low	33 (27.0)	89 (73.0)	
Average	141 (27.9)	363 (72.1)	
High	60 (64.5)	33 (35.5)	<.0001*
Marital status			
Single	33 (27.0)	89 (73.0)	
Married	141 (27.9)	363 (72.1)	
Divorced	60 (64.5)	33 (35.5)	<.0001*
BMI (kg/m²)			
< 19	138 (32.9)	280 (67.1)	
19-<25	48 (29.3)	116 (70.7)	
25-<30	32 (35.6)	58 (64.4)	
≥ 30	16 (33.0)	31 (67.0)	0.75
Family history of PCOS			
No	175 (31.6)	378 (68.4)	
1 st degree relative	37 (36.3)	65 (63.7)	
2 nd and 3 rd degree	22 (34.4)	42 (65.6)	0.62

*Significan

Table 2: Reproductive and medical characteristics of the studied women by polycystic ovary syndrome (PCOS) status.

Characteristics	PCOS (n= 234)	No PCOS (n= 485)	P value
Menstrual cycle			
Regular	78 (17.9)	357 (82.1)	<.0001*
Irregular	156 (54.9)	128 (45.1)	
Duration of cycle			
< 25 days	58 (33.9)	113 (66.1)	
25-	87 (23.6)	281 (76.4)	
35-	23 (46.0)	27 (54.0)	
> 60	5 (71.4)	2 (28.6)	
Totally variable	61 (49.6)	62 (50.4)	<.0001*
Pregnancy number			
No	147 (32.1)	311 (67.9)	
≥ 1	87 (33.3)	174 (66.7)	0.73
Abortion			
No	174 (29.5)	416 (70.5)	
≥ 1	60 (46.5)	69 (53.5)	0.0002*
Duration since last birth			
6 months	74 (62.7)	44 (37.3)	
One year	33 (41.3)	47 (58.7)	
≥ 2 years	44 (29.3)	106 (70.7)	<.0001*
Contraceptive use			
No	165 (28.2)	420 (71.8)	
Yes	69 (51.5)	65 (48.5)	<.0001*
Associated medical conditions			
DM	36 (15.4)	14 (2.9)	<.0001*
Hypertension	25 (10.6)	13(2.6)	<.0001*
Thyroid diseases	55 (23.5)	28 (5.8)	<.0001*

*Significant

Table 3: PCOS associated symptoms of the studied women by polycystic ovary syndrome (PCOS) status.

Characteristics	PCOS (n= 234)	No PCOS (n= 485)	P value
Hirsutism			
Yes	141 (60.0)	140 (28.9)	<.0001*
Chin	79 (33.7)	74 (15.2)	0.04*
Breasts	54 (22.9)	60 (12.4)	0.61
Chest between breast	41 (17.5)	57 (11.7)	0.44
Belly	41 (17.5)	99 (20.4)	<.0001*
Back	23 (9.8)	43 (8.8)	0.07
Upper arms	19 (8.1)	39 (8.0)	0.04*
Upper thighs	48 (20.5)	68 (14.0)	0.33
Weight increase	162 (69.2)	171(35.3)	<.0001*
Presence of acne	123 (52.6)	199 (41.0)	0.003*

Oily skin	129 (55.1)	178 (36.7)	<.0001*
Milky nipple discharge	74 (31.6)	38 (7.8)	<.0001*
Dyslipidemia	92 (39.3)	58 (11.9)	<.0001*

*Significant.

Table 4: Risk factors affecting PCOS among the studied women.

Factors	PCOS (n= 234)	No PCOS (n= 485)	OR	95% CI
Age in years				
18-	78	244	1.00	Ref.
25-	106	139	2.40*	1.70-3.41
32-	33	68	1.50	0.93-2.47
39- 45	17	34	1.55	0.83-2.95
Educational level				
Less than secondary	38	26	1.00	Ref.
Secondary	72	113	0.45*	0.24-0.77
University and higher	124	346	0.25*	0.14-0.42
Job				
Employee	89	62	1.00	Ref.
None employee	76	147	0.40*	0.23-0.55
Student	65	271	0.15*	0.11-0.25
Retired	4	5	0.55	0.14-2.15
Socioeconomic level				
Low	33	89	1.00	Ref.
Average	141	363	1.05	0.67-1.63
High	60	33	4.90*	2.70-8.78
Marital status				
Single	33	89	1.00	Ref.
Married	141	363	3.65*	2.60-5.14
Divorced	60	33	1.60	0.50-5.17
BMI (kg/m²)				
< 19	138	280	1.00	Ref.
19-<25	48	116	0.85	0.56-1.23
25-<30	32	58	1.15	0.70-1.80
≥ 30	16	31	0.98	0.51-1.86
Family history of PCOS				
No	175	378	1.00	Ref.
1 st degree relative	37	65	1.30	0.80-1.90
2 nd and 3 rd degree	22	42	1.15	0.65-1.95

*Significant

12- DISCUSSION

Polycystic ovary syndrome (POS) is a common endocrine disorder among females worldwide. The present study revealed the prevalence of PCOS among the studied women in Madinah city, Saudi Arabia to be 32.5%. In Saudi Arabia, the prevalence of PCOS was varied from a region to region. Higher prevalence of PCOS, however, was reported in a

previous study conducted on 201 female students from Taibah University in Madinah city. From this cohort of 201 participants, 108 (53.7%) were diagnosed to have PCO and most of them were in the age group 25-30 years.^[13] In our study, the prevalence was significantly higher in women aged from 25 to less than 32 years.

In a recent study conducted on a population of 126 young female students in Qatar, with their age was ranged from 18-25 years, the prevalence of PCOS among was found to be 18.3%.^[14] This prevalence was comparable with the prevalence detected in this with women of similar age from 18 to less than 25 years where the prevalence among this age group was 24% in our study. However, the prevalence of PCOS was found to vary in different countries. Williamson et al in their study reported the prevalence of PCOS between 2.2-26%.^[15] According to a prospective study conducted by Nidhi et al, on 460 girls aged 15-18 years in a residential college in Andhra Pradesh, South India, the prevalence of PCOS was found to be 9.13% in adolescents.^[16] The highest reported prevalence in the literature was 70% and it was found in Iranian women with gestational diabetes and a mean age of 31.5 ± 4 years.^[17] In Western countries, however, the prevalence was low. A cross-sectional cohort study carried out at Copenhagen University Hospital, Denmark, between 2008 and 2010 on 447 female students aged 20–40 years, and the prevalence among them was 16.5%.^[18]

The PCOS prevalence variations could be attributed to various population studies, their sample size, age of included women, the site where the subjects recruited, the criteria used to define PCOS and the methods used to define any criteria.^[19] There is no single criterion for PCOS diagnosis. Its diagnosis is rather based on a combination of clinical, laboratory and ultrasound results,^[20] with these three definitions are in common use. The first one was by the National Institute of Health (NIH) in 1990 in which clinical, biochemical signs and clinical symptoms of ovulation disorder or infertility in the absence of non-classical adrenal hyperplasia are the diagnostic criteria of the disease,^[21,22] The second definition (Rotterdam) was by Fertility and Embryology Association of Europe and America Fertility Society in Rotterdam conference in 2003 and has considered only two criteria from these criteria; Oligoovulation, clinical hyperandrogenism, or biochemical hyperandrogenism for diagnosis of PCOS,^[23] The third and the newest definition was presented in 2006 by Androgen Excess Society (AES) and considered the following criteria for the diagnosis of PCOS; hirsutism or hyperandrogenism, oligoovulation and anovulation or polycystic ovaries, and increase level of androgens or related disorders.^[24]

The demographic details, menstrual irregularities and associated PCOS symptoms were found in this study to significantly differ between women with and without PCOS. A significantly higher frequency of PCOS was found among low educated (59.4%), employed (58.9%), high socioeconomic level (64.5%) and women reported positive family history of PCOS (36.3%). These findings were consistent with the results of the recent study conducted in Qatar where PCOS subjects have significantly higher frequencies of family history of PCOS the control subjects.^[14] The high frequency of menstrual irregularities detected in this study among the studied POS women was also the matter in almost all PCOS studies.^[13-19] Menstrual irregularity is a diagnostic criterion found in all of the above mentioned definition used for diagnosis of PCOS. The PCOS women have also showed significant higher prevalence of DM (15.4) in this study. Gestational diabetic women in the Iranian study were found to have the highest reported prevalence of PCOS in the literature where it was 70%.^[17] Polycystic ovary syndrome (PCOS) recently has been identified as a risk factor associated with type 2 diabetes.^[25]

A statistically significant difference of PCOS associated symptoms among the studied PCOS women was found in this study. The prevalence of hirsutism associated with PCO in this study (60%) was higher than that reported in the previous study conducted in Taibah University, Madinah city.^[13] Also, it was higher than that reported in other similar studies conducted in Greek with a reported prevalence of 29%.^[26] and two other PCOS prevalence studies with hirsutism varies from 5-29%.^[27,28] In a Saudi study on 101 Saudi women presenting with hirsutism at King Khalid

University Hospital, Riyadh, Saudi Arabia, PCOS was the cause of hirsutism in 83 patients (82%),^[29] The lower prevalence of hirsutism in other reports, however, might be attributed to the used methodologies and the difference in the definition of hirsutism used in different studies worldwide.

Other PCOS symptoms were detected frequently in the studied PCOS group as increase in body weight (69.2%), presence of acne (52.6%), to have oily skin (55.1%), milky nipple discharge (31.6%) and dyslipidemia (39.3%) compared with women without PCOS. Acne and other dermatological lesions were also reported in other studies conducted in Gulf region,^[14,30,31] and it was as high as 50% in Denmark study.^[18] The contraceptive use was significantly more among POS group and it was approach 52%. Oral contraceptives were found to be administered to women with PCOS with more severe clinical

hyperandrogenism,^[32] and this in turn may exposed them to the risk of weigh increase and DM.^[32,33]

The risk of PCOS in this study was found to significantly increase among women aged from 25 to less than 32 years with OR of 2.40 (95% CI= 1.70-3.41), married (OR= 3.65; 95% CI= 2.60-5.14) and high socioeconomic level (OR= 4.90; 95% CI = 2.70-8.78). With the exception of PCOS associated with gestational diabetes mellitus, the high prevalence of PCOS was documented in this age in most of the published related studies (13-15,18). On the other hand, however, the risk was significantly decreased among secondary and highly educated women, not employed, and student (OR= 0.15) with the estimated OR was 0.45, 0.25, 0.40 and 0.15 respectively. Educated women were generally positive to understanding the nature of disease and to seek medical care and advice and to the opportunity to share experience.^[34]

Positive family history was found to increase the risk of PCOS among the studied women, particularly for first degree relatives. The same finding was also reported in a recent case-control study where the risk of PCOS was positively with family history of infertility, and menstrual irregularity of mother.^[35] The BMI in the present study, however, was found to have no effect on the risk of PCOS among the studied women, although the PCOS was more prevalent among overweight and obese women. Metabolic abnormalities associated with PCOS are obesity, dyslipidemia, insulin resistance, glucose intolerance, and hypertension.^[36] Compared with non PCOS women, PCOS in this study showed significant high prevalence of DM, hypertension and dyslipidemia.

This study has several important strengths: the high response rate, the relative large sample and the descriptive cross-sectional community-based design are factors consolidate the study results. According to available knowledge, the study is the first to assess the prevalence of PCOS among females in Madinah city outside the campus of Taibah University. The used questionnaire was comprehensive valid and including all related data to PCOS at a time. Using validated comprehensive tools are known to increase the confidence in obtaining sound and standard information. Also, the results of study will add to the Saudi literature concerning this issue. Although the data collection was based on subjective experiences of the studied women, self-reporting in such types of studies is the most practical way to obtain information, particularly in communities with special culture and tradition. However, the use of structured and anonymous questionnaires has facilitated the confidence in obtaining sound information and minimizes its potential bias.

15-CONCLUSION

The present study revealed a considerable high prevalence of PCOS among women living in Madinah, Saudi Arabia. Based on the previous report, the prevalence of PCOS is increasing gradually in Madinah and it may be a major health concern in future. Implementing programs to increase awareness of women in Madinah city about the value of early diagnosis and intervention will reduce the long term health complications associated with PCOS, and could significantly reduce the prevalence of problem in the city. Further studies are needed in different communities and have to address the knowledge, and perception of Saudi women towards PCOS.

16- ACKNOWLEDGMENT

We would like to acknowledge the efforts of our supervisor Prof. Jehan Alhazmi, who helped us in every step of our study. We also appreciate the students Shifaa Saud Alamri, Rehab Nasser Eid Alrashidi, Abrar Humaidi Alhubayshi and Fawziah Abdulhalim Abdulhalim for their extraordinary efforts as data collectors.

16- BUDGET

It self-funded.

17- REFERENCES

1. <http://www.adambalen.com/pcos/>.
2. Avery JC, Braunack-Mayer AJ. The information needs of women diagnosed with polycystic ovarian syndrome - Implications for treatment and health outcomes. *BMC Womens Health*, 2007; 7: 9.
3. Goodarzi, M. O., Dumesic, D. A., Chazenbalk, G., & Azziz, R. (2011). Polycystic ovary syndrome: Etiology, pathogenesis and diagnosis. *Nature Reviews Endocrinology*, 2016; 7(4): 219–231.
<http://www.nature.com/nrendo/journal/v7/n4/full/nrendo.2010.217.html> External Web Site Policy.
4. Broekmans, F. J., Knauff, E. A., Valkenburg, O., Laven, J. S., Eijkemans, M. J., & Fauser, B. C. PCOS according to the Rotterdam consensus criteria: Change in prevalence among WHO-II anovulation and association with metabolic factors, 2006.
5. Balen AH, Laven JS, Tan SL, Dewailly D. The ultrasound assessment of the polycystic ovary: International consensus definitions. *Hum Reprod Update*, 2003; 9: 505-14.

6. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. *Fertil Steril*, 2004; 81: 19–25.
7. Gene expression of inflammatory markers in adipose tissue between obese women with polycystic ovary and normal obese women. Author: Alshammari G, Khan R, Brameld J, Amer S, Lomax MA. PUPMED The effect of metformin use on pregnancy rates among polycystic ovary syndrome patients undergoing in vitro fertilization. A retrospective-cohort study. Author: Al-Ruthia YS1, Al-Mandeel H2, AlSanawi H3, Balkhi B1, Mansy W1, AlGasem R4, AlMutairi L5., PUPMED. Cardiovascular disease markers in women with polycystic ovary syndrome with emphasis on asymmetric dimethylarginine and homocysteine. Author: Ahmed M. Mohamadin,a Fawzia A. Habib,a and Abdulrahman A. Al-Sagg PMC. "Madinah City Profile". The Saudi Network. "Largest 20 cites in Saudi Arabia ". Arabia Weather. Archived from the original on 2013-11-28.
8. <https://www.stats.gov.sa/ar/1414>.
9. Guraya SS. Prevalence and ultrasound features of polycystic ovaries in young unmarried Saudi females. *Journal of Microscopy and Ultrastructure*, 2013; 1(1-2): 30-34.
10. Sharif E, Rahman S, Zia Y, Rizk N. The frequency of polycystic ovary syndrome in young reproductive females in Qatar. . *Int J Womens Health*, 2017; 9: 1-10.
11. Williamson K, Gunn AJ, Johnson N, Milsom SR. The impact of ethnicity on the presentation of polycystic ovarian syndrome. *Obstet Gynaecol*, 2001; 41(2): 202-206.
12. Nidhi R, Padmalatha V, Nagarathna R, Amritanshu R. Prevalence of polycystic ovarian syndrome in Indian adolescents. *J Pediatr Adolesc Gynecol*, 2011; 24(4): 223-227.
13. Mohajeri Tehrani M, Parvizi M, Amini Moghadam S, Heshmat R, Shaban Nejad-Khas Z, Golchin M. The prevalence of polycystic ovary syndrome in Iranian women with gestational diabetes: a pilot study. *Iranian Journal of Diabetes and Lipid Disorders*. 2009; 57 64.
14. Lauritsen MP, Bentzen GJ, Pinborg A, Loft A Forman JL, Thuesen LL, Cohen A, Hougaard DM, Nyboe Andersen A. The prevalence of polycystic ovary syndrome in a normal population according to the Rotterdam criteria versus revised criteria including anti-Müllerian hormone. *Human Reproduction*, 2014; 29(4): 791-801.
15. Ramezani Tehrani F, Simbar M, Tohidi M, Hosseinpanah F, Azizi F. The prevalence of polycystic ovary syndrome in a community sample of Iranian population: Iranian PCOS prevalence study. *Reprod Biol Endocrinol*, 2011; 9: 39.

16. Haji Shafiha M, Zabiri T, Salari Lak SH. Investigating validity criteria of vaginal ultrasound (ovarian volume, the ovarian stroma and the stromal surface of the ovary) in the diagnosis of polycystic ovary syndrome. *Urmia Medical Journal*, 2007; 3: 538-543.
17. Naderi T, Akbarzadeh M, Dabagh Manesh M, Tabatabaei H, Zareh Z. Frequency of facial and body acne in 14- to 18- year-old female high school students and its relationship to polycystic ovary syndrome. *JDC*, 2011; 2: 124-131.
18. Mehrabian F, Khani B, Kelishadi R, Ghanbari E. The prevalence of polycystic ovary syndrome in Iranian women based on different diagnostic criteria. *Endokrynol Pol.*, 2011; 62: 238-242.
19. Rahmanpour H, Heidari R, mousavinasab S, sharifi F, Fekri S. The Prevalence of polycystic ovarian syndrome in 14-18 year old girls of Zanzan high schools, 2008. *ZUMS Journal*. 2009; 17: 79-88.
20. Mehrabian F, Khani B, Kelishadi R, Ghanbari E. The prevalence of polycystic ovary syndrome in Iranian women based on different diagnostic criteria. *Endokrynol Pol.* 2011; 62: 238-242.
21. Gambineri A, Patton L, Altieri P. Polycystic Ovary Syndrome Is a Risk Factor for Type 2 Diabetes: Results From a Long-Term Prospective Study. *Diabetes.*, 2012; 61(9): 2369-2374.
22. Diamanti-Kandarakis E, Kouli CR, Bergiele AT, Filandra FA, Tsianateli TC, Spina GG, Zapanti ED, Bartzis MI. A survey of the polycystic ovary syndrome in the Greek island of Lesbos: hormonal and metabolic profile. *J Clin Endocrinol Metab*, 1999; 84: 4006-4011.
23. Michelmores KF, Balen AH, Dunger DB, Vessey MP. Polycystic ovaries and associated clinical and biochemical features in young women. *Clin Endocrinol (Oxf)*, 1999; 51: 779-786.
24. McKnight E. The prevalence of "hirsutism" in young women. *Lancet*, 1964; 1: 410-413.
25. Al-Ruhaily AD, Malabu UH, Sulimani RA. Hirsutism in Saudi females of reproductive age: a hospital-based study. *Ann Saudi Med*, 2008; 28(1): 28-32.
26. Gomathi K, Shaafie I, Mummigatti K, Shahid S, Sreedharan J. Biochemical Parameters in Women with Polycystic Ovary Syndrome in Ajman, UAE. *Nepal J Obstet Gynaecol*, 2012; 6(2): 7-10.
27. Balen A, Rajkowska M. Polycystic ovary syndrome – a systemic disorder? Best Rimm EB, Manson JE, Stampfer MJ. Oral contraceptive use and the risk of type 2 (non-insulin-

- dependent) diabetes mellitus in a large prospective study of women *Diabetologia*, 1992; 35: 967-972.
28. Chasan-Taber L, Willett WC, Stampfer MJ. A prospective study of oral contraceptives and NIDDM among U.S. women. *Diabetes Care*, 1997; 20: 330-335.
29. Hadjiconstantinou M, Mani H, Patel N. Understanding and supporting women with polycystic ovary syndrome: a qualitative study in an ethnically diverse UK sample. *Endocrine Connections*, 2017; 6(5): 323-330.
30. Shan B, Cai J, Yang Y, Rili Z. Risk factors of polycystic ovarian syndrome among Li People. *Asian Pacific Journal of Tropical Medicine*, 2015; 8(7): 590-593.
31. Vignesh JP, Mohan V. Polycystic ovary syndrome: A component of metabolic syndrome? *J Postgrad Med*, 2007; 53: 128-134.