MEDICAL SCIENCE

Prevalence and awareness assessment towards Polycystic Ovary Syndrome (PCOS) among Saudi females in the western region of Saudi Arabia

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To Cite:
Bukhari T, Babaqi L, Alhariry AJ, Alqahtani L, Alkhayrallah S, Alalwani W, Alzahrani K, Allarkia S. Prevalence and awareness assessment towards Polycystic Ovary Syndrome (PCOS) among Saudi females in the western region of Saudi Arabia. *Medical Science* 2023; 27: e339ms3170
doi: https://doi.org/10.54905/disssi/v27i138/e339ms3170

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Peer-Review History
Received: 18 June 2023
Reviewed & Revised: 22/June/2023 to 15/August/2023
Accepted: 19 August 2023
Published: 25 August 2023

Peer-review Method
External peer-review was done through double-blind method.

Medical Science
pISSN 2321–7359; eISSN 2321–7367

ABSTRACT

Background: The genetic endocrine disorder known as polycystic ovary syndrome (PCOS) promotes ovarian dysfunction, there are several different morphological manifestations of this condition. Females' awareness of health issues is seen to be a key component in encouraging their attitude to seek medical help. The main objective of this study is to determine (PCOS) among Saudi females in the western region of Saudi Arabia. *Methodology:* In our study, the knowledge was assessed using 18 questions, where 8 were for symptoms, 5 for complications, and 5 for risk factors. A score of one for each correct answer, while a score of zero for wrong or uncertain responses. The total knowledge scores for each answered question range from 1 to 18, where a score ≥ 9 is excellent and below 9 is poor. Prior to logistic regression analysis, "sufficient knowledge" was described for scores ≥ 9, whereas scores < 9 are categorized as "insufficient knowledge". *Results:* This paper included 418 contributors, 53.6 percent of them were 20-30 years old. 31.8 percent of study participants were previously diagnosed with PCOV. Only 2.9% had a good awareness score, 60% had moderate awareness and 37.1% had poor awareness. Awareness of PCOS was significantly associated with age, educational level and previous diagnosis of polycystic ovary (P< 0.05). *Conclusion:* In summary, (PCOS) the prevalence of polycystic-ovary syndrome was relatively high among study participants compared to worldwide figures. However, participants have poor awareness of PCOS. By putting programs in place to educate women in Madinah about the importance of early detection and intervention.

Keywords: Polycystic ovary syndrome, knowledge, prevalence, menstrual irregularities

1. INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a disorder in which multiple cysts are developed in the ovaries, which leads to hormonal imbalance. PCOS may lead to insulin resistance, which prevents cells from utilizing the insulin hormone, resulting in an excess level of glucose, which raises androgen levels and causes anovulation (Ilyas et al., 2019). Polycystic ovarian syndrome (PCOS), one of the main causes of infertility, is now viewed as a common and widespread medical condition among adolescent girls (Salama et al., 2019). According to the 2003 Rotterdam criteria, the global-prevalence-of (PCOS) ranges from 4% to 21% and 16% in the Middle East. As stated by some studies, black women are at higher risk of having PCOS than middle eastern women, followed by Caucasian and Asian women (Aldossary et al., 2020).

One of the commonest endocrinopathies is PCOS, affecting approximately 5%–10% of women of childbearing age worldwide (Alfahl et al., 2020). One or more of the following symptoms typically present in addition to it: Menstrual irregularities, infertility, hirsutism, acne, and weight gain (Rao et al., 2020). As claimed by reports, women who have PCOS are more prone to developing metabolic syndrome, which encompasses obesity, dyslipidemia, and insulin resistance leading to major persistent effects like type 2 diabetes, infertility, and cardiovascular disease (Chatterjee and Bandyopadhyay, 2020). In a cross-sectional study conducted in Saudi Arabia in 2020 by Alruwaili et al., (2020), females were evaluated to assess the level of awareness of PCOS. The participants in the study were well aware of PCOS, with the majority (n = 309, or 74.8 percent) recognizing it with a good level of awareness.

A similar study has been published using a questionnaire-based online survey that was posted on social media, Prakash et al., (2021), reported that of the 150 women, only 8.96% had a good understanding of PCOS compared to 33.37% who had average knowledge and 45.66% who had poor knowledge. In Gurgaon, Haryana, India, Research was also conducted to evaluate the awareness of PCOS among college-going females. Using a questionnaire with inquiries about PCOS, menstrual cycle information, and sociodemographic questions, of the 428 females, the respondent's average age was 19.9 +/- 1.7 years, with a range of 18 to 24 years. The study has shown that college-going females had very poor awareness of PCOS (Jakhar, 2022). The reason of conducting this study is due to the diversity in the results of previous studies, insignificant numbers related to our topic, especially in Saudi Arabia, and to assess the importance of early diagnosis of PCOS to prevent the immediate and chronic consequences.

Objective

The primary objective of this study is to determine the prevalence of polycystic-ovary-syndrome among Saudi females. The secondary objective of our study is to assess the awareness level of polycystic ovary syndrome among Saudi females.

2. MATERIALS AND METHODS

Study design

In our study, we will perform an open descriptive study (cross-sectional survey) that was applied in the Saudi western region among Saudi females.

Study setting: Participants, recruitment, and sampling procedure

Our study was conducted between July 2022 to January 2023. The participants of the study was randomly selected Saudi females aged from 15-45 years in the western region of Saudi Arabia.

Inclusion and Exclusion Criteria

The inclusion criteria in our study include Saudi females between the ages of 15 and 45. We will exclude females who are more than 45 years old, under 15 years old, males in all age groups, and critically ill patients.

Sample size

The sample size was estimated by using Roasoft calculator using the equation:

$$n = N\,x/((N\text{-}1)E2 + x)$$

n = sample size,
N = population size (2000),
E = margin of error (5%) with a confidence level of 95%. The calculated sample size is 384.

Method for data collection and instrument (Data collection Technique and tools)

In this study, we will use an online questionnaire using Google Forms. The questionnaire was conducted by (Omer Abdelbagi et al., 2022). This study was collected from the Saudi female population in the western region by an online questionnaire, and also because we are dealing with patients, we may face some selection bias, in addition, some patients may provide us with inaccurate information. Therefore, we will avoid it by selecting a wider population. Eventually, we will have a higher chance of conducting bias-free research and obtaining reliable results. The ideal sample size is an important aspect of this study. The study could undergo limitations and selection bias if the sample size were reduced as a consequence of not finding enough patients for an ideal study. Therefore, we will put effort into making sure.

Ethical considerations

We will provide an information and consent sheet to maintain the patient's confidentiality. Data was analyzed and reported in a de-identified form.

Scoring system

In our study, the knowledge was assessed using 18 questions, 8 of which are related to symptoms, 5 to complications, and 5 more to risk factors. A score of one was given for each correctly answered question in the knowledge part, while a score of zero was given for wrong or uncertain responses. A total score is determined for each question that was answered. The knowledge scores range from 1 to 18. A knowledge score of >15 was rated as excellent, one between 9 and 15 as good, and one below 9 as poor. Prior to logistic regression analysis, excellent and good levels are reclassified as "sufficient knowledge" (scores 9 and above), and those with a low level of knowledge (scores 9 and below) are categorized as "insufficient knowledge."

Analyzes and entry method

Statistical analysis was performed utilizing the Statistical Package of Social Science Software (SPSS). Program to be statistically analyzed.

3. RESULTS

The study included 418 participants, 53.6% of them were 20- 30 years old, 20.3% were 41- 50 years old, and 17.7% were 31- 40 years old. 51.9% were single and 42.3% were married. 46.4% of participants had bachelor's degrees. 28.9% had education related to medical science, as illustrated in (Table 1).

Table 1 Sociodemographic characteristics of participants (n=418)

Parameter		No.	%
Age	Less than 20	35	8.4
	20 - 30	224	53.6
	31 - 40	74	17.7
	41 -50	85	20.3
Marital status	Single	217	51.9
	Married	177	42.3
	Divorced	20	4.8
	Widow	4	1.0
Region	Taif	6	1.4
	City	28	6.7
	Jeddah	328	78.5
	Mecca	56	13.4
Education level	Primary	2	5.0
	Middle	9	2.2
	Secondary	66	15.8
	Bachelor's	194	46.4
	Graduated	147	35.2

Education related to medical science	Yes	121	28.9
	No	297	71.1

Figure 1 shows that, only 32% of participants were diagnosed with PCOS and 68% dose not Diagnosed with polycystic ovary syndrome

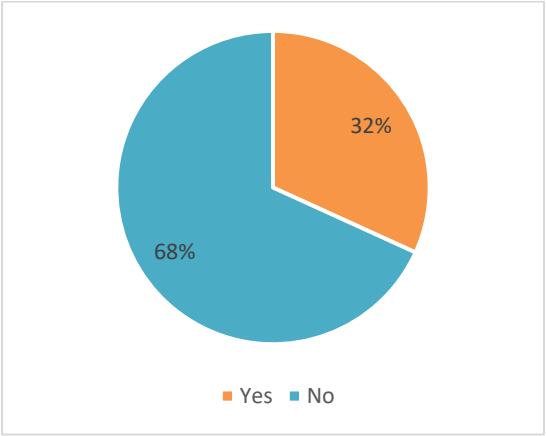

Figure 1 Prevalence of PCOS among study participants

In Table 2, symptoms of PCOS among participants were reported as 33.3% overweight, 32.8% having facial acne, 34.9% irregular menstruation, and 19.9% having hirsutism. 31.8% of study participants were previously diagnosed with PCOV (22.2% of them take medications). 43.5% of participants searched for a dermatologist to treat acne before, while 39.2% searched for a gynecologist for irregular menstruation. 16.3% visited a gynecologist for delayed pregnancy.

Table 2 Prevalence of PCOS and its symptoms among study participants (n=418)

Parameter		No.	%
Suffer from any of these symptoms	Irregular menstruation	146	34.9
	Hirsutism	83	19.9
	Increase in weight	139	33.3
	Facial acne	137	32.8
	None	124	29.7
Diagnosed with polycystic ovaries before	Yes	133	31.8
	No	285	68.2
If yes, take medications	Yes	93	22.2
	No	40	9.6
Searched for a dermatologist to treat acne	Yes	182	43.5
	No	236	56.5
Looked for a gynecologist for irregular menstruation	Yes	164	39.2
	No	254	60.8
Visited a gynecologist for delayed pregnancy	Yes	68	16.3
	No	350	83.7

Figure 2 shows that, only 2.9% had good awareness score, 60% had moderate awareness and 37.1% had poor awareness.

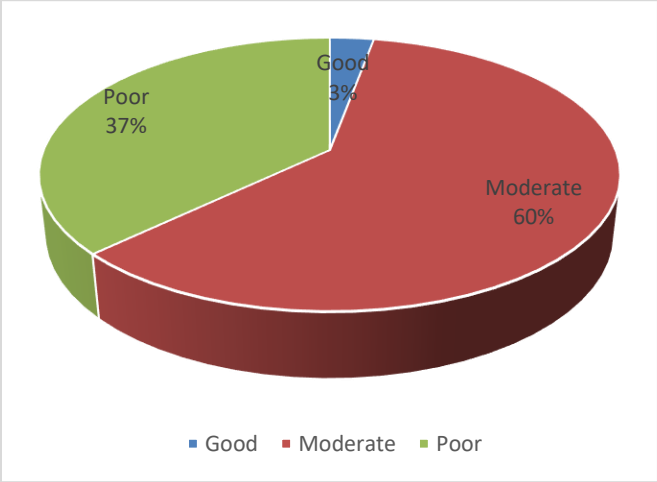

Figure 2 Awareness score of PCOS among participants

Table 3 illustrates participants awareness of risk factors, symptoms and complications of PCOS, 63.4% of participants acknowledged overweight as a risk factor for developing PCOS, 44% reported genetic factors, 56.5% lack of physical activity, and 62.9% not following a healthy diet. As for symptoms, 84.4% reported irregular menstruation, 57.2% reported acne, 61.2% hirsutism, 68.7% weight gain, and 52.2% reported pelvic pain. Regarding complications, 62.7% reported psychological disorders, 30.1% reported diabetes, 30.6% reported breast and uterine cancer, and 69.1% reported delayed pregnancy.

Table 3 Awareness of participants of risk factors of PCOS (n=418)

Parameter	Yes	No	Don't konw
Overweight	265 63.4%	57 13.6%	96 23.0%
Genetic factors	184 44.0%	90 21.5%	144 34.4%
Lack of physical activity	236 56.5%	90 21.5%	92 22.0%
Not following a healthy diet	263 62.9%	68 16.3%	87 20.8%
Irregular menstruation	353 84.4%	28 6.7%	37 8.9%
Facial acne	239 57.2%	71 17.0%	108 25.8%
Hirsutism	256 61.2%	64 15.3%	98 23.4%
Increase in weight	287 68.7%	52 12.4%	79 18.9%
pelvic pain	218 52.2%	73 17.5%	127 30.4%
precocious puberty	64 15.3%	140 33.5%	214 51.2%
Hair loss or loss	208 49.8%	56 13.4%	154 36.8%
Psychological disorders	262 62.7%	43 10.3%	113 27.0%
Diabetes	126 30.1%	102 24.4%	190 45.5%

Cardiovascular diseases	57 13.6%	127 30.4%	234 56.0%
Breast and uterine cancer	128 30.6%	101 24.2%	189 45.2%
Premature birth	47 11.2%	121 28.9%	250 59.8%
Delayed pregnancy	289 69.1%	54 12.9%	75 17.9%

As Table 4 show, awareness of PCOS was significantly associated with age, educational level and previous diagnosis of polycystic ovary (P< 0.05).

Table 4 Association between awareness score with sociodemographic characters of participants

		Awareness score			Total (N=418)	P value
		Poor	Moderate	Good		
Age	Less than 20	21	13	1	35	0.003
		5.0%	3.1%	0.2%	8.4%	
	20 - 30	63	153	8	224	
		15.1%	36.6%	1.9%	53.6%	
	31 - 40	32	41	1	74	
		7.7%	9.8%	0.2%	17.7%	
	41- 50	39	44	2	85	
		9.3%	10.5%	0.5%	20.3%	
Marital status	Single	76	134	7	217	0.906
		18.2%	32.1%	1.7%	51.9%	
	Married	69	103	5	177	
		16.5%	24.6%	1.2%	42.3%	
	Divorced	9	11	0	20	
		2.2%	2.6%	0.0%	4.8%	
	Widow	1	3	0	4	
		0.2%	0.7%	0.0%	1.0%	
Region	Taif	3	3	0	6	0.924
		0.7%	0.7%	0.0%	1.4%	
	Madinah	10	18	0	28	
		2.4%	4.3%	0.0%	6.7%	
	Jeddah	121	196	11	328	
		28.9%	46.9%	2.6%	78.5%	
	Makkah	21	34	1	56	
		5.0%	8.1%	0.2%	13.4%	
Education level	Primary	2	0	0	2	0.036
		0.5%	0.0%	0.0%	0.5%	
	Preparatory	6	3	0	9	
		1.4%	0.7%	0.0%	2.2%	
	Secondary	34	32	0	66	
		8.1%	7.7%	0.0%	15.8%	
	Bachelor's	65	122	7	194	
		15.6%	29.2%	1.7%	46.4%	
	Graduated	48	94	5	147	
		11.5%	22.5%	1.2%	35.2%	

Diagnosed with polycystic ovary	Yes	33	96	4	133	0.002
		7.9%	23.0%	1.0%	31.8%	
	No	122	155	8	285	
		29.2%	37.1%	1.9%	68.2%	

4. DISCUSSION

PCOS is a prevalent issue that affects females after they reach puberty. This study was conducted to determine the prevalence of polycystic ovary syndrome among Saudi females. PCOS impacts approximately 3.4% of females worldwide, according to the World Health Organization (Guraya, 2013). According to our results, 31.8% of study participants were previously diagnosed with PCOV. The prevalence rate of (PCOS) varies significantly depending on the diagnostic techniques used in medical contexts. However, a recent systematic review discovered that 27 studies using different diagnostic criteria had a mean prevalence of 21.27% PCOS (Deswal et al., 2020). Geographical location, racial and ethnic characteristics, as well as PCOS prevalence all vary considerably (Wolf et al., 2018).

Since there are no official data on the prevalence of (PCOS) in Saudi Arabia, the study's reported 53% prevalence rate is quite alarming (Shabtai and Wisher, 2017). Another study carried out in the Saudi Arabian province of Madinah revealed a prevalence of PCOS of 32.5% (Alraddadi et al., 2018). The prevalence of PCOS was 16%, according to a more recent Saudi Arabian research based on an online survey (Aldossary et al., 2020). However, the prevalence of psychiatric disorders in the Saudi Arabian population is also concerning, with a significantly high rate (>36%) (Blay et al., 2016). However, a previous study on 201 female students from Taibah University in Madinah City found a higher prevalence of PCOS. 108 (53.7%) of the 201 individuals in this cohort with a diagnosis of PCO were found to be in the 25–30 age range (Mohajeri-Tehrani et al., 2009).

The prevalence of PCOS was found to be 18.3% in a recent study that involved 126 young female students in Qatar whose ages varied from 18 to 25 years (Farhadi-Azar et al., 2022). This prevalence was comparable to that found in women who were the same age, between the ages of 18 and less than 25, in our research, where the prevalence for this age group was 24%. However, it was discovered that there were regional differences in PCOS incidence. In their research, estimated that 2.2-26% of women had PCOS (Jalilian et al., 2015). In 460 girls between the ages of 15 and 18 who attended a residential college in Andhra Pradesh, South India, performed a prospective study. They found that 9.13% of teenagers had PCOS.

The prevalence that was observed in Iranian women with gestational diabetes and a mean age of 31.54 years had the highest reported prevalence in the literature at (70%) (Mehrabian et al., 2011). However, it was not very common in Western nations. A cross-sectional cohort research on 447 female students aged 20 to 40 years old was done in Denmark at Copenhagen University Hospital between 2008 and 2010. The prevalence rate was 16.5% (Rahmanpour et al., 2009). Menstrual irregularities, obesity, hirsutism, androgenization, insulin resistance, and subfertility are just a few of the signs that PCOS can cause (Sills et al., 2001). Symptoms of PCOS among our participants were reported as 33.3% overweight, 32.8% having facial acne, 34.9% irregular menstruation, and 19.9% have hirsutism.

Our results are in line with earlier research on PCOS women from the Arabian Peninsula Alghadeer et al., (2018) and South Asia (Henry and Crawford, 2005). High indices of hirsutism and-anovulation-were-discovered in Alghadeer et al., (2018), while secondary infertility, oligomenorrheas, and hirsutism were found to be the three most common symptoms in PCOS patients in South Asia (Henry and Crawford, 2005). Acne, which is typically prevalent in adolescents and young adults and may be more of a cosmetic observation than a clinical symptom, was the most frequently reported symptom among participants in different research (Alshdaifat et al., 2021).

Our study participants exhibited poor awareness of PCOS as only 2.9% had a good awareness score, 60% had moderate awareness and 37.1% had poor awareness. Up to 56.7% of the female participants in previous Saudi research Alessa et al., (2017) had heard of PCOS before. Another Saudi research found that the majority of the participants (74.8%) were recognized with a good level of awareness, indicating a high-level-of awareness about PCOS among the study participants. In a study carried out in Saudi Arabia, Alessa et al., (2017) discovered that 56.7% of people were aware of PCOS, which is a lower percentage than that reported above. The prevalence of (PCOS) was 15.3% among them, and 21.3% of them had heard of the condition from various sources.

In a survey of non-medical undergraduate students at both private and public institutions in Dhaka, Bangladesh, Jahangir and safa, (2017) discovered that only 6% of the population was aware of PCOS, while 58% of the population knew very little about the condition. Sunanda and Nayak, (2016) performed a similar study with second- and third-year nursing undergraduate students who were familiar with PCOS and its symptoms, onset, diagnosis, and management (AlSinan and Shaman, 2017). This was in contrast to the findings for the Saudi Arabian population issued by (Alessa et al., 2017). According to their findings, Saudi Arabian women are

highly knowledgeable about PCOS. In contrast to the findings of a study conducted in Indore, central India, as described by Patel and Rai, who stated an awareness level of 41 percent Patel and Rai, (2018), a lower-than-average 21.6% awareness was noted in India (Jabeen et al., 2022).

As for symptoms, 84.4% of participants reported irregular menstruation, 57.2% reported acne, 61.2% hirsutism, 68.7% weight gain, and 52.2% reported pelvic pain. A previous study found that the majority of participants were unaware of PCOS symptoms, possible genetic causes, the chance of parent inheritance, and risk factors like obesity. The majority of respondents believed that hormonal imbalances and the development of PCOS could be related to symptoms of PCOS like irregular menstruation, mood swings, hirsutism, and hair loss. The majority of subjects were made aware that infertility and abortion could be long-term effects of (PCOS). But they were-not-aware of the connection between PCOS and diabetes, gynecological tumors, and heart issues (Jabeen et al., 2022).

Similar to a previous paper from Mumbai, India, which found that a healthy diet and regular exercise are essential for managing and preventing PCOS Pitchai et al., (2016), participants in the current study were conscious of the significance of these factors. According to our study results, awareness of PCOS was significantly associated with age, educational level, and previous diagnosis of polycystic ovary. This was consistent with a prior study that found that awareness was, unsurprisingly, correlated with a high level of education and experience in health care, whether as a student or a worker (Alessa et al., 2017). According to the current findings, there was a substantial relationship between PCOS awareness and educational levels, and this relationship grew as education levels rose (Alruwaili et al., 2020).

Similar findings were made by Alessa et al., (2017) in their research, which discovered that education level was significantly correlated with PCOS awareness ($p = 0.000$). Married participants have the highest degree of awareness of PCOS, and marital status was also significantly correlated with awareness of (PCOS) ($p = 0.000$) (Alruwaili et al., 2020). Contrary to the results of the research by Alessa et al., (2017), there was no connection between marital status and the degree of PCOS awareness. Participants ages had no discernible effect on their knowledge of PCOS ($p = 0.170$). According to Pitchai et al., (2016) findings, the relationship between age and awareness degree was not statistically significant.

5. CONCLUSION

In conclusion, the prevalence of polycystic ovary syndrome was relatively high among study participants compared to worldwide figures. However, participants have poor awareness of PCOS. By putting programs in place to educate women in Madinah about the importance of early detection and intervention, PCOS will have fewer long-term health consequences, and its prevalence in the city may be greatly reduced. Additional research is required in various communities and must address Saudi women's awareness of and attitudes toward PCOS.

Author Contributions

The authors confirm their contribution to the paper as follows: Data collection: Tayf Bukhari, Lama Babaqi, Anmar Jamal Alhariry, Lamiaa Alqahtani, Salma Alkhayrallah, Waad Alalwani. Analysis, and interpretation of results: Tayf Bukhari, Lama Babaqi, Anmar Jamal Alhariry, Lamiaa Alqahtani, Salma Alkhayrallah, Waad Alalwani. Draft manuscript preparation: Tayf Bukhari, Lama Babaqi, Anmar Jamal Alhariry, Lamiaa Alqahtani, Salma Alkhayrallah, Waad Alalwani. All authors reviewed the results and approved the final version of the manuscript.

Ethical Approval

Ethical approval was obtained from the Research Ethical Committee at King Abdullah International Medical Research Center in Saudi Arabia (Ethical approval number: NRJ22J/304/11). Participants were informed that their participation is voluntary, and filling the questionnaire indicates their consent to participate.

Informed consent

Written consent was obtained from all individual participants included in the study

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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