MEDICAL SCIENCE

Knowledge and awareness level assessment of PCOS among females in Saudi Arabia

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ABSTRACT

Background: Polycystic ovary syndrome is one of the most common endocrine diseases worldwide. The ovaries produce a large number of tiny fluid-filled sacs known as follicles and may stop consistently releasing eggs, menstruation cycle abnormalities and frequently elevated levels of the male hormone androgen are the commonest features of the polycystic ovarian syndrome. This study aims to assess the knowledge and awareness level of the polycystic ovarian syndrome among females in Saudi Arabia. *Methodology:* This cross-sectional study was conducted from January 2022 to May 2023 in Saudi Arabia. Our population consisted of Saudi females aged 16-60. Our sample size is minimally 384 females. Our sampling method was simple random sampling. Data collected through the questionnaire will be entered, stored, and coded using Microsoft Office Excel (2019). And all the statistical analysis will be carried out using the Statistical Package of Social Science Software (SPSS), version 26 for windows. *Results:* This paper comprised 1368 individuals, with a 43.1 percent age range of 20 to 30 years, a 22.2% age range of 31 to 40 years, and a 20.8% age range of 41 to 50 years. 82.2% of individuals had prior knowledge of PCOS. Only 2.07% of our respondents cited television, while 23.02% cited families, 23.02% the internet, 18.3% health care providers, and 17.1% friends as their primary sources of knowledge. *Conclusion:* In summary, Saudi women's knowledge regarding PCOS is inadequate. Knowledge ratings were strongly correlated with age and level of education, marital-status and employment.

Keywords: Polycystic ovary syndrome, polycystic ovarian syndrome, ovaries, ovary, hormonal disorders, endocrine diseases, Saudi Arabia.

1. INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the most common endocrinopathies and it's a complex disorder affecting females at their reproductive age (Nautiyal et al., 2022). As a result of hormonal disturbance

that leads to irregular menstruation with different common symptoms such as acne, infertility, weight gain, and insulin resistance (Zulfiqar et al., 2022). An estimated 5–20% of people worldwide have PCOS during the reproductive age (Elasam et al., 2022). PCOS affects 12.0 percent of Middle Eastern females, according to the 2006 Androgen Excess Society (AES) (Ding et al., 2017). According to some studies, Middle Eastern women have a higher-risk of developing-PCOS than Caucasian and Asian women but a lower risk than black women (Cioana et al., 2021; Qahwaji, 2023).

A Saudi Arabian population study done at Princess Noura University found that among females, self-reported PCOS was present at a rate of 16% (Aldossary et al., 2020). A cross-sectional study aimed to assess the level-of PCOS-awareness and knowledge among Saudi women including 674 participants showed that the level of knowledge regarding the female reproductive system physiology among Saudi women was poor. 62.5% of the participants were unaware of the link between PCOS and decreased ovulation, which can affect their fertility, and 62% were unaware of the likelihood of an increase in androgen production in PCOS patients. Of the participants, 72.1% were unaware that PCOS patients commonly have metabolic syndrome (Al-Sinan and Shaman, 2017).

Another study was performed in Saudi Arabia in 2016 among 2000 females revealed that 56.7% of the Saudi population aware of PCOS, whereas 43.3% of females are unaware of PCOS. Among 56.7% of aware participants; 15.3% reported having PCOS, while the most often cited source was the internet 21.3%. Of the participants, 60.7% are unaware of whether PCOS is inherited or not. The most known symptoms among aware females were irregular menstrual cycle 51.9%, followed by reduced fertility 39.0% (Alruwaili et al., 2020; Mahmoud et al., 2023).

According to a study conducted in Taif city, menstrual issues were the most common presenting symptom among women with PCOS 42% and were followed by a delayed pregnancy 40%. This study revealed that there is currently a low level of knowledge among Saudi women with PCOS regarding the advantages of weight loss as it is the first line of therapy (Albezrah and Arein, 2019). PCOS is a common female syndrome in Saudi Arabia. The self-reported frequency ranged from 16.4% to 19.4%. For an early diagnosis and speedy recovery, it is critical to be knowledgeable about its symptoms and risk factors.

Despite the significance of this topic, there are limited studies conducted in Saudi Arabia to examine the level of knowledge of PCOS in those locations. Given the lack of understanding, attitudes, and awareness around PCOS, to improve the quality of life, this study seeks to give current and comprehensive data about the degree of awareness and understanding of PCOS in Saudi society. The main-objective of this paper is to assess the knowledge and awareness level regarding polycystic ovarian syndrome (PCOS) symptoms, risk factors, complications, and management among females in Saudi Arabia.

2. METHODOLOGY

Study design

This is an observational cross-sectional study conducted from January 2022 to May 2022 in Saudi Arabia. Our study population consisted of Saudi females aged 16 to 60. The sampling method was simple random sampling.

Inclusion and exclusion criteria

In this study, we will include Saudi females older than 16 years old and younger than 60 years old who agreed to participate in our study. We will exclude non-Saudi females, women more than 60 years old, and women younger than 16 years old.

Sample size

The sample size was estimated using the Qualtrics calculator with a confidence level of 99%, a sample size of 666.

The Sample size was estimated using the formula: $n = P (1-P) * Z\alpha^2 / d^2$ with a confidence level of 99%;

n: Calculated sample size

Z: The z-value for the selected level of confidence (1- a) = 1.96.

P: An estimated prevalence of knowledge

Q: (1 – 0.50) = 50%, i.e., 0.50

D: The maximum acceptable error = 0.01.

So, the calculated minimum sample size was:

$n = (1.96)^2 X 0.50 X 0.50/ (0.05)^2 = 666.$

Method for data collection and instrument

A structured questionnaire was developed from similar studies. It was written in both-Arabic and English-languages to avoid self-reported bias. The questionnaire consists of three main sections. The first section is socio-demographic variables (age, gender, educational status, nationality, marital status, occupation, and residency). The second section is PCOS knowledge-related questions. It contains questions about pathophysiology, causes, clinical presentation, management, and the risk factors of PCOS (22 questions). The third section includes questions about awareness of possible complications of PCOS (7 questions).

The female knowledge and awareness level regarding PCOS will be evaluated by using a scoring system. The score will be calculated as follows: For each correct answer, one point will be given; and zero for wrong answers and "I don't know". The knowledge score that can be obtained varies from 0 to 22. Accordingly, the knowledge level will be classified as inadequate (0 – 11 scores), moderate (11.22 – 16.5), and adequate (16.72 – 22). Similarly, the awareness level of participants will be ranked as low, high, and medium based on their scores as in (Table 1).

Table 1 Knowledge and awareness scoring scale

	Score	Percentage
Level of knowledge about PCOS		
Inadequate	0 – 11	< 50%
Moderate	11.22 – 16.5	51% – 75%
Adequate	16.72 – 22	> 76%
Awareness regarding PCOS complications		
Low	0 – 3.5	< 50%
Medium	3.6 – 5.2	51% - 75%
High	5.32 - 7	> 76%

Pilot test

The questionnaire was distributed on above 15 individuals and asked to fill it. This was done to measure the understanding of the questionnaire and the feasibility of the study. The final data of the study doesn't include the pilot data of the study.

Analyzes and entry method

Microsoft-Office-Excel (2019) will be used to enter, keep, and code the data that was gathered through the questionnaire. The Statistical-Package of Social-Science Software (SPSS), version 26 for Windows, was used for all statistical-analyses. Descriptive statistics will be used to describe the qualitative variables in frequencies and percentages. Pearson's Chi-square test will be conducted to measure the association between the categorical variables. For all analyses, a P value less than 0.05 will be considered statistically significant.

3. RESULTS

The study included 1368 participants, 43.1% aged between 20- 30 years old, 22.2% aged 31- 40 years old and 20.8% aged 41- 50 years old. 92.2% of participants were Saudi. 70.9% had bachelor degree. 56.5% were married while 38.9% were single. 24.3% were students and 12.1% were teachers (Table 2). As in Figure 1, 82.2% of participants heard about PCOS before.

Table 2 Socio-demographic characteristics of participants (n=1368)

Parameter		No.	%
Age	Less than 20	86	6.3
	20- 30	589	43.1
	31- 40	304	22.2
	41 – 50	284	20.8
	51 – 60	105	7.7
Nationality	Saudi	1262	92.2
	Non-Saudi	106	7.7
Residence	Abha	63	4.6

region	Other	316	23.1
	Bahah	11	.8
	Aljouf	1	.1
	Dammam	105	7.7
	Riyadh	436	31.9
	Taif	19	1.4
	Tabuk	3	.2
	Jizan	4	.3
	Jeddah	244	17.8
	Hail	5	.4
	Asir	62	4.5
	Makkah	97	7.1
	Najran	2	.1
Education level	Uneducated	1	.1
	Primary School	16	1.2
	Secondary School	31	2.3
	High School	301	22.0
	Bachelor Degree	971	70.9
	Post graduated	48	3.5
Marital Status	Single	532	38.9
	Married	773	56.5
	Divorced	45	3.3
	Widow	18	1.3
Occupation	Student	333	24.3
	Worker in the health sector	102	7.5
	Retired	79	5.8
	Teacher	165	12.1
	Administrative Officer	127	9.3
	Other	562	41.1

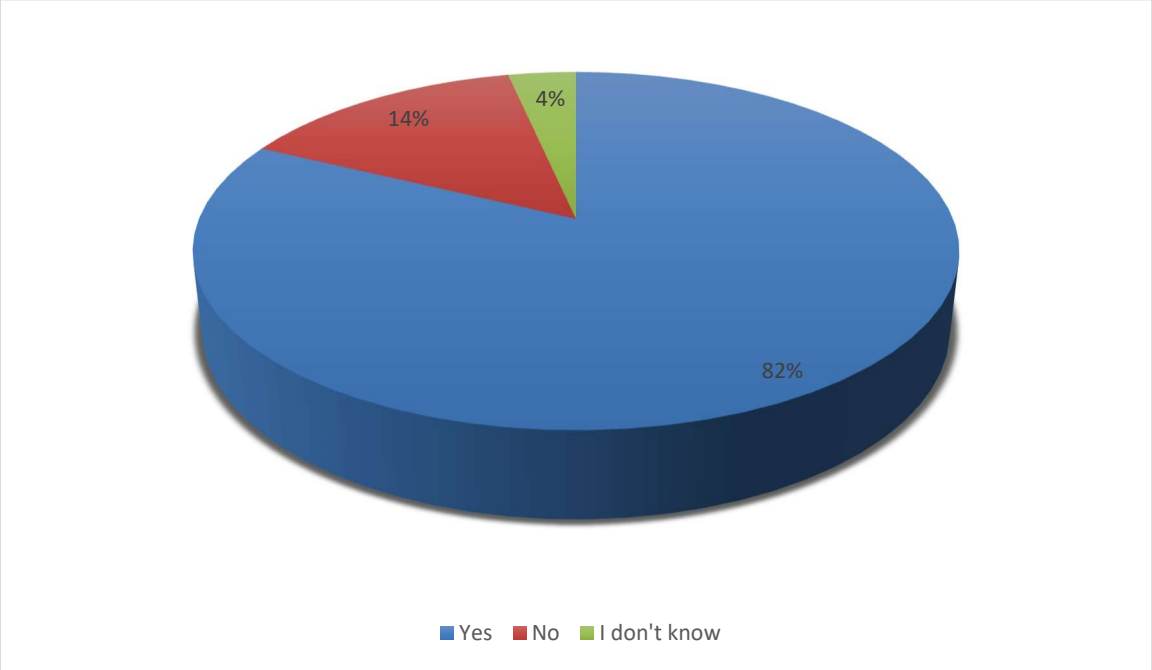

Figure 1 The frequency of Heard about PCOS before among participants (n=1368)

In Table 3, 23.02% of them reported relatives as the main-source of information, 23.02% reported internet, 18.3% health worker, 17.1% friends and only 2.07% television. In Figure 2, 52.2% of them reported yes, 40.8% reported I don't know.

Table 3 Knowledge of participants of online nutritional applications and tele-dietetics (n=1368)

Parameter		No.	%
Heard of PCOS before	Yes	1125	82.2
	No	197	14.4
	I don't know	46	3.4
If you heard about PCOS, what is source of information	Relatives	315	23.02
	Friend	234	17.1
	Health worker	251	18.3
	Internet	315	23.02
	TV	37	2.07
	NA	12	0.87
What is PCOS	That the ovaries contain malignant cells	24	1.8
	The ovaries having firm, liquid-filled sacs cause an imbalance in the female sex hormones	302	22.1
	Ovaries with fluid-filled sacs that cause an imbalance in the female sex hormones	2	.1
	Ovaries with fluid-filled sacs that cause an imbalance in the female sex hormones	655	47.9
	I have no Idea	385	28.1

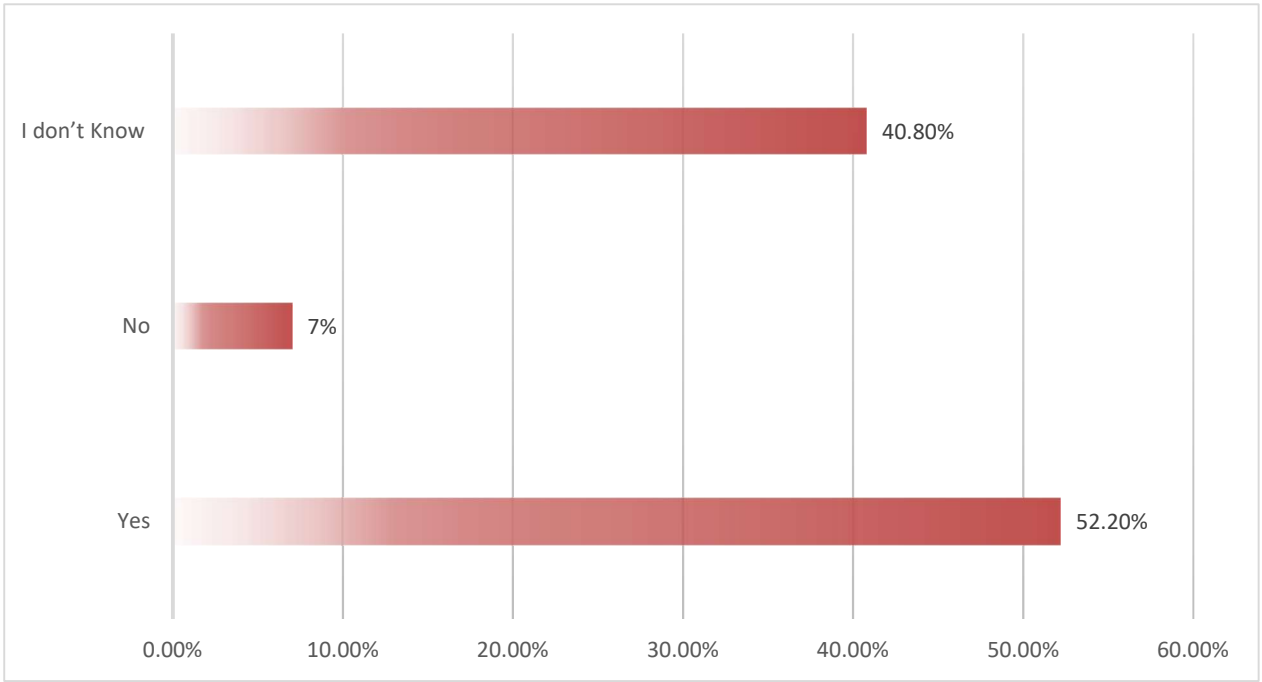

Figure 2 Regarding Knowledge of PCOS

Table 4 Knowledge of PCOS (n=1368)

Parameter	*Yes*	*No*	*Don't know*
Is PCOS (Polycystic Ovaries Syndrome) a treatable	*1062 77.6%*	*65 4.8%*	*241 17.6%*
Is PCOS a lifelong, chronic disease	*331 24.2%*	*563 41.2%*	*474 34.6%*
Do polycystic ovaries have more visible follicles than a typical ovary dose?	*509 37.2%*	*49 3.6%*	*810 59.2%*
Ovulation frequency is often lower in polycystic ovaries than in normal ovaries?	*618 45.2%*	*94 6.9%*	*656 48.0%*
Do polycystic ovaries often produce more testosterone than the normal ovary does?	*588 43.0%*	*98 7.2%*	*682 49.9%*
Does an increased level of free testosterone encourage unwelcome hair growth, acne, and alopecia (hair loss on the scalp)	*1023 74.8%*	*30 2.2%*	*315 23.1%*
Does PCOS cause o irregular menstruation?	*1152 84.2%*	*21 1.5%*	*195 14.3%*
Does PCOS cause hirsutism (an abnormal male hair distribution)?	*894 65.4%*	*54 3.9%*	*420 30.7%*
Does PCOS cause-acanthosis-nigricans, or velvety patches across the nape of the neck, which may be signs of insulin resistance	*482 35.2%*	*89 6.5%*	*797 58.3%*
Does PCOS cause infertility?	*509 37.2%*	*274 20.0%*	*585 42.8%*
Do women with PCOS commonly have high insulin levels?	*446 32.6%*	*101 7.4%*	*821 60.0%*
Does obesity consider one of the risk factors of PCOS?	*885 64.7%*	*91 6.7%*	*392 28.7%*
Does PCOS have a familial inheritance?	*323 23.6%*	*327 23.9%*	*718 52.5%*
Does PCOS cause the development of metabolic syndrome if left untreated	*480 35.1%*	*41 3.0%*	*847 61.9%*
Endometrial cancer may result from PCOS	*327 23.9%*	*156 11.4%*	*885 64.7%*
Are people with PCOS more likely to get diabetes	*493 36.0%*	*101 7.4%*	*774 56.6%*
Can PCOS lead to psychological distress	*886 64.8%*	*61 4.5%*	*421 30.8%*
PCOS can result in dyslipidaemia and is a risk factor for coronary artery disease	*222 16.2%*	*96 7.0%*	*1050 76.8%*
If PCOS is not treated, might it lead to hypertension	*278 20.3%*	*129 9.4%*	*961 70.2%*
Does Changes in lifestyle are the primary line of management for PCOS	*809 59.1%*	*70 5.1%*	*489 35.7%*

Only 12.9% of participants had good knowledge scores regarding PCOS, 28.6% had moderate knowledge and 58.5% had poor knowledge (Figure 3). As in Table 5, there was a significant association between knowledge scores with age, educational level, marital status and occupation ($P < 0.05$).

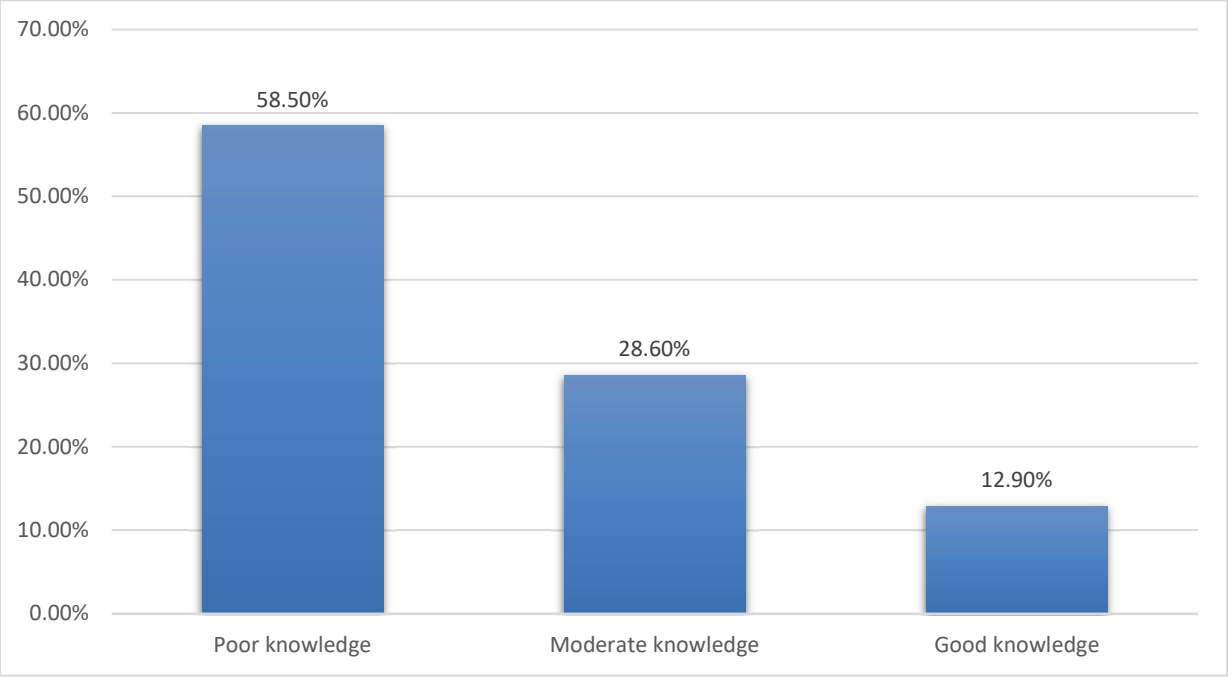

Figure 3 Knowledge scores of participants on PCOS (n= 1368)

Table 5 Association between socio-demographic characters of participants with their knowledge scores

		Knowledge score			Total (N=1368)	P value
		Inadequate	Moderate	Good		
Age	Less than 20	63	17	6	86	0.001
		7.9%	4.3%	3.4%	6.3%	
	20-30	262	213	114	589	
		32.8%	54.5%	64.4%	43.1%	
	31-40	184	85	35	304	
		23.0%	21.7%	19.8%	22.2%	
	41-50	206	59	19	284	
		25.8%	15.1%	10.7%	20.8%	
	51-60	85	17	3	105	
		10.6%	4.3%	1.7%	7.7%	
Education level	Uneducated	1	0	0	1	0.003
		0.1%	0.0%	0.0%	0.1%	
	Elementary school	9	5	2	16	
		1.1%	1.3%	1.1%	1.2%	
	Middle school	23	6	2	31	
		2.9%	1.5%	1.1%	2.3%	
	High school	195	71	35	301	
		24.4%	18.2%	19.8%	22.0%	
	College	544	302	125	971	
		68.0%	77.3%	70.7%	70.9%	
	Higher education	28	7	13	48	
		3.5%	1.8%	7.3%	3.5%	
Nationality	Saudi	733	374	155	1262	0.004
		91.6%	95.7%	87.6%	92.2%	
	None-Saudi	67	17	22	106	
		8.4%	4.3%	12.4%	7.7%	

Marital status	Widowed	16	2	0	18	0.001
		2.0%	0.5%	0.0%	1.3%	
	Single	255	177	100	532	
		31.9%	45.3%	56.5%	38.9%	
	Married	504	198	71	773	
		63.0%	50.6%	40.1%	56.5%	
	Divorced	25	14	6	45	
		3.1%	3.6%	3.4%	3.3%	
Occupation	Worker in the health sector	25	45	32	102	0.001
		3.1%	11.5%	18.1%	7.5%	
	Other	362	155	45	562	
		45.3%	39.6%	25.4%	41.1%	
	Retired	66	11	2	79	
		8.3%	2.8%	1.1%	5.8%	
	Teacher	109	34	22	165	
		13.6%	8.7%	12.4%	12.1%	
	Administrative Officer	84	32	11	127	
		10.5%	8.2%	6.2%	9.3%	
	Student	154	114	65	333	
		19.3%	29.1%	36.7%	24.3%	

4. DISCUSSION

Polycystic ovary syndrome is a complex disorder that affects a woman's hormone levels and is considered the most common female syndrome. It contributes to long-term health risks, metabolic complications and psychological problems, and can affect various aspects of people's life. Thus, this study was undertaken to assess-the-knowledge and awareness level regarding polycystic ovarian syndrome (PCOS) symptoms, risk factors, complications, and management among females in Saudi Arabia.

The results of the present study demonstrated that only 12.9% of participants had good knowledge scores regarding PCOS, 28.6% had moderate knowledge and 58.5% had poor knowledge. This was on the line with most previous literature. A previous study reported that most of the women have inadequate knowledge about PCOS (Abu-Taha et al., 2020). The results were consistent with previous study-conducted among-nursing-students, where 76% had regular knowledge and 10.7% had good knowledge about PCOS (Sunanda and Nayak, 2016).

Another study-to-assess-the-knowledge of students on symptoms, complications, diagnosis methods and sources of knowledge, treatment and management methods showed that 58% had minimal knowledge on PCOS and only 6% were aware and informed on the condition (Jahangir, 2017). Another study reported that 41.3% of the females had inadequate knowledge (Omer-Abdelbagi et al., 2022), which is not different from other countries like Egypt and Pakistan where females' knowledge was very poor (Ali and Mahmoud, 2019; Gul et al., 2014).

A similar study Aubuchon, (2020) showed that 58% of the study population has minimal knowledge about PCOS. In Jordan, a study found that majority of the female population has adequate knowledge on the most common symptoms, diagnosis, and management of PCOS (Jaber et al., 2022). Due to a paucity of conversations on reproductive-health in families and schools, a Saudi-research of 350 female-participants revealed that 66.3% of them had incorrect-information about the dangers of PCOS (Gaferi et al., 2018). This may be-explained by the paucity of readily available-materials and the common omission of reproductive-health themes from school-curriculum. Conversely, there is high level of knowledge among women from Saudi Arabia reported in one study (Salama and Mostafa-Elbana, 2019).

In this study, 23.02% of our study participants reported relatives as the main-source of information, 23.02% reported internet, 18.3% health worker, 17.1% friends and only 2.07% television. This was comparable to previous study reported the main-source of information as medical professionals (gynecologists) (Omer-Abdelbagi et al., 2022), which is similar to that in Saudi Arabia where women did get information and guidance from medical doctors (Al-Sinan and Shaman, 2017). The highest percentage of participants was within the age group of 20–30 years, which made the Internet and social media another source of information to raise awareness-about PCOS among the participants in this study.

Another study showed that the major information source was physician for 34% of participant. Also, family member was the main-source of information for 34% of participants followed by website then pharmacists Abu-Taha et al., (2020) demonstrated that major information source was relatives (mother, sister, cousin, etc.) which is similar to the result of this study that shows family as one of the main sources (Bassam et al., 2018). In a study by Upadhye and Shembekar, (2017) to assess the knowledge on PCOS among medical students, it showed that the main-source of information was from teacher, followed by friends, doctors, respectively, and only 5% from internet.

Another investigation revealed that the internet was the participant's-first-source of information-regarding PCOS, followed by patients, physicians, and literature (Salama and Mostafa-Elbana, 2019). Moreover, Jahangir, (2017) showed that the majority had knowledge from their doctor. In our study, age and educational level were significantly associated with knowledge scores of participants on PCOS. This was on the line with a Sudanese study Omer-Abdelbagi et al., (2022) reported that level of participants' knowledge about PCOS was significantly related to age ($p < 0.001$), educational level ($p < 0.001$), and being a health professional (< 0.001).

Another investigation revealed that the internet was the participant's-first-source of information-regarding PCOS, followed by patients, physicians, and literature (Bassam et al., 2018). Another study revealed that educational level significantly affects participants' knowledge about PCOS (Abu-Taha et al., 2020). This is an expected finding which was confirmed by according to an investigation done in Saudi Arabia, having more-education is substantially-correlated with knowing-more about PCOS (Salama and Mostafa-Elbana, 2019). A further investigation done in Saudi Arabia came to the conclusion that greater educational-level was substantially-correlated with PCOS knowledge (Jahangir, 2017).

This may be explained by the fact that women with higher educational levels have better access to information, as well as good medical care. Also, marital status of participants was significantly associated with knowledge scores which was supported by previous study reported that, married females showed better knowledge about PCOS compared with those who are non-married (Omer-Abdelbagi et al., 2022). This can be explained by the fact that married females usually visit their gynecologists, which could be a possible cause for their higher level of awareness and knowledge about PCOS.

5. CONCLUSION

In conclusion, Saudi females have inadequate-knowledge of PCOS. Knowledge of PCOS was significantly-associated with age, educational level, marital status and occupation. There is an urgent need to increase knowledge about PCOS among Saudi women to increase awareness and promote health-seeking behavior for early treatment to avoid complications.

Author Contributions

The authors confirm contribution to the paper as follows: Data collection: Analysis, interpretation of results: Reham Alharbi, Faris Albeladi, Amal Alzahrani, Joudi Alnfaiei, Maya Abualhamael, Reem Hazem, Wasan Aldalbhi, Osama Sadeak Bajouh. Draft manuscript preparation: Ashraf Radwan, Reham Alharbi, Faris Albeladi, Amal Alzahrani, Joudi Alnfaiei, Maya Abualhamael, Reem Hazem, Wasan Aldalbhi, Osama Sadeak Bajouh, Abdelmageed Ali abdou, Hussein Sabban, Khames Alzahrani. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

This study was approved by the Research Committee of the Biomedical Ethics Unit, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia. Reference No 234-23

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

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

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