Medical Science

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DISCOVERY
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Knowledge of polycystic ovary syndrome among females in Al-Qunfudah governorate, Saudi Arabia: A cross-sectional community-based study

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ABSTRACT

Background: Polycystic ovary syndrome (PCOS) considered one of the foremost common endocrinological diseases, which affects women of childbearing age and their quality of life. *Methods:* An analytical cross-sectional study was conducted among a simple random sample of 826 females whose ages of 18-years-old and above in Al-Qunfudah governorate. Data were collected through a validated, electronic self-administered questionnaire to assess their knowledge toward PCOS. *Results:* A total of 826 women from different areas of Al-Qunfudah governorate were recruited in this study, 47.3% of them whose ages between 18 to 24 years and 39.3% were residents of Al-Qunfudah city. A percentage of 11.9 of this study sample self-reported as being previously diagnosed of PCO, of whom 65.3% received treatment. There was a significant association between knowledge score and age (p=0.000), marital status (p=0.036), educational level (p=0.000), prior knowledge about PCOS and its symptoms (p=0.000) and self-reported PCOS diagnosis (p=0.000). *Conclusions:* Knowledge levels varied among participants of different socio-demographic backgrounds. Better knowledge was evident among younger and married participants, university graduates, participants with previous background regarding PCOS and its symptoms, as well as participants with self-reported PCOS diagnoses.

Keywords: Female, knowledge, polycystic ovarysyndrome, Al-Qunfudah, Saudi Arabia.

1. INTRODUCTION

The syndrome of polycystic ovary is one of the most widespread endocrinological diseases that involve women at childbearing age (Ibrahim et al., 2017). The exact cause behind PCOS is unfamiliar; however, studies submit that a complex feature appears at the time of puberty age (Roe andDokras, 2011). Depending on multiple factors which include age, race, family history, weight and also medication history, the symptoms of PCOS are variable (Ibrahim et al., 2017). PCOS is associated with obesity, hirsutism, insulin resistance and irregular menstrual cycle (Roe andDokras, 2011). Regarding PCOS prevalence and its associated symptoms, it varies with different women groups and their ethnicity background (Ibrahim et al., 2017). This syndrome increases the females risk for different disorders which include infertility, pregnancy loss, preeclampsia and increased risk to cancer specialty endometrial cancer (Gupta et al., 2017; Parveen et al., 2021). The metabolic characteristics that affect patients with PCOS include insulin resistance, dyslipidemia and increased risk of cardiovascular disease (Pramodh, 2020). PCOS also has an impact on patients' mental health such as depression, anxiety disorder and more (Santoro, 2018).

Since April 1990, National Institute of Child Health and Human Development of the US National Institutes of Health (NIH) conference, the diagnostic criteria of PCOS have been evolved through four stages: NIH 1990 (ZawadskiandDunaif, 1992). European Society for Human Reproduction and Embryology (ESHRE) and the conference held by American Society for Reproductive Medicine (ASRM) in 2003 (Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group, 2004), the Androgen Excess & PCOS Society (AEPCOS) task force 2006 (Azziz et al., 2006; Azziz et al., 2009) and workshop of NIH 2012 extension of ESHRE/ASRM 2003 (National Institutes of Health, 2012). Currently, evidence-based phenotypic approach has been proposed by NIH 2012, which gives high clinical practice applications and more epidemiologic research benefits, as it can allow the researchers to classify their results on a limited number that can be compared with other more specific PCOS types (Lizneva et al., 2016).

According to NIH's 2012 phenotypic extension of the Rotterdam definition, two of three following criteria are required for the diagnosis: Hyperandrogenic (HA), ovulatory dysfunction (OD) and polycystic ovarian morphology (PCOM). The Identification of specific phenotypes included the following: Phenotype A: HA (clinical or biochemical presence) + OD + PCOM; phenotype B: HA + OD; phenotype C: HA + PCOM; and phenotype D: OD + PCOM (Glintborg and Andersen, 2010). PCOS is a group II ovulation disorder as classified by the World Health Organization and it is considered a hypothalamic-pituitary-ovarian axis disorder (ESHRE Capri Workshop Group, 2012).

In Bhopal Central India, insufficient level of awareness about PCOS was found among majority of study participants (78.4%) (Pramodh, 2020). While about 45% of participants were found to have poor knowledge of PCOS symptoms and management in Quetta, Pakistan (Haq et al., 2017). Furthermore, in Jordan only 12.3% of participants thought that PCOS augments the risk of cardiovascular disease and 31.3% of them said that PCOS would cause an increase in blood sugar (Abu-Taha et al., 2020) while poor awareness about PCOS were found among female students at Emirati university, in which Only 38.3% had heard about PCOS (Santoro, 2018). In Qassim region Saudi Arabia, 71% of students had good knowledge about the Polycystic Ovary Syndrome (Bassam et al., 2018). Moreover, a study done in five regions in Saudi Arabia showed that most of the participants (74.8%) were recognized with a good level of awareness (Alruwaili et al., 2020). Due to the lack of studies about PCOS in Al-Qunfudah, Saudi Arabia, therefore this study was conducted to measure the level of knowledge among women in Al-Qunfudah, Saudi Arabia.

2. METHODS

An analytical cross-sectional study was performed among Al-Qunfudah governorate residents, Saudi Arabia, during the period from August 2021 to November 2022. The study population included female adults aged 18 years and above who lived in Al-Qunfudah governorate and agreed to participate in this study voluntarily, after being assured that all data would be collected anonymously. The sample size calculated by Raosoft calculator with 5% margin of error and 95% confidence interval, resulting in a sample of 385 respondents are enough for this cross-sectional study. However, during the data collection period, we received 826 eligible responses. The data were collected through a valid, semi-structured online survey. The questionnaire was designed in Arabic language by the study researchers based on the literature and validated by expert opinions. Before starting the main study data collection, a pilot study had been performed among 10% of the calculated sample (40 subjects) to test validity of this survey and to determine the approximate time needed for its filling by each participant. The data from this pilot study were excluded from the main study results.

The questionnaire was preceded by consent and ensured to keep acquired data confidential. The used questionnaire was divided into four sections. The first section included the socio-demographic profile: Age, height, weight, nationality, residence, employment status and educational level. The second section inquired about personal information: Social status, the number of

children and whether they encountered any problem during their conception and the menstrual cycle status. The third section inquired about the awareness of the participants regarding PCOS symptoms. The fourth section of the questionnaire asked the participants about their awareness of PCOS and their past medical history. Data were collected over a period of six months starting from October 2021 to March 2022. The online survey was created by using Google form application and disseminated among the public through the available social media platforms. Prior to data collection, the study protocol was evaluated and an approval was obtained from the biomedical research ethics committee of Umm Al-Qura University (Approval number: (SSJI100821 -2021-09-755).

During the course of this research, all data were kept protected for confidentiality. The applied questionnaire started with a question to obtain consent from all participants. None of the personal identifying data were obtained from participants then all obtained data were encrypted and manipulated carefully to guarantee its intimacy. The purpose of this research was described at the first introduction of the applied questionnaire then the participants were asked to voluntarily participate in the study according to their own and full will only after reading the information and consenting for participation. They had the right to quit filling the online questionnaire whenever they wanted. They confirmed that their information would be kept confidential and never be used for purposes other than scientific ones.

Statistical analysis

The data were inputted through Microsoft Excel 2016 and all data analysis was executed by using Statistical Package for Social Sciences (SPSS) software, version 26. Descriptive data analysis was explained using frequencies, percentages, means and standard deviations. Inferential statistics were performed using the Kruskal-Wallis test and the Mann-Whitney test. The value of P was considered statically significant when it is less than 0.05.
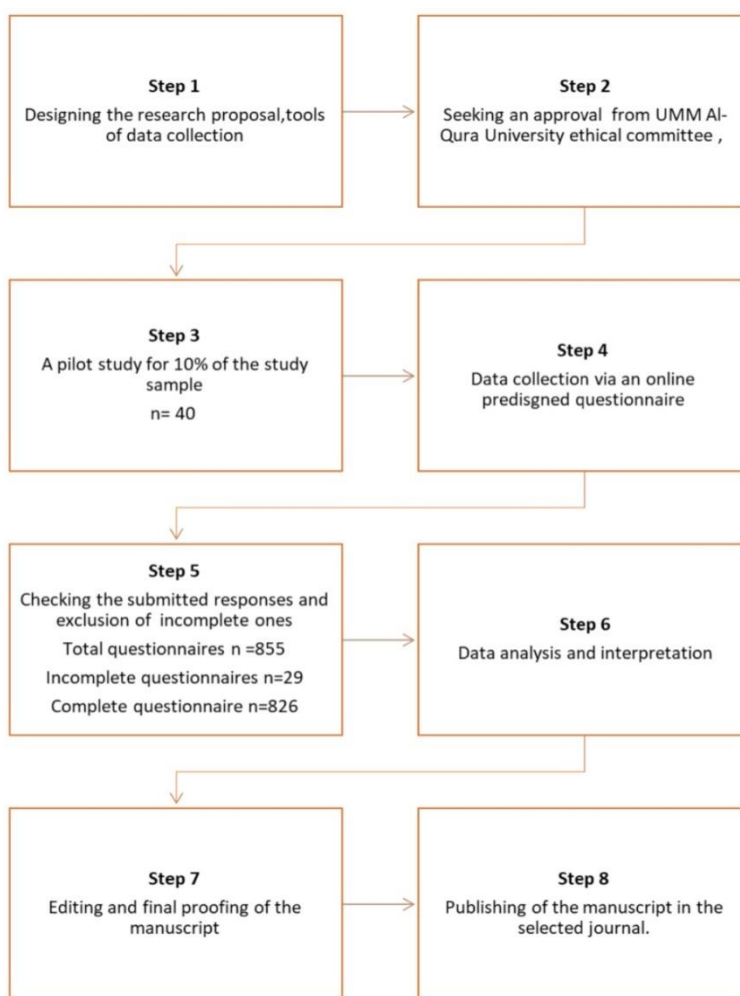

Figure 1 Flowchart of the study framework

3. RESULTS

The study included 826 participants of whom 47.3% were aged between 18 to 24 years and 39.3% were from Al-Qunfudah city. Nearly half of the sample (51.2%) was single and 42.7% were married. Students constituted 43.3% of the sample and 66.2% of the study participants held a bachelor's degree (Table 1).

Table 1 Socio-demographic characteristics of the studied sample

Parameter		N=826 (%)
Age, year	18-24	391 (47.3%)
	25-31	131 (15.9%)
	32-38	136 (16.5%)
	39-45	126 (15.3%)
	> 45	42 (5.1%)
Residency	Al-Qunfudah	325 (39.3%)
	Al-Qouz	219 (26.5%)
	Haly	174 (21.1%)
	Almuzaylif	50 (6.1%)
	Al Ardiyat	14 (1.7%)
	Doga	20 (2.4%)
	AhadBani-Zayd	15 (1.8%)
	KhamisHarb	9 (1.1%)
Marital status	Single	423 (51.2%)
	Married	353 (42.7%)
	Divorced	42 (5.1%)
	Widow	8 (1.0%)
Occupational status	Student	358 (43.3%)
	Unemployed	222 (26.9%)
	Employee	246 (29.8%)
Educational level	Primary	2 (0.2%)
	Intermediate	11 (1.3%)
	Secondary	153 (18.5%)
	Diploma	95 (11.5%)
	BA	547 (66.2%)
	M.A.	14 (1.7%)
	Ph. D	4 (0.5%)

The majority of participants (79.5%) have heard of PCOS before. Internet and social media were the predominant sources of knowledge among participants (51.3%). As demonstrated in (Table 2), the majority recognized that PCOS is manageable (77.1%), affects the ovaries (100%), constitutes multiple ovarian cysts (89.3%), affects mostly the middle age (75.5%), in which male sex hormones are at higher levels (52.4%) and associated with excessive hair (84.6%). Diagnosis of PCOS among participants was self-reported by 11.9% of the sample, of whom 65.3% received treatment. Nearly one-third (31.7%) of participants knew someone with PCOS.

Table 2 PCOS general knowledge among participants

Knowledge item		N=826 (%)
Previously heard about Polycystic Ovary Syndrome	Yes	657 (79.5%)
	No	169 (20.5%)
Source of knowledge about Polycystic Ovary Syndrome	Television	105 (12.7%)
	Internet/Social Media	424 (51.3%)
	People	297 (36%)

	Hospital	169 (20.5%)
	None	151 (18.3%)
The nature of polycystic ovary syndrome	Personality disorder	22 (2.7%)
	Hormonal disturbance	676 (81.8%)
	Don't know	121 (14.6%)
	Neurological disorder	7 (0.8%)
Fatality of PCOS	Fatal	15 (1.8%)
	Not curable	44 (5.3%)
	No idea	130 (15.7%)
	Manageable	637 (77.1%)
Definition of polycystic ovary	No cysts	15 (1.8%)
	Multiple cysts	738 (89.3%)
	One cyst	73 (8.8%)
The affected age group by PCOS	Young	20 (2.4%)
	Middle age	624 (75.5%)
	Old	182 (22%)
The types of hormones which increase in the PCO affected woman	Male hormones	433 (52.4%)
	Female hormones	393 (47.6%)
Definition of hirsutism	No hair	38 (4.6%)
	Less hair	89 (10.8%)
	Excessive hair	699 (84.6%)
Knowing the symptoms of PCOS	Yes	509 (61.6%)
	No	317 (38.4%)
Previously diagnosed with Polycystic Ovary Syndrome	Yes	98 (11.9%)
	No	728 (88.1%)
Receiving treat for the syndrome (N=98)	Yes	64 (65.3%)
	No	34 (34.7%)
Knowing anyone is suffering from PCOS	Yes	262 (31.7%)
	No	564 (68.3%)

Figure 2 demonstrates the knowledge of participants about the pathophysiology of PCOS. Participants agreed that in PCOS there are more visible follicles (52.5%), there is less tendency to ovulation (54.8%), there is tendency to make more male sex hormones (53%), more disfiguring hair growth, acne and scalp hair loss (66.5%) and that the condition is associated with higher insulin levels (45.3%). As shown in (Figure 3), participants regarded family history (58.7%), T2DM (49.8%), obesity (76%), high cholesterol (62.8%), high blood pressure (48.8%) and CVDs (43.1%) as risk factors for PCOS.
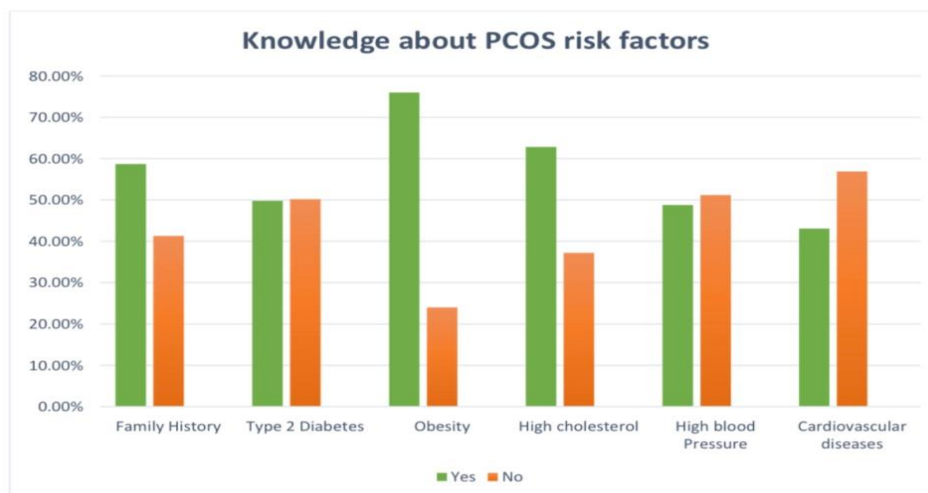

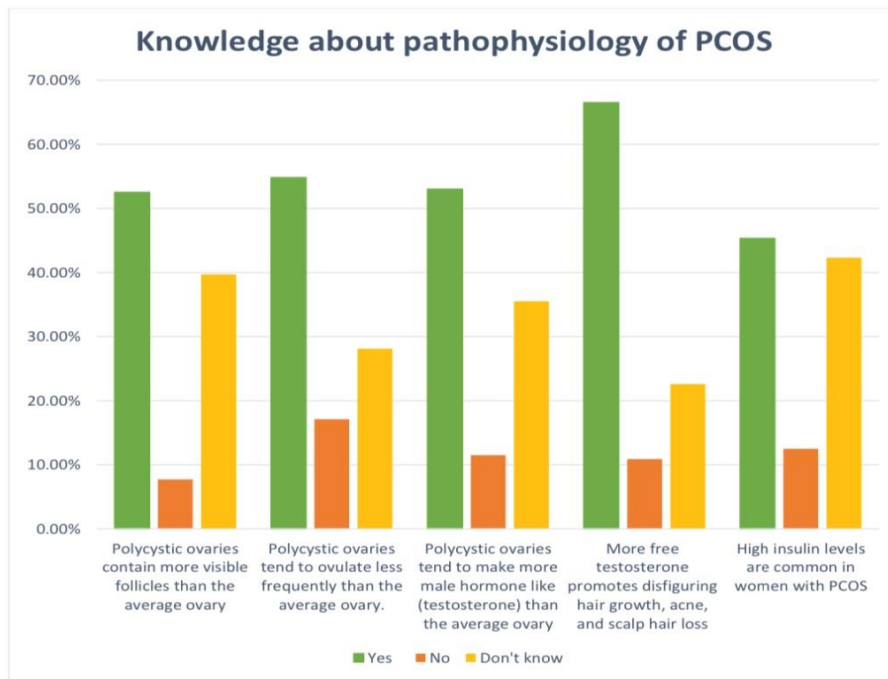**Figure 2** Knowledge about pathophysiology of PCOS

Figure 3 Knowledge about risk factors of PCOS

Psychological upset was the most considered complication of PCOS among participants (78%), followed by endometrial cancer (68.5%) and dyslipidemia (66.5%). Irregular period (82.2%), excessive hair growth (51.5%) and infertility (43.3%) were the most recognized symptoms of PCOS, as shown in (Figure 4). Healthy exercise (71.3%), weight control 65.7%) and good diet (65%) were considered as preventive methods against PCOS, whereas lifestyle modifications were considered a management of PCOS by 55.2% (Table 3).
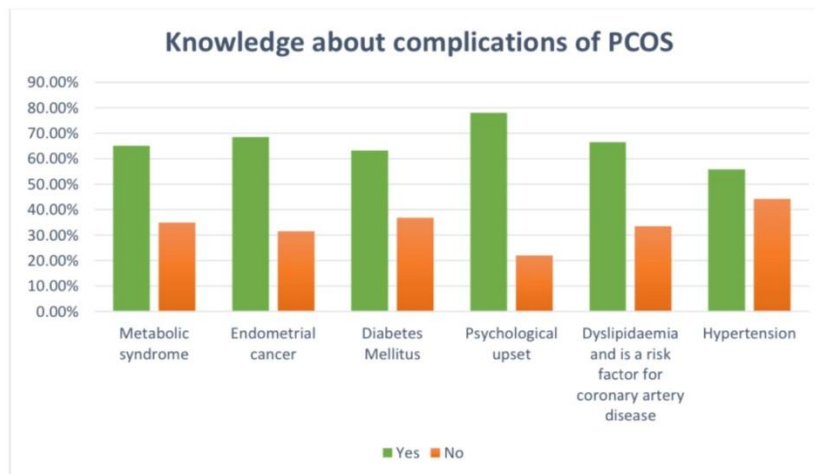

Figure 4 Knowledge about complications of PCOS

Table 3 Knowledge regarding symptoms, management and prevention

Parameter		Yes N (%)	No N (%)
Symptoms	Irregular period	679 (82.2%)	147 (17.8%)
	Infertility	358 (43.3%)	468 (56.7%)
	Obesity	344 (41.6%)	482 (58.4%)
	Excessive hair growth	425 (51.5%)	401 (48.5%)

	Acne	317 (38.4%)	509 (61.6%)
	High blood pressure	136 (16.5%)	690 (83.5%)
	Fever	107 (13%)	719 (87%)
Management	Oral contraceptives	356 (43.1%)	470 (56.9%)
	Anti-diabetic medicine	156 (18.9%)	670 (81.1%)
	Lifestyle modifications	456 (55.2%)	370 (44.8%)
	Anti-hypertensive medicines	85 (10.3%)	741 (89.7%)
	Surgery	337 (40.8%)	489 (59.2%)
	Pain Killers	164 (19.9%)	662 (80.1%)
Prevention	Treating insulin resistant	363 (43.9%)	463 (56.1%)
	Avoid smoking	220 (26.6%)	606 (73.4%)
	Good diet	537 (65%)	289 (35%)
	Healthy exercise	589 (71.3%)	237 (28.7%)
	Weight control	543 (65.7%)	283 (34.3%)

Average knowledge score among all participants was 56.4±16.9. Table 4 shows the association between knowledge score and socio-demographic factors. Knowledge score (100) was significantly associated with age (p=0.000), as participants aged 25-31 years had the highest knowledge score average (60.7±15.8). Single and married participants scored significantly higher than divorced and widowed women (p=0.036). Educational level was significantly associated with knowledge score (p=0.000), as the highest score was among participants with an undergraduate degree (58.4±17.1) and the lowest score was among participants with primary education (36.7±11). Having heard of PCOS (59.5±16 vs. 44.4±15.4) and its symptoms (63.6±14.1 vs. 44.9±14.9) was significantly associated with knowledge (p=0.000; p=0.000, respectively). Moreover, self-reported PCOS diagnosis was significantly associated with adequate PCOS knowledge (p=0.000).

Table 4 Knowledge score in relation to socio-demographic characters

Parameter		Knowledge score	P-value
Total		56.4±16.9	-
Age, year	18-24	57.3±17.4	
	25-31	60.7±15.8	
	32-38	53.5±15.7	0.000*
	39-45	53.6±18.3	
	> 45	52.3±14.6	
Residency	Al-Qunfudah	57.8±17.4	
	Al-Qouz	55.4±16.4	
	Haly	55.5±16.7	
	Almuzaylif	57.5±15.2	
	Al Ardiyat	53.1±21.3	0.171*
	Doga	60.3±18.7	
	AhadBani-Zayd	51.2±19.6	
	KhamisHarb	47.7±15.9	
Marital status	Single	56.8±17.5	
	Married	56.9±16.3	
	Divorced	49.8±17.9	0.036*
	Widow	48.9±17.8	
Occupational status	Student	57.7±17.4	
	Unemployed	55.8±16	0.076*
	Employee	55.1±17.3	
Educational level	Primary	36.7±11	0.000*

	Intermediate	47.3±15.2	
	Secondary	54.8±16.2	
	Diploma	49.8±15.8	
	BA	58.4±17.1	
	M.A.	52.4±18.5	
	Ph. D	53.9±15.3	
Previously heard about Polycystic Ovary Syndrome	Yes	59.5±16	0.000**
	No	44.4±15.4	
Knowing the symptoms of PCOS	Yes	63.6±14.1	0.000**
	No	44.9±14.9	
Previously diagnosed with Polycystic Ovary Syndrome	Yes	63.4±14.5	0.000**
	No	55.5±17.1	
Receiving treat for the syndrome	Yes	64.9±13.5	0.278**
	No	60.5±16	

*Kruskal-Wallis test was used.   ** Mann-Whitney test was used.

Association found at 0.05 level of significant

4. DISCUSSION

The most prevalent female endocrinopathy is polycystic ovary syndrome, which is a complicated condition that influences hormonal levels of women (Wolf et al., 2018). However, the incidence varies depending on the age range of the population investigated (Naderpoor et al., 2015). It is linked to long-term health concerns, metabolic disorders and psychological issues and may have an impact on many aspects of people's lives (Dravecká, 2016). This is the first study in Al-Qunfudah governorate, Saudi Arabia, to assess female's knowledge and attitude as regards PCOS and to associate knowledge scores with socio-demographic factors. The findings of this study revealed that the majority of women had average knowledge level regarding PCOS. The present study comprised 826 women, 47.3 percent of whom were at age group of 18 -24 years old and 39.3 percent of them were from Al-Qunfudah city. The diagnosis of PCOS was self-reported by 11.9 percent of the individuals, with 65.3 percent receiving treatment. Average knowledge score (100) of 56.4±16.9.

According to the study results, participants from various socioeconomic backgrounds had varying degrees of knowledge. Age (p=0.000), marital status (p=0.036), educational level (p=0.000), previous knowledge of PCOS (p=0.000), prior knowledge about PCOS symptoms (p=0.000) and self-reported PCOS diagnosis (p=0.000) all had a significant relationship with knowledge score, as younger individuals, single and married participants, university graduates, people with previous awareness of PCOS and its symptoms and those with a self-reported PCOS diagnosis all had higher levels of knowledge.

The findings matched those of a prior study of nursing students, which found that 76 percent had regular awareness of PCOS and 10.7% had high knowledge (Sunanda and Nayak, 2016). Another research that looked at students' awareness of symptoms, complications, diagnostic techniques and sources of information, therapy and management strategies found that 58 percent had only a rudimentary understanding of PCOS and just 6% were well-informed about the illness (Jahangir, 2017). In another study conducted by Alessa et al., (2017) however, Saudi Arabian women, on the other hand, have a high level of knowledge.

In the study conducted among Lebanese women data showing that most of their responders have had good knowledge of understanding the pathophysiology of PCOS as corresponding with the present study result (Al Souheil andChahine, 2021). In this study, the most recognized symptoms were irregular periods (82.2%) and excessive hair growth (51.5%). This finding is similar to a study conducted among Lebanese women that found that the most common PCOS symptoms were androgen-related side effects (75.8%), followed by menstrual irregularity (72.7%) (Al Souheil and Chahine, 2021). These symptoms were more noticeable in the Jordanian research (90.3 percent) (Bassam et al., 2018). Women, in particular, must be aware of the symptoms of the syndrome in order to link it to the illness and seek further study if they arise.

The present study showed that participants' understanding of PCOS is strongly influenced by their educational level. This is a predictable result, as it is similar to what was reported in another study done in Saudi Arabia, which found that the participants' knowledge about PCOS was significantly associated with better educational attainment (Alessa et al., 2017). In the Jordanian study, married women, on had a better understanding of PCOS than non-married women (Bassam et al., 2018), whereas in the present results both groups had similar knowledge scores. This might be explained by the fact that married women see their gynecologists more often, which could explain their better degree of awareness and information concerning PCOS.

The study researchers faced some limitations that should be acknowledged. The cross-sectional design of the study limits causality of the findings. The data collection method was via an online survey, which is another limitation that could carry a risk for non-response bias and may lead to different characteristics between the non-respondents and the respondents. This is due to the COVID-19 pandemic period which concurrent with the study period; as a result, the study researchers were forced to distribute the questionnaire exclusively via online method. However, the study researchers tried to maximize the sample size through forwarding the survey link to the different social media platforms and also by extending data collection period in order to overcome the impact of these biases. Another factor was most of the sample from the younger population since the questioners distributed in social platforms which could explain the lack of the older generation in this study. However, this study is the first report that discussed female knowledge and attitude towards PCOS and to associate knowledge scores with socio-demographic factors in Al-Qunfudah governorate, Kingdom of Saudi Arabia.

5. CONCLUSION

The study concludes that Saudi women in Al-Qunfudah governorate, Saudi Arabia had average knowledge levels of PCOS. In this study, younger individuals, single and married participants, university graduates, people with previous awareness of PCOS and its symptoms and those with a self-reported PCOS diagnosis all had higher levels of knowledge.

Authors' contributions

MMO: Conceptualization and study design, SHA: Conceptualization, designing the research materials, writing the study methods, designing the flowchart of study methodology, designing of tables and figures of the study results, editing, final proofing and publishing the manuscript. FMK: Designing of tools for data collection, data acquisition, editing of the manuscript. IAA and HIA: Data acquisition, editing of the manuscript. HOA, AAA and AAA: Data acquisition, drafting of the manuscript and final approval of the latest version submitted. TMA, AAA, AAA: Data acquisition, drafting of the manuscript, statistical analysis.

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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