Sudan Journal of Medical Sciences
Volume 17, Issue no. 2, DOI 10.18502/sjms.v17i2.11455
Production and Hosting by Knowledge E

Original Article

Knowledge, Prevalence and Practice of Polycystic Ovary Syndrome among Sudanese women in Khartoum State, Sudan: The need for health education

Zeinab Omer Alfanob[1], Mohamed H Ahmed[2], Musaab Ahmed[3], and Safaa Badi[4]*, Habab K. Elkheir[5]

[1]Clinical Pharmacy Department, Faculty of Pharmacy, Omdurman Islamic University, Khartoum, Sudan
[2]Department of Medicine and HIV Metabolic Clinic, Milton Keynes University Hospital NHS Foundation Trust, Eaglestone, Milton Keynes, Buckinghamshire, United Kingdom
[3]College of Medicine, Ajman University, Ajman, United Arab Emirates
[4]Clinical Pharmacy department, Faculty of Pharmacy, Omdurman Islamic University, Khartoum, Sudan
[5]Department of Clinical Pharmacy, OIU, Department of Clinical Pharmacy and Pharmacology, UST

ORCID:
Zeinab Omer Alfanob: https://orcid.org/0000-0002-2846-7871
Mohamed H Ahmed: https://orcid.org/0000-0001-8045-6996
Musaab Ahmed: https://orcid.org/0000-0002-2300-9919
Safaa Badi: https://orcid.org/0000-0003-3204-983X Habab K.Elkheir: https://orcid.org/0000-0001-5281-0054

Corresponding Author: Safaa Badi; email: safaabadi30@gmail.com

Received 1 September 2021
Accepted 30 April 2022
Published 30 June 2022

Production and Hosting by Knowledge E

Editor-in-Chief:
Prof. Mohammad A. M. Ibnouf

Abstract

Background: Polycystic ovary syndrome (PCOS) is the most common endocrine disorder and cause of infertility in women of reproductive age. Knowledge of females about health problems is considered an important factor that promotes females' health-seeking behavior. This study aimed to evaluate females' knowledge and attitude toward PCOS as well as to assess PCOS prevalence among the participants.

Methods: A total of 240 females were included in the study between January and April 2019. A convenience sampling technique was used to select the participants. Data were collected using a self-administered questionnaire and analyzed using the Statistical Package for Social Sciences (SPSS) version 24. The analysis included frequencies of discrete variables and descriptors and cross-tabulation of the variables using the Chi-square test and logistic regression analysis. $P < 0.05$ was considered statistically significant.

Results: The results showed a low level of knowledge (scoring <9) in 41.3%, a good level (scoring between 9 and 15) in 21.3%, and also an excellent level of knowledge (scoring >15) in 37.5%. The Chi-square statistical test showed significant associations between the level of knowledge and education level, urban residence, health profession, marital status, and the prevalence of PCOS ($p < 0.001$, <0.001, <0.001, 0.045, and <0.001), respectively. Logistic regression showed that the females' knowledge about PCOS was significantly associated with urban residence and being a health professional ($p = 0.004$ and $p < 0.001$, respectively).

Conclusion: The study highlighted that there was inadequate knowledge about the disease among participants and showed an urgent need to improve the knowledge about PCOS among Sudanese women.

OPEN ACCESS

Keywords: knowledge, practice, polycystic ovary syndrome (PCOS), Khartoum, Sudan

1. Introduction

Polycystic ovarian syndrome (PCOS) is a condition associated with excess androgen production [1]. Globally, PCOS prevalence estimates range between 2.2% and 26% [2]. The high prevalence was attributed to PCOS association with obesity, sedentary lifestyle, and genetic predisposing factors [3]. PCOS is characterized by excessive ovarian and/or adrenal androgen secretion. Ovarian factors include altered steroidogenesis as well as other factors such as hyperinsulinemia which contribute to excessive ovarian androgen production [4]. Importantly, amenorrhea increases the chance of having PCOS to 90%. Other associated symptoms of PCOS include hirsutism, acne, central obesity, and subfertility [5]. The mainstream treatment for PCOS is oral contraceptives and clomiphene citrate [6, 7]. If not managed well, PCOS can lead to infertility and long-term complications such as heart disease, diabetes, and metabolic syndrome [8, 9]. Moreover, women with PCOS have a threefold increase in the risk of developing endometrial cancer compared to women without PCOS [10].

Lack of knowledge in women about PCOS often delays diagnosis and treatment [11]. The degree of knowledge about PCOS was found to vary considerably. For instance, in Saudi Arabia, most women (>60%) were not aware of PCOS symptoms and complications [12].

A study done among 200 female medical students of different colleges in India revealed that 28% of the medical students were unaware of PCOS [13]. Although PCOS is a common condition, 76% of the student nurses have average knowledge about PCOS and only 10.7% had good knowledge [1].

Sociocultural factors can also influence knowledge and attitude about PCOS. For instance, in Egypt, most women had inadequate knowledge about PCOS, 52.4% had poor knowledge, 45.4% do not even know the definition of PCOS, 69.6% don't know the symptoms of PCOS, and 83.9% don't know the effects of PCOS [14]. While in Pakistan, 10% were familiar with PCOS [15]. Furthermore, primary care physicians and women perceived that irregular menstrual cycles were identified as a key clinical feature of PCOS [16]. A study done in the universities of Quetta in 2016 to check the percentage of females' awareness of PCOS showed that 72.5% of respondents were not aware of PCOS [17]. Another study done in central India revealed that the lack of awareness about PCOS was reported in around one-third of the participants [11].

PCOS has been identified as one of the major risks for infertility and endometrial cancer. Knowledge and awareness of females about PCOS symptoms and its complications is essential for them to seek early medical care. Accurate diagnosis at a young age may

be a key to preventing further complications. Also, identifying the prevalence of PCOS may help the healthcare authorities in better screening and treatment options. There is no published data about knowledge of females in Sudan about PCOS; therefore, this study aimed at exploring the knowledge of Sudanese females about PCOS.

2. Materials and Methods

2.1. Study setting

This study was a descriptive cross-sectional community-based study, conducted from January to April 2019 in Khartoum State, Sudan. The study was conducted at public places in three different localities of Khartoum State (Omdurman, Khartoum, and Khartoum North). The population recruited were women of reproductive age (16 to 50 years; married and single) who were residents in Khartoum State and agreed to participate in the study.

2.2. Sample size and sampling method

A convenience sampling technique was used to select the participants; 240 females were selected during the data collection period (one month).

2.3. Data collection method

Data were collected using a close-ended questionnaire, comprehensible questions format. The questionnaire was filled out during a face-to-face interview (240 participants). The questionnaire was translated into Arabic and a pretest survey was done on 30 participants, which has led to the rephrasing of several questions for better understanding. The participants included in the pilot phase were excluded from the study.

2.4. Knowledge scale

The knowledge was tested using 18 questions, of which 8 were about symptoms, 5 about complications, and another 5 about risk factors. For each question in the knowledge section, a score of one was given for a correct answer, whereas a zero was given for incorrect or uncertain responses. Questions were rated and a total

score was obtained. Knowledge scores ranged between 1 and 18. A knowledge score >15 was considered excellent, between 9 and 15 as well, and <9 as low [18]. Before logistic regression analysis, excellent and good levels were re-categorized as ”sufficient knowledge” (scores ≥9), and those with a low level of knowledge (scores <9) were re-categorized as “insufficient knowledge” [21].

2.5. Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 24. The analysis included frequencies of discrete variables and descriptors and cross-tabulation of the variables using the Chi-square test and logistic regression analysis. $P < 0.05$ was considered as statistically significant. Then all data were expressed as text, illustrated in tables and figures.

3. Results

3.1. Sociodemographic characteristics of the study population

The total responded participants in this study were 240 females. Less than half of the participants (46%) were within the age group of 20–30 years. Almost half of the participants (49%) were single, (48%) had university-level education, and (61%) weren’t healthcare professionals. The majority of participants (80%) were residents in urban areas (Table 1).

3.2. Knowledge

While 82.1% of the participants reported that irregularity of the menstrual cycle is one of the symptoms of PCOS, 88.8% reported that delayed pregnancy is one of the complications of the PCOS. Many females (41.3%) had a low level of knowledge, while 21.3% had a good level, and 37.5% had an excellent level of knowledge.

3.3. Prevalence of and practice of PCOS among the participants

It was found that 32.5% of the participants had PCOS; of them, 94.9% received treatment. With regards to symptoms, 78.2% of the participants who were diagnosed previously with PCOS were suffering from weight gain, 79.5% from acne, 85.9% from menstrual

Table 1: Sociodemographic characteristics among studied population (n = 240).

Characteristics	Percentage (%)
Age groups (yr)	
16–20	9.2
20–30	45.4
30–40	25.4
40–50	20
Marital status	
Married	42
Single	49
Divorced	3
Widow	6
Educational level	
Primary	7
Secondary	14
University	48
Postgraduate	31
Field of study	
Health professionals	39
Non-health professionals	61
Residence	
Rural	20
Urban	80

irregularity, and 70.5% from hirsutism. The vast majority of patients (91%) who were diagnosed with PCOS visited a gynecologist for the treatment of cycle irregularity, while 55% visited a dermatologist for the treatment of acne (Table 3).

The study showed that healthcare providers were the primary source of information (mentioned by about 63.3% of the participants), followed by relatives and social media by about 52.5% and 47.9% respectively**.**

3.4. Chi-square and logistic regression tests

Chi-square statistical test showed significant associations between the level of knowledge and age, education level, residence, the field of study, and marital status (p < 0.001 , <0.001, <0.001, <0.001, 0.045), respectively. Furthermore, there were significant associations between knowledge and the prevalence of PCOS (p < 0.001).

When logistic regression was performed to determine the predictors of knowledge toward PCOS, it was found that residence, study field, and being known case of PCOS were significantly associated with the knowledge (p 0.004, <0.001, and <0.001),

Table 2: Knowledge among studied participants about clinical features, complications, and risk factors of PCOS (n = 240).

Variables	Percentage (%)		
	Yes	No	I do not know
Symptoms			
Psychological disturbance	52.1	14.6	33.3
Hair loss	57.9	10.8	31.3
Early puberty	30.8	24.6	44.6
Pelvic pain	60.4	12.5	27.1
Weight gain	73.3	7.9	18.8
Hirsutism	62.9	12.9	24.2
Facial acne	71.7	10.4	17.9
Irregularity of menstrual cycle	82.1	8.3	9.6
B. Complications			
Diabetes	41.3	13.3	45.4
Cardio-vascular Disease	28.3	19.2	52.5
Breast and uterus cancer	44.2	14.6	41.3
Premature birth	27.5	24.2	48.3
Delayed pregnancy	88.8	2.1	9.2
C. Risk factors			
Obesity	75	2.9	22.1
Genetic factors	59.2	8.8	32.1
Diabetes	37.1	18.8	44.2
Not doing exercise	58.8	8.8	32.5
Not eating vegetables	50.4	15	34.6

respectively. This means that being a health professional will increase the probability of having sufficient knowledge by 10 times more than those of non-health professionals; additionally, those living in urban areas were more likely to have sufficient knowledge compared to those living in rural areas by 4.8 times. Furthermore, those who were previously diagnosed with PCOS were more likely to have sufficient knowledge by 10 times than those who did not (Table 4).

4. Discussion

In this study, 46% of the participants were within the age group 20–30 years. The 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). These results were similar to a study done in Saudi Arabia in which the level of awareness was significantly related to higher educational levels and health college qualifications [12].

Table 3: Prevalence and practice of PCOS among the participants (*n* = 240).

	Responses	N (%)
Known case of PCOS (n = 240)	Yes	78(32.5)
	No	162(67.5)
Sings of hirsutism (n = 78)	Yes	55(70.5)
	No	23(29.5)
Signs of MC irregularities (n = 78)	Yes	67(85.9)
	No	11(14.1)
Signs of acne (n = 78)	Yes	62(79.5)
	No	16(205)
Signs of weight gain (n = 78)	Yes	61(78.2)
	No	17(21.8)
Received medications (n = 78)	Yes	74(94.9)
	No	4(5.1)
Seek dermatologist for acne (n = 78)	Yes	43(55.1)
	No	35(44.9)
Seek a gynecologist for menstrual irregularity (n = 78)	Yes	71(91)
	No	7(9)

Table 4: Predictors of knowledge about PCOS by using logistic regression test: (*n* = 240).

	B	P-value	Odd ratio
Age	0.766	0.506	2.150
Education level	0.830	0.401	2.293
Residence	1.537	0.004	4.652
Marital status	–0.737	0.142	0.479
Field of study	2.336	<0.001	10.345
Known case of PCOS	2.306	<0.001	10.033

This may be explained by the fact that women with higher educational levels have better access to information, as well as good medical care. While on other hand, in this study, residence was significantly correlated with knowledge ($p < 0.001$), unlike the results obtained from Saudi Arabia, where the area of residence showed no major impact on participants' knowledge [12]. About 80% of the females were from urban areas which showed a significant association to the knowledge score. This difference may be because females residing in urban areas had a better chance to seek medical specialists' advice and to learn more about the condition.

In this study, the main source of information was medical professionals (gynecologists), which is similar to that in Saudi Arabia where women did get information and guidance from medical doctors [12]. The highest percentage of participants were 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.

PCOS is a condition that is not diagnosed using a single criterion; therefore, the presence of signs and symptoms assist in the diagnosis of PCOS. In this study, the majority of females were not diagnosed with PCOS, although many of them were complaining of the symptoms thereof. The highest percentage of symptoms that were experienced by females diagnosed with PCOS were menstrual cycle irregularities (85.9%), acne (79.5%), weight gain (78.2%), and hirsutism (70.5%). This was higher than that found in another study conducted with medical students in India, which found that 33.5% of females had acne, 16% had cycle irregularity, and 5% had hirsutism while 2% had infertility [13]. The weight gain observed among women included in the study may be explained in part by the fact that women in Khartoum are often not engaged in regular exercise. Furthermore, Khalil *et al.* showed that physical activity in Sudanese women was significantly lower when compared to men [19].

The study found that the majority of females (67.5%) were not diagnosed with PCOS, but complained of symptoms, while 32.5% were diagnosed with PCOS. This percentage is very high; these results raise questions about the exact causes and how to minimize risk factors. However, in Pakistan, only 10% were known cases of PCOS [15]. While other studies conducted in different public universities of Quetta obtained that only 5.5% were already diagnosed with PCOS [17].

In this study, 41.3% of the females had inadequate knowledge, which is not different from other countries like Egypt and Pakistan where females' knowledge was very poor [14, 15].

Regarding practice, a vast majority of participants who were diagnosed with PCOS reported that they seek gynecologist's help for the treatment of delayed pregnancy and irregular menses, which is similar to the findings in Indian females, which reflected that seeking pregnancy (in case of married women) and normalizing menstrual cycle (in case of single women) [20] were the main reasons to visit the gynecologist.

This study revealed that 55.5% of the participants diagnosed with PCOS sought a dermatologist for acne. Beauty is the main concern for females in reproductive ages and makes them seek treatment against acne. The acne may be a symptom of several gynecological conditions which may delay the treatment and lead to further complications. PCOS patients are mostly young and the comprehension and awareness regarding the underlying disease, to some symptoms and clinical signs they are experiencing, were generally found to be deficient among them. Increasing their awareness of this issue

may lead to improved quality of life and even pharmacists could play a role in the awareness and management of PCOS.

5. Limitations

This study is not without limitations. The cross-sectional design may not allow establishing the temporal relationship with risk factors. In addition, it is difficult to suggest that the study should be considered representative for all of Sudan since participant recruitments took place only in the Khartoum area. However, the study is novel as it showed the level of knowledge of Sudanese women about PCOS and this can help in developing strategies for future policy on women's health in Sudan.

6. Conclusion

The study revealed that there was a high prevalence of PCOS among the study participants and that the knowledge of participants about PCOS symptoms and complications was not adequate. The degree of knowledge was significantly associated with educational level, being a healthcare provider, place of residence, and previous diagnosis with the disease. There is an urgent need to increase knowledge about PCOS among Sudanese women to increase awareness and promote health-seeking behavior for early treatment to avoid complications.

Acknowledgements

The authors are grateful to all the participants.

Ethical considerations

Ethical approval was obtained from Omdurman Islamic University, Faculty of Pharmacy (OIU-FP-12/2017), and the participants gave consent prior to the enrolment in the study. The research purpose and objectives were explained to the participants in clear simple words. Participants had the right to withdraw at any time without any deprivation. Privacy and confidentiality were kept.

Competing Interests

The authors declare no competing interest.

Availability of Data and Materials

Data and other materials will be available upon reasonable request.

Funding

None

Questionnaire

Evaluation of Women's Knowledge about Polycystic Ovary Syndrome (PCOS) in Khartoum State

Demographic characteristics:

Age (yr):

16–20

20–30

30–40

40–50

Educational level:

Primary

Secondary

University

Postgraduate

Place of residence:

Rural

Urban

Marital status:

Married

Single

Divorced

Widow

Field of study:

Medical

Non-medical

Knowledge of symptoms about PCOS:

Irregularity of MC

Yes No I don't know

Facial acne

Yes No I don't know

Hirsutism

Yes No I don't know

Weight gain

Yes No I don't know

Pelvic pain

Yes No I don't know

Early puberty

Yes No I don't know

Hair loss

Yes No I don't know

Psychological disturbance

Yes No I don't know

Knowledge of complications about PCOS:

Diabetes

Yes No I don't know

CVS disease

Yes No I don't know

Breast and uterus cancer

Yes No I don't know

Premature birth

Yes No I don't know

Delayed pregnancy

Yes No I don't know

What is the risk factors of PCOS:

Weight gain

Yes No I don't know

Genetic factors

Yes No I don't know

Diabetes

Yes No I don't know

Not doing exercises

Yes No I don't know

Not eating fruits and vegetables

Yes No I don't know

What is your source of information:

Health care providers Yes No

Relatives Yes No

Social media Yes No

Others Yes No

Do you have any one of these symptoms:

Hirsutism Yes No

Irregularity of menses Yes No

Facial acne Yes No

Weight gain Yes No

Have you been diagnosed as a PCOS patient before:

Yes No

If yes, did you receive medications

Yes No

What is your attitude about any one of the symptoms of the disease

Seeking dermatologist for acne

Yes No

Seeking gynecologist for irregularity of menses

Yes No

Seeking dermatologist for delayed pregnancy

Yes No

References

[1] Nayak, S. (2016). A study to assess the knowledge regarding PCOS (polycystic ovarian syndrome) among nursing students at NUINS. *Nitte University Journal of Health Science*, vol. 6, no. 3.

[2] Bharathi, R. V., Neerajaa, J., Madhavica, J. V., et al. (2017). An epidemiological survey: Effect of predisposing factors for PCOS in Indian urban and rural population. *Middle East Fertility Society Journal*, vol. 22, no. 4, pp. 313–316.

[3] Dias, D. (2015). A descriptive study to assess the knowledge and warning signs of the polycystic ovarian syndrome among girls of selected colleges of Belagavi Karnataka. *KLE University Journal*, vol. 89, no. 2, pp. 142–156.

[4] Witchel, S. F., Oberfield, S. E., and Pena, A. S. (2019). Polycystic ovary syndrome: Pathophysiology, presentation, and treatment with emphasis on adolescent girls. *Journal of the Endocrine Society*, vol. 3, no. 8, pp. 1545–1573.

[5] Alessa, A., Dalal, A., Almutairi, S., et al. (2017). Awareness of polycystic ovarian syndrome among Saudi females. *International Journal of Medical Science and Public Health*, vol. 6, no. 6, pp. 1013–1020.

[6] de Medeiros, S. F. (2017). Risks benefit size and clinical implications of combined oral contraceptive use in women with polycystic ovary syndrome. *Reproductive Biology and Endocrinology*, vol. 15, no. 1, p. 93.

[7] Lucidi, R. S. (n.d.). Polycystic ovarian syndrome treatment and management. *Medscape*. Retrieved from: http://emedicine.medscape.com/article/256806-treatment.

[8] Palomba, S., Santagni, S., Falbo, A., et al. (2015). Complications and challenges associated with polycystic ovary syndrome: Current perspectives. *International Journal of Women's Health*, vol. 7, pp. 745–763.

[9] Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. (2004). Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. *Fertility and Sterility*, vol. 81, no. 1, pp. 19–25.

[10] Shafiee, M. N., Chapman, C., Barrett, D., et al. (2013). Reviewing the molecular mechanisms which increase endometrial cancer (EC) risk in women with polycystic ovarian syndrome (PCOS): time for a paradigm shift? *Gynecologic Oncology*, vol. 131, no. 2, pp. 489–492.

[11] Patel, J. and Rai, S. (2018). Polycystic ovarian syndrome (PCOS) awareness among young women of central India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, vol. 7, no. 10, pp. 3960–3964.

[12] AlSinan, A. and Shaman, A. (2017). A study to measure the health awareness of polycystic ovarian syndrome in Saudi Arabia. *Global Journal of Health Science*, vol. 9, no. 8, p. 130.

[13] Upadhye, J. J. and Shembekar, C. A. (2017). Awareness of PCOS (polycystic ovarian syndrome) in adolescent and young girls. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, vol. 6, no. 6, pp. 2297–2301.

[14] Ali, M. R. and Mahmoud, O. M. (2019). Polycystic ovarian syndrome knowledge and awareness of non-medical undergraduate students. *International Journal of Novel Research in Healthcare and Nursing*, vol. 6, no. 3, pp 1249–1258).

[15] Gul, S., Zahid, S., and Ansari, A. (2014). PCOS: Symptoms and awareness in urban Pakistani women. *International Journal of Pharma Research and Health Sciences*, vol. 2, no. 5, pp. 356–360.

[16] Teede, H., Gibson-Helm, M., Norman, R. J., et al. (2014). Polycystic ovary syndrome: perceptions and attitudes of women and primary health care physicians on features of PCOS and renaming the syndrome. *The Journal of Clinical Endocrinology and Metabolism*, vol. 99, no. 1, pp. E107–E111.

[17] Haq, N., Khan, Z., Riaz, S., et al. (2017). Prevalence and knowledge of polycystic ovary syndrome (PCOS) among female science students of different public universities of Quetta, Pakistan. *Imperial Journal of Interdisciplinary Research*, vol. 35, no. 6, pp. 385–392.

[18] Memon, M. S., Shaikh, S. A., Shaikh, A. R., et al. (2015). An assessment of knowledge, attitude and practices (KAP) towards diabetes and diabetic retinopathy in a suburban town of Karachi. *Pakistan Journal of Medical Sciences*, vol. 31, no. 1, pp. 183–188.

[19] Khalil, S., Almobarak, A. O., Awadalla, H., et al. (2017). Low levels of physical activity in Sudanese individuals with some features of metabolic syndrome: Population-based study. *Diabetes & Metabolic Syndrome*, vol. 11, no. 2, pp. S551–S554.

[20] Sharma, S. and Mishra, A. J. (2017). Tabooed disease in alienated bodies: A study of women suffering from polycystic ovary syndrome (PCOS). *Clinical Epidemiology and Global Health*, vol. 6, no. 3, pp. 130–136.

[21] Ali- Risasi, C., Mulumba, P., Verdonck, K., et al. (2014). Knowledge, attitude and practice about cancer of the uterine cervix among women living in Kinshasa, the democratic republic of Congo. *BMC Women's Health*, vol. 14, p. 30.