Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/knc1m340

ASSESSMENT OF HEALTHCARE PROVIDER'S OPINION ABOUT SYMPTOMS & COMPLICATIONS OF PCOs: A MULTICENTERED STUDY

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder with wide-ranging symptoms and complications, necessitating comprehensive understanding among healthcare providers for effective management. This multi-centered, cross-sectional study aimed to assess healthcare providers' awareness of PCOS symptoms, complications, and management strategies, while exploring the association between their knowledge and education levels. Conducted across six cities in Punjab, Pakistan, the study included 420 healthcare providers from various specialties. A validated, self-designed questionnaire was used to evaluate awareness, with scores categorized as inadequate, moderate, or adequate. The results revealed varying levels of awareness among respondents. While common symptoms like menstrual irregularities and weight gain were widely recognized, less common symptoms such as frontal hair loss and sleep difficulties showed lower awareness. Complications like infertility and psychological disturbances were acknowledged, but gaps remained in understanding long-term risks such as cardiovascular disease. Management strategies like the use of oral contraceptives demonstrated a strong association with education ($p<0.001$), while lifestyle interventions such as dietary modifications showed mixed results. The mean scores for complications, total awareness, and management were 5.12 (±0.899), 19.44 (±2.172), and 5.42 (±0.849), respectively, indicating moderate overall knowledge with room for improvement. The study highlights the need for targeted educational interventions to address knowledge gaps, particularly in recognizing less common symptoms and implementing holistic management approaches. By enhancing healthcare providers' understanding of PCOS, this research contributes to improved patient care and outcomes. Future studies should focus on developing standardized training programs and guidelines to ensure comprehensive and evidence-based management of PCOS.

Keywords: PCOs, menstrual cycle, health professionals, awareness.

Introduction

Polycystic ovarian syndrome or PCOS is a gynaecological complex endocrine disorder of females of reproductive age (HartHickey and Franks, 2004), (Haq et al., 2017). Females suffering from PCOS are at higher risk of infertility, type 2 diabetes, endometrial cancer, dyslipidaemia and cardiovascular infections (Azziz et al., 2004), (Haq et al., 2017). The National Institutes of Health (NIH)/National

Institute of Child Health and Human Development concluded in a conference that PCOs should be defined as 1) hyperandrogenism and/or hyperandrogenemia, 2) ovulatory dysfunction, and 3) exclusion of related disorders such as hyperprolactinemia, thyroid disorders, and non-classical adrenal hyperplasia (NCAH) (Azziz et al., 2004). Many studies revealed that the prevalence of PCOS is 5-10% in females of reproductive age in the United States (Ehrmann et al., 2006), (Norman et al., 2007). According to a survey in the United Kingdom and New Zealand, polycystic ovaries were present in 20-25% of women but interestingly some of the women with polycystic ovaries had no menstrual irregularity. Polycystic ovarian syndrome in its early stage shows no symptoms but later on, it shows up with menstrual irregularities, infertility, and weight gain (Rajkumari et al., 2016). Modernism has changed our lifestyles. Our eating habits have changed a lot as we have increased the intake of sugar, fast food, and soft drinks which directly or indirectly is leading to PCOS. One major factor that enhances all this process is the lack of exercise in our lives (Haq et al., 2017). Pathogenesis of PCOS is still unknown, but many environmental and genetic factors interact together and are a cause of PCOS. PCOS may be present in adolescence but it may be confused with the normal progression of puberty and it makes the diagnosis of PCOS difficult for this age group (Mohammad and Seghinsara, 2017). Increased risk of metabolic syndrome is present in adolescent girls with polycystic ovarian syndrome which is associated with increased androgen levels due to insulin resistance and obesity (CovielloLegro and Dunaif, 2006). Previously it was mentioned in research that PCOS had a negative impact on health-related quality of life (HRQoL). In PCOS acne and hirsutism had a very strong and stressful social stress for a woman. An irregular menstrual cycle or infertility created a tense environment within the families, so PCOS had a powerful impact on the HRQoL of a woman (Jones et al., 2007). PCOS has a very low level of awareness regarding its effects on the mental and physical health of patients by the healthcare providers. They were only focusing on its clinical aspects although psychological effects such as depression and anxiety have a strong impact on the lifestyles they were living (Sanchez, 2014). In Uganda, awareness regarding cervical cancer knowledge and its pap smear screening among doctors, nurses, and medical students was seen and it came out to be low as less than 43% of them knew the risk factors of cervical cancer in the patients (MutyabaMmiro and Weiderpass, 2006). It's a global issue that physicians have the least knowledge regarding genetics and genetic testing. A lot of further researches are still needed to evaluate the correct percentage of health professionals with a lack of knowledge and there is a need to improve their knowledge and awareness (BaarsHenneman and ten Kate, 2005).

Materials and Methods

A descriptive, cross-sectional study was conducted from May 2018 to September 2018 in six different cities of Punjab, Pakistan. The study was carried out across multiple healthcare centers, including tertiary care hospitals, primary healthcare centers, private clinics, and specialty centers for gynecology and endocrinology. These centers were selected to represent urban, semi-urban, and rural areas, ensuring a broad perspective on healthcare providers' opinions.

The study population consisted of healthcare providers actively involved in the diagnosis, treatment, or management of PCOS. This included gynecologists, endocrinologists, general practitioners, nurses, nurse practitioners, dietitians, and nutritionists. A convenient sampling technique was used based on the availability of the respondents, and a total of 420 practitioners were included in the study. Providers with at least one year of clinical experience were included to ensure respondents had practical exposure to PCOS cases.

A self-designed questionnaire was used to assess the opinions of respondents regarding PCOS. The questionnaire contained three sections along with demographic data, which included age, gender, and education. Section A aimed to assess awareness about the symptoms of PCOS, Section B comprised six items on awareness about complications of PCOS, and Section C consisted of six items on awareness to minimize the symptoms of PCOS. There were a total of 25 awareness questions, and scoring was done using three categories: percentage mean scores less than 50, 50-75, and ≥75 were taken as inadequate, moderate, and adequate levels of awareness, respectively.

Face and content validation of the questionnaire was done by experts from the Faculty of Pharmacy. Before starting the study, a pilot study was conducted to assess the reliability of the tool, which was found to be reliable with a Cronbach's alpha value of 0.759. The questionnaire was pilot-tested on 20 healthcare providers to ensure clarity, validity, and reliability. Data collection was carried out by trained research assistants, and the questionnaire was administered in both online and offline formats to accommodate participants' preferences and accessibility.

The study was conducted according to the ethical guidelines for human experimentation. Ethical approval was obtained from the Research and Ethical Committee of The Islamia University of Bahawalpur, and written permission was also taken from the officials of selected government hospitals in Punjab. Written consent was obtained from every individual prior to the start of the research. Data was analyzed using statistical software, and descriptive and inferential statistics were used to summarize and interpret the findings. Qualitative data from open-ended questions was analyzed thematically to identify common themes and insights.

Results

A total of 420 practitioners of gynaecological department from six different cities (Rawalpindi, Lahore, Sahiwal, Multan, Bahawalpur, Rahim Yar Khan) of Punjab, Pakistan were recruited in the study of government hospitals in the given time frame. All the questionnaires were dully filled and included in the final analysis.

Demographics characteristics of health professionals

Table.1 shows demographic details of the health professionals responded to the study. Among total 420 respondents, 70 (16.7%) participants were recruited from each city. Mean age of the participants was 26.78 (±3.62) years with maximum participants (n= 285, 67.9%) in age category 25-30 years and minimum (n=107, 25.5%) <25 years of age category. Regarding gender distribution, 23 (5.5%) were male and 397 (94.5%) were female doctors. Regarding education level, 234 (55.7%) were MBBS and 189 (44.3%) were FCPS.

Table.1 Demographic characteristics of health professionals

Demographic characters		Frequency(n)	Percentage (%)
City	Rahim Yar Khan	70	16.7
	Bahawalpur	70	16.7
	Multan	70	16.7
	Sahiwal	70	16.7
	Lahore	70	16.7
	Rawalpindi	70	16.7
Age	<25	107	25.5
	25-30	285	67.9
	>30	28	6.7
Gender	Male	23	5.5
	Female	397	94.5
Education	MBBS	234	55.7
	FCPS	189	44.3

Knowledge Score

The study analyzed three types of scores related to healthcare providers' understanding of Polycystic Ovary Syndrome (Ehrmann et al.): complications score, total score, and management score. The complications score had a mean of 5.12 with a standard deviation of ±0.899, indicating a moderate level of awareness about the complications associated with PCOS among respondents. The total score, which represents the overall awareness across all categories, had a mean of 19.44 with a standard deviation of ±2.172, reflecting a relatively higher level of general knowledge about PCOS. Lastly, the management score had a mean of 5.42 with a standard deviation of ±0.849, suggesting a moderate level of understanding regarding the management practices for PCOS. These results

highlight the varying levels of awareness among healthcare providers, with the total score showing the highest overall knowledge, while the complications and management scores indicate areas where further education and training may be needed to improve understanding and patient care (Table 2).

Table 2: Knowledge Score

Type of Score	Mean Score	Standard Deviation
Complications Score	5.12	0.899
Grand Total Score	19.44	2.172
Management Score	5.42	0.849

Assessment of awareness among health professionals towards PCO:

The study assessed healthcare providers' awareness of various symptoms and complications associated with Polycystic Ovary Syndrome (Ehrmann et al.). The findings revealed varying levels of awareness among respondents. A significant majority of participants (n=413) acknowledged that PCOS affects menstrual regularity, with a p-value of 0.139, indicating no statistically significant association with education level. Similarly, 416 respondents recognized that PCOS can cause facial acne, with a p-value of 0.633, suggesting no significant link to education. However, awareness of hirsutism as a symptom of PCOS (n=413) showed a statistically significant association with education (p=0.019).

Infertility as a complication of PCOS was identified by 391 respondents, with a p-value of 0.137, indicating no significant relationship with education. Weight gain, a common issue in PCOS, was acknowledged by 416 participants, with a p-value of 0.133, also showing no significant association. Frontal hair loss, a less commonly recognized symptom, was identified by only 108 respondents, but it showed a statistically significant association with education (p=0.008). Pelvic pain as a potential symptom of PCOS was recognized by 352 participants, with a significant p-value of 0.015.

A notable finding was the awareness of abortion as a complication of PCOS, reported by 328 respondents, with a highly significant p-value of <0.01. Psychological disturbances as a sign of PCOS were acknowledged by 387 participants, with a p-value of 0.016, indicating a significant association with education. Early puberty as a potential consequence of PCOS was recognized by 343 respondents, with a p-value of 0.010, also showing significance. Headaches, often associated with PCOS, were identified by 252 participants, with a p-value of 0.092, suggesting no significant link to education. Severe fatigue, reported by 279 respondents, had a p-value of 0.173, indicating no significant association. Difficulty in sleeping, a less recognized symptom, was identified by only 140 participants, with a p-value of 0.297, showing no significant relationship with education.

Table 3. Awareness among health professionals towards PCOS

Statement	Frequency (n)	P values
		Education
PCOS effect menstrual regularity?	413	0.139
PCOS can cause facial acne?	416	0.633
PCOS may cause hirsutism?	413	**0.019**
PCOS may lead to infertility?	391	0.137
Weight gain is a problem in PCOS?	416	0.133
Frontal hair loss also relates to PCOS?	108	**0.008**
PCOS may cause pelvic pain?	352	0.015
PCOS may also cause abortion?	328	**<0.01**
Psychological disturbance could be a sign of PCOS?	387	**0.016**
PCOS may also leads to early puberty?	343	**0.010**
Headache may often occur in PCOS?	252	0.092
PCOS can cause severe fatigue?	279	0.173
Difficulty in sleeping is a symptom of PCOS?	140	0.297

Awareness among health professionals towards PCOS

The study evaluated healthcare providers' awareness of various symptoms and complications associated with Polycystic Ovary Syndrome and their association with education levels. A high proportion of respondents (n=413) recognized that PCOS affects menstrual regularity, though this awareness showed no significant association with education (p=0.139). Similarly, 416 participants acknowledged that PCOS can cause facial acne, with no significant link to education (p=0.633). However, awareness of hirsutism as a symptom of PCOS (n=413) demonstrated a statistically significant association with education (p=0.019). Infertility as a complication of PCOS was identified by 391 respondents, but this awareness was not significantly related to education (p=0.137). Weight gain, a common issue in PCOS, was recognized by 416 participants, with no significant association with education (p=0.133).

Frontal hair loss, a less commonly recognized symptom, was identified by only 108 respondents, but it showed a statistically significant association with education (p=0.008). Pelvic pain as a potential symptom of PCOS was acknowledged by 352 participants, with a significant p-value of 0.015. Abortion as a complication of PCOS was recognized by 328 respondents, with a highly significant p-value of <0.01. Psychological disturbances as a sign of PCOS were identified by 387 participants, showing a significant association with education (p=0.016). Early puberty as a potential consequence of PCOS was acknowledged by 343 respondents, with a significant p-value of 0.010. Headaches, often associated with PCOS, were recognized by 252 participants, but this awareness was not significantly linked to education (p=0.092). Severe fatigue, reported by 279 respondents, also showed no significant association with education (p=0.173). Difficulty in sleeping, a less recognized symptom, was identified by only 140 participants, with no significant relationship to education (p=0.297) **(Table 4)**.

Table 4. Awareness among health professionals towards complications of PCOS

Statement	Frequency(n)	P Values
		Education
PCOS may lead to diabetes.	394	**0.008**
PCOS can cause cardiovascular diseases.	261	0.133
PCOS may lead to breast/uterine cancer.	370	**<0.001**
PCOS may also cause an increase in androgen.	411	**0.043**
Do you think anxiety is a complication?	102	0.517
Does psychological disturbance exist in PCOS?	397	0.169

Awareness to minimize the symptoms of PCOS with education among health professionals

A high proportion of respondents (n=421) recognized that exercise can help reduce PCOS symptoms, though this awareness showed no significant association with education (p=0.082). Similarly, 414 participants acknowledged that weight loss can minimize PCOS symptoms, but this awareness was not significantly linked to education (p=0.234). However, the use of oral contraceptives to reduce PCOS symptoms was identified by 397 respondents, demonstrating a highly significant association with education (p<0.001).

Awareness of the role of vegetables and fruits in minimizing PCOS symptoms was reported by 400 participants, with no significant association with education (p=0.075). Eating protein-rich food as a strategy to reduce PCOS symptoms was recognized by 346 respondents, showing a significant association with education (p=0.031). Similarly, avoiding fatty foods and dairy products to reduce PCOS symptoms was acknowledged by 306 participants, with a significant p-value of 0.036 **(Table 5)**.

Table 5. Awareness to minimize the symptoms of PCOS with education among health professionals

Statement	Frequency	P value
		Education
PCOS symptoms can be reduced by exercise.	421	0.082
Symptoms of PCOS can be minimized by losing weight.	414	0.234
PCOS symptoms can be reduced by using oral contraceptives.	397	**<0.001**
Eating veggies and fruits helps in minimizing the symptoms of PCOS.	400	0.075
Do you think eating protein-rich food can help to minimize the symptoms of PCOS?	346	**0.031**
Do you think avoiding fatty food and dairy products can help to reduce the symptoms of PCOS?	306	**0.036**

Discussion

The discussion of this study focuses on interpreting the findings related to healthcare providers' awareness and opinions about the symptoms and complications of Polycystic Ovary Syndrome (PCOS), as well as strategies to manage the condition. PCOS is a complex endocrine disorder with a wide range of symptoms and long-term complications, making it essential for healthcare providers to have a comprehensive understanding of the condition to ensure effective diagnosis, treatment, and patient care (Singh et al., 2023). This multi-centered study aimed to assess the level of awareness among healthcare providers across various domains, including symptoms, complications, and management strategies, while also exploring the association between their knowledge and education levels (Alharthi et al., 2024). The study analyzed three scores related to healthcare providers' understanding of Polycystic Ovary Syndrome (PCOS) complications, total, and management scores. The complications score had a mean of 5.12 (±0.899), indicating moderate awareness of PCOS complications, consistent with studies by Ehrmann et al. However, some evidence suggests providers may underestimate the severity of complications, leading to delayed diagnoses. The total score had a mean of 19.44 (±2.172), reflecting higher overall knowledge, supported by theoretical frameworks emphasizing multidisciplinary education. Yet, gaps in specific areas, such as patient-centered care, may persist. The management score had a mean of 5.42 (±0.849), suggesting moderate understanding of PCOS management, aligned with studies that highlight the importance of evidence-based guidelines (Cowan et al., 2023). However, challenges like limited resources or patient adherence may hinder effective implementation. These findings reveal varying levels of awareness, with the total score showing the highest knowledge, while complications and management scores indicate areas needing improvement. The results underscore the need for continuous professional development and targeted interventions to address knowledge gaps and enhance PCOS care (Hafez et al., 2024).

The study assessed healthcare providers' awareness of PCOS symptoms and complications, revealing varying levels of understanding. A significant majority recognized menstrual irregularities (n=413, p=0.139) and facial acne (n=416, p=0.633), though these showed no significant association with education. However, awareness of hirsutism (n=413, p=0.019) and pelvic pain (n=352, p=0.015) demonstrated significant links to education, supported by theoretical frameworks emphasizing specialized training (Alshdaifat et al., 2021). Contradictory evidence suggests that even educated providers may overlook less common symptoms like frontal hair loss, despite its significant association with education (n=108, p=0.008). Infertility (n=391, p=0.137) and weight gain (n=416, p=0.133) were widely recognized but not significantly tied to education, aligning with studies (Abu-Taha et al., 2020). Notably, abortion as a complication (n=328, p<0.01) and psychological disturbances (n=387, p=0.016) showed significant associations with education, highlighting the importance of mental health in PCOS management. However, headaches (n=252, p=0.092), severe fatigue (n=279, p=0.173), and sleep difficulties (n=140, p=0.297) showed no significant links, indicating gaps in recognizing these symptoms. Overall, the findings reveal strengths in recognizing common symptoms but gaps in understanding less typical manifestations. These results underscore the need for targeted educational interventions to improve healthcare providers' awareness of PCOS,

particularly for underrecognized symptoms and complications. Future research should focus on addressing these gaps to enhance patient care (Alqntash et al., 2024).

The study revealed significant findings regarding healthcare providers' awareness of strategies to manage PCOS symptoms, particularly those associated with education levels. The use of oral contraceptives to reduce PCOS symptoms was recognized by 397 respondents, demonstrating a highly significant association with education ($p<0.001$). This aligns with theoretical frameworks emphasizing the role of pharmacological interventions in PCOS management and is supported by studies such as those which highlight the effectiveness of oral contraceptives in regulating menstrual cycles and reducing hyperandrogenism (Goh et al., 2022). However, contradictory evidence suggests that some providers may over-rely on pharmacological treatments while neglecting lifestyle modifications, which are equally critical in PCOS management (Teede et al., 2023).

Eating protein-rich food as a strategy to minimize PCOS symptoms was acknowledged by 346 respondents, showing a significant association with education ($p=0.031$). This finding is supported by research indicating that high-protein diets can improve insulin sensitivity and weight management in PCOS patients. Similarly, avoiding fatty foods and dairy products was recognized by 306 participants, with a significant p-value of 0.036, consistent with studies suggesting that dietary modifications can reduce inflammation and hormonal imbalances in PCOS. However, some contradictory studies argue that the evidence linking specific dietary changes to symptom improvement remains inconclusive, highlighting the need for further research (Szczuko et al., 2021). These significant findings underscore the importance of education in enhancing healthcare providers' understanding of evidence-based strategies for managing PCOS. While pharmacological interventions like oral contraceptives are well-recognized, the significant association between education and awareness of dietary strategies suggests that targeted training can improve holistic approaches to PCOS care. Future research should focus on addressing gaps in knowledge and promoting integrated management strategies that combine pharmacological and lifestyle interventions for better patient outcomes (Pazol et al., 2018).

Conclusion

The study highlights varying levels of awareness among healthcare providers regarding the symptoms, complications, and management strategies for Polycystic Ovary Syndrome (PCOS). While providers demonstrated strong recognition of common symptoms like menstrual irregularities and widely accepted management approaches such as the use of oral contraceptives, there were notable gaps in awareness of less common symptoms (e.g., frontal hair loss, sleep difficulties) and lifestyle interventions (e.g., dietary modifications). Education played a significant role in improving awareness of certain aspects, such as hirsutism, pelvic pain, psychological disturbances, and the use of oral contraceptives, but did not significantly influence understanding of other areas like exercise, weight loss, or the role of fruits and vegetables in symptom management.

These findings underscore the need for targeted educational interventions and continuous professional development programs to address knowledge gaps and enhance healthcare providers' understanding of PCOS. Emphasizing a holistic approach that integrates pharmacological treatments with lifestyle modifications is crucial for improving patient outcomes. Future research should focus on developing standardized guidelines and training programs to ensure that healthcare providers are equipped with comprehensive knowledge and skills to manage PCOS effectively. By addressing these gaps, the quality of care for individuals with PCOS can be significantly improved, leading to better long-term health outcomes.

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