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Empowering Women Through Health Belief Model–Based Education on Polycystic Ovarian Syndrome

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ABSTRACT

Objective: This study aimed to evaluate the effectiveness of Health Belief Model (HBM)–based education on improving women's knowledge, health beliefs, and practices regarding PCOS.

Methods and Materials: A quasi-experimental pre-post design was employed with a purposive sample of 300 women attending an outpatient obstetrics and gynecology clinic of Kafr El-Sheikh University Hospital, Egypt. Data were collected using a structured questionnaire assessing demographic characteristics and HBM constructs. The intervention consisted of eight educational sessions delivered over six months. Pre- and post-intervention data were analyzed using descriptive statistics and inferential tests to determine statistical significance.

Findings: Pre-intervention findings indicated high levels of negative health beliefs regarding PCOS: perceived susceptibility (75.3%), severity (71.3%), barriers (68.3%), benefits (65.0%), and cues to action (73.3%). Following the intervention, positive health beliefs significantly increased across all domains, with over 80% of participants showing improved scores (p < 0.001). Overall, the proportion of women with positive total HBM scores rose from 32.3% to 83.3%. Significant associations were found between sociodemographic factors and health belief scores both pre- and post-intervention (p < 0.001).

Conclusion: The HBM-based educational program significantly improved women's health beliefs about PCOS, demonstrating its effectiveness as a tool for empowering women and promoting informed self-management across diverse sociodemographic groups.

Keywords: Polycystic ovarian syndrome, Health Belief Model, women's health, health education, health beliefs, intervention study.

Introduction

Polycystic Ovarian Syndrome (PCOS) is one of the most prevalent endocrine disorders affecting women of reproductive age, with wide-ranging consequences on reproductive, metabolic, and psychological health.

Despite its high global prevalence, estimated at 15% based on the Rotterdam criteria, PCOS remains significantly underdiagnosed and undertreated, particularly in low- and middle-income countries (Athar & Javed, 2024; Han et al., 2024). This is often due to a lack

of awareness and understanding among women about the condition, its symptoms, and long-term health risks (Ding et al., 2023).

PCOS is characterized by hyperandrogenism, chronic anovulation, and polycystic ovarian morphology. Its multifactorial pathophysiology includes genetic predisposition, insulin resistance, hyperinsulinemia, and dysfunction of ovarian theca cells. These mechanisms contribute to excess androgen production, ovulatory dysfunction, and metabolic complications (Van Der Ham et al., 2024; Van Tienhoven et al., 2025). A systematic review by Lim et al. (2023) highlighted the bidirectional relationship between obesity and insulin resistance, both of which exacerbate PCOS symptoms and elevate the risk for type 2 diabetes, cardiovascular disease, and endometrial cancer (Lim et al., 2023).

The chronic and complex nature of PCOS underscores the urgent need for effective, theory-driven educational interventions. Empowering women with accurate knowledge, self-care strategies, and the motivation to seek timely medical attention is crucial for improving health outcomes and quality of life. Educational programs grounded in behavioral models, particularly the Health Belief Model (HBM), offer a promising approach. HBM is a psychological framework designed to explain and predict health behaviors by focusing on individuals' perceptions of susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Teede et al., 2018).

Applying the HBM in PCOS-related education enables women to better understand their health risks, recognize early symptoms, and make informed decisions about their care. This model-based approach promotes active decision-making, long-term behavioral change, and improved self-management. It also strengthens women's ability to advocate for themselves in clinical settings and take preventive action against complications such as infertility, diabetes, and cardiovascular disease (Goodarzi et al., 2011).

Despite the burden of PCOS, public health strategies addressing awareness, screening, and self-care remain limited. This gap highlights the need for culturally tailored and evidence-based interventions. Health education based on HBM is effective in other areas of chronic disease prevention and management; however, its application to PCOS remains underexplored, especially in underserved regions.

This study was conducted to evaluate the effectiveness of an HBM-based educational program in modifying health beliefs among women diagnosed with PCOS. By examining changes in HBM constructs before and after the intervention, and exploring associations with sociodemographic variables, the study aims to contribute to a more informed, culturally sensitive approach to women's health education

This study aimed to evaluate the effectiveness of a Health Belief Model (HBM)–based educational intervention in increasing knowledge, improving health beliefs, and promoting self-care behaviors among women diagnosed with or at risk of polycystic ovarian syndrome (PCOS).

By leveraging the constructs of the HBM, the study sought to examine how changes in health beliefs can empower women to adopt healthier lifestyles, engage in early detection, and actively manage PCOS. The results are expected to inform both clinical practice and public health policy by offering a scalable, culturally adaptable model for enhancing women's reproductive and metabolic health, particularly in resource-limited settings.

Methods and Materials

Study Design and Participants

This study employed a quasi-experimental, pre-post intervention design to evaluate the effect of Health Belief Model (HBM)–based education on knowledge, beliefs, and self-care practices among women diagnosed with polycystic ovarian syndrome (PCOS). The study was conducted in the outpatient obstetrics and gynecology clinic of Kafr El-Sheikh University Hospital, Egypt. Data collection and implementation of the program were carried out over 6 months from January to June 2022.

A purposive, non-probability sampling technique was used to recruit participants. The sample comprised 300 women who had been clinically diagnosed with PCOS, as confirmed by their medical records. Eligible participants were required to have a scheduled follow-up visit at the outpatient clinic during the study period. Women who were pregnant, menopausal, or diagnosed with other serious gynecological or endocrine disorders were excluded.

Data collection was performed through individual, face-to-face interviews using the validated questionnaire

at two time points: before and after the educational intervention. Each interview lasted approximately 25–35 minutes. The same instrument was administered post-intervention to assess the impact of the program.

Instruments

Data were collected using a structured questionnaire based on the Health Belief Model (HBM), adapted from Champion's original tool (1999) and modified for PCOS-related education. The questionnaire was reviewed and validated by a panel of ten experts with over five years of academic and clinical experience from multiple institutions: Kafr El-Sheikh University, Helwan University (30%), Tanta University (30%), and Fayoum University (40%).

The final version of the questionnaire consisted of two major sections:

- **Part I – Demographic Characteristics:** Included items such as age, marital status, educational level, occupation, monthly income, place of residence, family size, and number of rooms in the household.
- **Part II – Health Belief Model Constructs:** Comprised the following domains:
  - Perceived vulnerability (7 items)
  - Action cues/signals (7 items)
  - Perceived barriers (10 items)
  - Perceived severity of PCOS (10 items)
  - Perceived benefits of action (5 items)

Intervention

The educational intervention was delivered over a six-month period and consisted of eight structured sessions: three theoretical and five practical. Each session lasted between 20 and 30 minutes and was conducted either individually or in small groups (2–4 participants), depending on scheduling and participant preference. Sessions began with a brief review of previously covered content to reinforce learning.
Educational materials were designed using simple, culturally appropriate language to match participants' literacy levels. Participants were informed at the end of each session about the content and timing of the next session to ensure engagement and continuity.

Data Analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic data. Comparative analysis between pre- and post-intervention scores was conducted using independent-sample t-tests, chi-square tests, and Fisher's exact test as appropriate. A p-value of < 0.05 was considered statistically significant.

Findings and Results

Participant Demographics: Out of the total sample (N = 300), most participants (80.0%) were over the age of 30 years, with a mean age of 33.5 ± 6.9 years. More than half of the participants were married (55.0%), and 43.0% had attained a secondary level of education. Most participants (85.0%) were employed during the study. Additionally, 90.0% reported that their monthly income was insufficient to meet their family's basic needs, and 85.0% resided in urban areas.

Pre- and Post-Intervention Health Belief Model Constructs: Baseline data revealed that a substantial proportion of women with PCOS held negative health beliefs about the various constructs of the Health Belief Model. Specifically: Perceived Susceptibility: 75.3% negative. Perceived Severity: 71.3% negative. Perceived Barriers: 68.3% negative. Perceived Benefits: 65.0% negative. And cues to Action: 73.3% negative

Following the HBM-based educational intervention, there was a marked improvement across all domains: Perceived Susceptibility: 81.7% positive. Perceived Severity: 84.0% positive. Perceived Barriers: 86.7% positive. Perceived Benefits: 88.0% positive, and cues to Action: 81.7% positive

All differences between pre- and post-intervention responses were found to be statistically significant ($p < 0.001$), indicating the effectiveness of the educational program in transforming health beliefs.

Total Health Belief Scores: Analysis of total HBM scores showed that prior to the intervention, 67.7% of women had negative overall health beliefs regarding PCOS. After participation in the educational sessions, 83.3% of women reported positive total health belief scores. This improvement was statistically significant ($p < 0.001$), reflecting a substantial shift in beliefs following the intervention.

Association Between Sociodemographic Factors and Health Belief Scores

Table 3 presents the relationship between participants' demographic characteristics and their total Health Belief Model (HBM) scores on Polycystic Ovary Syndrome (PCOS) before and after implementation of the educational intervention.

A statistically significant relationship was observed between age and HBM scores post-intervention (χ^2 = 9.231, p = 0.001). All women under the age of 30 demonstrated positive health beliefs after the program, compared to 84% of women aged 30 years and older. This finding suggests that younger women were more responsive to the educational intervention.

Marital status was also significantly associated with health belief scores both before and after the program (pre χ^2 = 34.76, post χ^2 = 66.88; p = 0.000). Notably, 60% of single women continued to exhibit negative health beliefs post-intervention, indicating the need for more tailored approaches for this subgroup.

Regarding educational level, women who had attained university-level education or higher consistently reported more positive health beliefs both pre- and post-program (χ^2 = 30.82 and 37.65, respectively; p = 0.000).

This underscores the influence of educational attainment in shaping individuals' health perceptions and their responsiveness to health promotion strategies.

The variable of occupation also revealed significant differences post-intervention (χ^2 = 3.970, p = 0.031). Employed women exhibited greater improvements in positive health beliefs compared to housewives, potentially reflecting increased access to information or a heightened sense of autonomy and self-efficacy.

A significant association was found between place of residence and health beliefs prior to the program (χ^2 = 8.063, p = 0.009), with urban residents reporting more positive beliefs. However, post-program differences were not statistically significant (p = 0.104), suggesting that the educational intervention had a balancing effect across both urban and rural populations.

Finally, monthly income showed a strong correlation with HBM scores both pre- and post-intervention (χ^2 = 38.90 and 24.77; p = 0.000). Interestingly, women with sufficient and savings income were more likely to maintain negative health beliefs, even after the program. This counterintuitive result may point to underlying psychosocial or cultural factors not addressed by the intervention and warrants further investigation

Table 1

Demographic Characteristics of Participants

Demographic Characteristic	Category	Frequency (n = 300)	Percentage (%)
Age	>30 years	240	80.0
Marital Status	Married	165	55.0
Education Level	Secondary	129	43.0
Employment Status	Employed	255	85.0
Monthly Income	Insufficient	270	90.0

Table 2

Health Belief Model (HBM) Constructs Pre- and Post-Intervention

HBM Construct	Negative Belief (Pre-Program)	Positive Belief (Post-Program)	p-value
Perceived Susceptibility	75.3%	81.7%	< 0.001
Perceived Severity	71.3%	84.0%	< 0.001
Perceived Barriers	68.3%	86.7%	< 0.001
Perceived Benefits	65.0%	88.0%	< 0.001
Cues to Action	73.3%	81.7%	< 0.001
Total HBM Score	67.7% (Negative)	83.3% (Positive)	< 0.001

Figure 1

Pre-post inrevention health blief model scores

Pre- and Post-Intervention Health Belief Model Scores
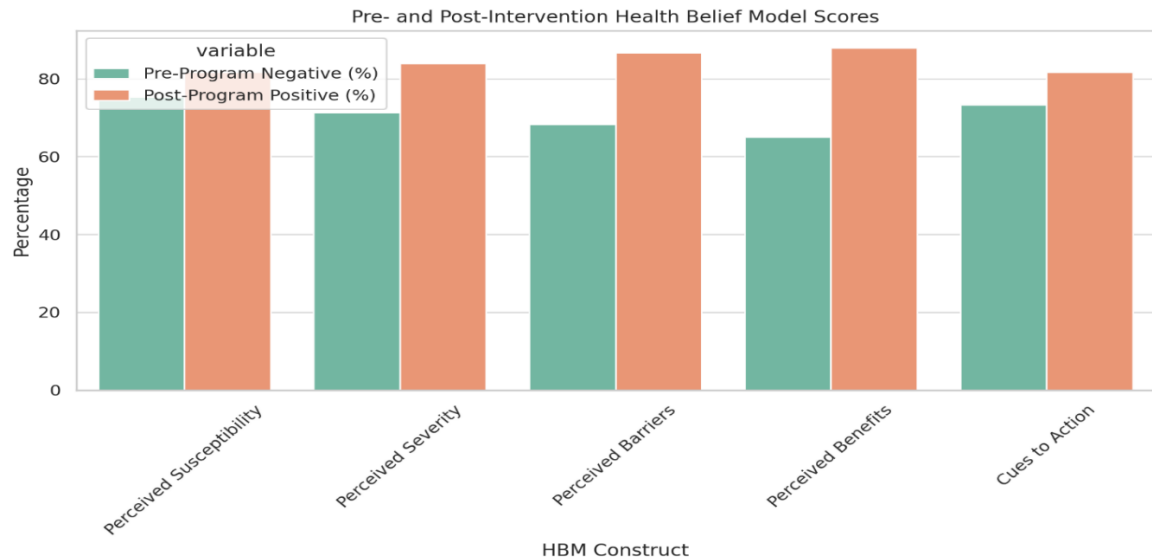
The bar chart compares the percentage of women with negative health beliefs before the intervention versus those with positive beliefs after the intervention across five Health Belief Model (HBM) constructs: Perceived Susceptibility, Perceived Severity, Perceived Barriers, Perceived Benefits, and Cues to Action

Table 3

Relationship between Demographic Characteristics and Total Health Belief Model Scores on PCOS at Pre- and Post-Educational Intervention (N = 300)

Variable	Pre-Education Program		χ^2	p-value	Post-Education Program		χ^2	p-value
	Positive (n=97)	Negative (n=203)			Positive (n=250)	Negative (n=50)		
Age								
<30	14 (14.4%)	26 (12.8%)	1.150	.413	40 (16%)	0 (0.0%)		
≥30	83 (85.6%)	177 (87.2%)			210 (84%)	50 (100%)		
Marital Status								
Single	0 (0.0%)	30 (14.8%)	34.76	.000**	0 (0.0%)	30 (60%)		
Married	44 (45.4%)	116 (57.1%)			147 (58.8%)	13 (26%)		
Divorced	40 (41.2%)	31 (15.3%)			67 (26.8%)	4 (8%)		
Widow	13 (13.4%)	26 (12.8%)			36 (14.4%)	3 (6%)		
Education								
Read/Write	0 (0.0%)	4 (2%)	30.82	.000**	0 (0.0%)	4 (8%)		
Basic	0 (0.0%)	49 (24.1%)			3 (1.2%)	46 (92%)		
Secondary	18 (18.6%)	26 (12.8%)			44 (17.6%)	0 (0.0%)		
University+	79 (81.4%)	124 (61.1%)			203 (81.2%)	0 (0.0%)		
Occupation								
Employed	38 (39.2%)	86 (42.4%)	11.27	.017*	97 (38.8%)	27 (54%)		
Housewife	59 (60.8%)	117 (57.6%)			153 (61.2%)	23 (46%)		
Residence								
Urban	86 (88.7%)	151 (74.4%)	8.063	.009**	199 (79.6%)	38 (76%)		
Rural	11 (11.3%)	52 (25.6%)			51 (20.4%)	12 (24%)		
Monthly Income								
Sufficient	53 (54.6%)	93 (45.8%)	38.90	.000**	146 (58.4%)	0 (0.0%)		
Insufficient	42 (43.3%)	44 (21.7%)			77 (30.8%)	9 (18%)		
Sufficient + Saving	2 (2.1%)	66 (32.5%)			27 (10.8%)	41 (82%)		

*Significant at $p < 0.05$. **Highly significant at $p < 0.01$.

Discussion and Conclusion

The findings of this study demonstrate that a Health Belief Model (HBM)-based educational intervention significantly improved health beliefs among women diagnosed with Polycystic Ovary Syndrome (PCOS). The notable shift from predominantly negative to positive perceptions across all HBM constructs following the intervention underscores the program's effectiveness in enhancing participants' understanding and attitudes toward PCOS.

The baseline data revealed a high prevalence of negative health beliefs, particularly in perceived susceptibility (75.3%) and cues to action (73.3%). This is consistent with previous studies indicating limited awareness and low perceived risk among women with PCOS, which may hinder early detection and management (Ali et al., 2020; Teede et al., 2018). The observed deficits in perceived benefits and perceived severity further highlight a critical gap in knowledge, which may contribute to poor adherence to treatment recommendations.

Post-intervention, participants demonstrated substantial improvements across all domains of the HBM, with perceived benefits (88.0%) and perceived barriers (86.7%) showing the most significant positive change. These findings align with other research indicating that structured educational programs can effectively reshape cognitive beliefs and health behavior intentions (Shakya et al., 2021; Shishehgar et al., 2019). Notably, the improvement in perceived barriers suggests that the intervention not only increased knowledge but also addressed motivational and practical obstacles to health-seeking behavior.

The statistically significant improvement in overall HBM scores—from 67.7% negative beliefs before the intervention to 83.3% positive beliefs afterward (p < 0.001)—reflects a meaningful transformation in health beliefs. This underscores the potential of HBM-based frameworks in designing educational interventions that are both theoretically grounded and practically impactful.

Moreover, the strong association between sociodemographic factors (age, marital status, education, occupation, income, and residence) and health belief scores suggests that belief systems and health behaviors are contextually influenced. Women with lower education or income, for instance, may face greater informational and structural barriers, which need to be considered when tailoring interventions. These results echo the findings of Dabbaghi et al. (2019) and Karimy et al. (2020), who noted that educational level and socioeconomic status significantly influence the effectiveness of health education (Dabbaghi et al., 2019).

Importantly, the high proportion of urban-dwelling participants (85.0%) and the reported insufficiency of monthly income (90.0%) may point to intersecting vulnerabilities that compound health disparities. This reinforces the need for targeted interventions in underserved urban communities, where women may face compounded barriers due to environmental, financial, and healthcare access factors.

In light of these findings, this study contributes to a growing body of evidence advocating for culturally and demographically responsive health education. By demonstrating that beliefs are modifiable through tailored interventions, this study highlights the value of applying theoretical models such as the HBM in both research and public health practice.

The findings of this study underscore the effectiveness of a Health Belief Model (HBM)–based educational intervention in improving women's health beliefs concerning polycystic ovarian syndrome (PCOS). Before the intervention, a majority of participants exhibited negative perceptions across all HBM constructs. Following the program, significant improvements were observed in perceived susceptibility, severity, benefits, barriers, and cues to action, with all post-intervention scores indicating positive health beliefs (p < 0.001).

Furthermore, overall HBM scores shifted markedly from predominantly negative to predominantly positive, confirming the educational program's impact. The results also revealed strong associations between sociodemographic factors (age, marital status, education, occupation, income, and residence) and health belief scores, both before and after the intervention. These relationships suggest that the program was effective across various demographic groups.

In conclusion, HBM-guided educational strategies appear to be a powerful tool in empowering women with PCOS by promoting positive health beliefs and encouraging proactive health behaviors. Such

interventions can serve as a model for future health education initiatives targeting chronic conditions among women.

Based on the findings of this study, the following recommendations are proposed:

1. **Integration of HBM-Based Education into Routine Care**: Health Belief Model–based educational interventions should be incorporated into the standard care practices for women diagnosed with PCOS in outpatient and primary care settings. This can enhance awareness, correct misconceptions, and foster long-term behavioral change.

2. **Tailored Health Education Programs**: Educational interventions should be customized to accommodate the diverse sociodemographic backgrounds of women, especially considering factors such as age, educational level, and socioeconomic status, which were shown to significantly influence health belief outcomes.

3. **Community and Media-Based Awareness Campaigns**: Public health authorities should design and implement widespread awareness campaigns—leveraging community health workers and digital media—to disseminate accurate information about PCOS and its management.

4. **Training for Healthcare Providers**: Continuous professional development programs should be organized to train healthcare professionals, particularly nurses and health educators, in delivering HBM-based educational content effectively.

Future studies are recommended to explore the long-term effects of HBM-based education on actual behavioral outcomes, such as treatment adherence, lifestyle modification, and fertility management in women with PCOS.

Acknowledgments

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional. The study protocol received ethical approval from the Research Ethics Committee of the College of Nursing, Kafr El-Sheikh University (Approval No KFSIRB 200-444, Date: 28 November 2021). Additional institutional approval was obtained from the Ministry of Health and Kafr El-Sheikh University Hospital. Informed consent was obtained from all participants prior to their inclusion in the study. Confidentiality, anonymity, and the right to withdraw at any stage were assured throughout the research process.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

Authors' Contributions

All authors equally contribute to this study.

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