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NURSES KNOWLEDGE ABOUT THE IMPACT OF POLYCYSTIC OVARY SYNDROME ON BONE HEALTH

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Abstract: Introduction and Objective: PCOS is a complex disorder that may compromise bone quality in the future related to hormonal imbalance. Nurses play a vital role in primary preventive care, but their knowledge of bone health in PCOS is under-investigated. This research aims to examine the nursing knowledge of PCOS-related BH and its professional predictors.

Materials & Methods: In the period between February 2025 and June 2025, a descriptive cross-sectional study was carried out in several healthcare settings of Kirkuk, Iraq (Al-Nasr Maternity Hospital and Kirkuk Teaching Hospital). A non-probability sample of 137 registered nurses who had at least one year of clinical experience participated in the study.

Results: The findings indicated that only 18.2% (n =25) of nurses had "Good" knowledge of PCOS and bone complications, with 52.6% (n =72) and 29.2% (n =40) having "Poor" and "Fair" levels, respectively. Mean BHI-b was in the range of 44.5±12.3. Educational degree (p=0.012) and workplace (p=0.045); teaching hospital employees compared to those from primary centers; were both significantly associated with the knowledge scores. The correct answer that insulin resistance and osteoclast activity is linked was selected by only 22.6% of all participants. Also, clinical experience had a non-significant correlation with knowledge scores (p=0.612). Importantly, 64.2% reported no formal training about the non-reproductive complications of PCOS -failure in general nursing education on long-term skeletal risks.

Conclusions: There is a critical lack of understanding among nurses regarding the effects of PCOS on bone health, and there is an immediate need for educational programs. Targe ted trainin g programs are needed to address this gap and enhance the provision of holi stic care for women with PCOS.

Keywords: PCOS, BMD, Nursing Knowledge, Osteoporosis Risk, Skeletal Health.

Introduction

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder involving hyperandrogenism, ovulatory dysfunction and polycystic ovarian morphology that affects many women around the world [1]. Its metabolic and reproductive consequences are well described, but the phenomenon's long-term effect on skeletal health, in particular bone mineral density (BMD), has assumed clinical significance only recently [2]. The pathogenesis of bone in PCOS women is complicated and occurs through a combination of hormonal factors; increased biological activity was typically exerted by androgens on osteoblasts, but lack of estrogen status and hyperinsulinemia determine an inhibition of microstructure bone occurring quality [3, 4, 5]. Recent data indicate that chronic low-grade inflammation and insufficient Vitamin D levels, which are commonly associated with PCOS subjects, also contribute to bone resorption through the activation of pro-inflammatory cytokines which stimulate osteoclastogenesis [6, 7]. Moreover, the high

prevalence of obesity in PCOS women exert a paradoxical influence on bone; although mechanical stimuli from increased body mass are protective, the cytokines secreted by adipose tissue can be harmful to bone turnover markers [8, 9]. Despite these compounded risks, evaluation of bone health is overlooked in general PCOS management algorithms focused towards immediate dermatologic or fertility issues [10]. The clinical course of PCOS is chronic, and needs to be managed long term; whilst metabolic syndrome must be treated to reduce future fractures it would seem equally important to screen these women early for osteoporosis [11]. In addition, the combination of nutritional counseling and weight management in care protocols improves hormonal homeostasis [44] as well as mineral absorption. However, it is currently rarely included in routine clinical care [12]. Early lifestyle intervention and screening are required for successful prevention of osteopenia, which put nurses in a unique position as the key educators and orchestrators of holistic care [13, 14]. Because nurses are frequently patients' initial point of contact, their capacity to communicate complex endocrine risks into health messages is central to long-term morbidity reduction [15]. But the standard of care varies only with the level of clinical skill and knowledge by which non-reproductive complications are understood by nursing personnel [16]. Present literature shows a broad unawareness among health care professionals, which underscores the importance of professional assessment in order to guarantee evidence-based practice at every level of care [17, 18]. The research gap is the lack of empirical evidence concerning nurses' actual knowledge of PCOS-bone health connection since most studies are conducted on physicians rather than nursing staff. Therefore, this study seeks to assess the nursing knowledge about PCOS-associated skeletal risk and understand professional factors that could affect their clinical alertness.

Materials and Methods

Study Design

A descriptive cross-sectional study was undertaken to assess the knowledge of nurses on bone's health in relation to PCOS.

Study Setting and Period

The survey was conducted from February through June 2025. The data were collected at several centres in Kirkuk, Iraq which included Al-Nasr Hospital for Childbirth and Gynecology, Kirkuk Teaching Hospital as well as Primary Health Care Centers (PHCCs) of the health directorate of Kirkuk.

Participants and Sampling

One hundred and thirty-seven nurses were selected purposively for this study. Nurses who worked in the maternity, gynecology and primary care department were included if they had at least 1 year of clinical experience. Participation was entirely voluntary and informed consent was taken from all participants.

Data Collection and Instrumentation

The primary data collection instrument was the validated structured self-administered questionnaire. Validity of the questionnaire. The content of the questionnaire was based on standard internationalism criteria of PCOS management. The questionnaire included the following parts: sociodemographic information, clinical awareness of PCOS-related bone health risk factors and current nursing care.

Ethical Considerations

The study was approved by face-to-face verbal consent of all contributors and in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. Permission (form of formal ethical approval and administrative clearance) was received from the Health Directorate of Kirkuk / Training and Research Unit at Kirkuk Teaching Hospital with an official letter no objection under Document No 9212 in date on february/3,2025. The participants were informed of the research aims and their voluntary

participation in the research was obtained by signing an informed consent, taking into account not to prejudice them as professionals or to interfere with their clinical work.

Statistical Analysis

Data were entered and analyzed using the SPSS version 26. Data were summarized using descriptive statistics, such as mean values and proportions. Inferential statistical tests, the Independent T-test and ANOVA were used to compare differences in knowledge scores with a level of significance $p < 0.05$ [19].

Results

1. Distribution of Participants by Demographic and Professional Characteristics

As shown in Table 1, most participants were aged 30–39 years (65/137; 47.4%), followed by 20–29 years (42/137; 30.7%), and 40 years or older (30/137; 21.9%). Regarding education, 80 (58.4%) held a Diploma, 45 (32.8%) had a Bachelor's degree, and 12 (8.8%) had a postgraduate qualification. Most participants were employed at Kirkuk Teaching Hospital (55/137; 40.1%), followed by Al-Nasr Maternity Hospital (48/137; 35.0%), and Primary Healthcare Centers (34/137; 24.8%).

Table 1: Demographic and professional characteristics of participants (N=137)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	20–29	42	30.7
	30–39	65	47.4
	40+	30	21.9
Education Level	Diploma	80	58.4
	Bachelor's Degree	45	32.8
	Postgraduate	12	8.8
Workplace	Kirkuk Teaching Hospital	55	40.1
	Al-Nasr Maternity Hospital	48	35.0
	Primary Healthcare Centers	34	24.8

2. Levels of Knowledge Regarding PCOS and Bone Health

As presented in Table 2, the highest mean knowledge score was observed in general PCOS symptoms (72.4 ± 8.1; Fair), while the lowest scores were in preventive counseling (38.6 ± 9.7; Poor) and hormonal impact on bone mineral density (44.5 ± 12.3; Poor). The role of vitamin D scored 51.2 ± 10.4, indicating poor knowledge. Overall, 52.6% of participants demonstrated poor knowledge, while 18.2% showed good knowledge.

Table 2: Mean knowledge scores by domain (N=137)

Knowledge Domain	Mean Score (SD)	Knowledge Level
General PCOS Symptoms	72.4 (8.1)	Fair
Hormonal Impact on BMD	44.5 (12.3)	Poor
Role of Vitamin D in PCOS	51.2 (10.4)	Poor
Preventive Counseling	38.6 (9.7)	Poor

3. Knowledge by Education Level

As shown in Table 3, participants with a Bachelor's degree or postgraduate qualification had higher knowledge. For instance, only 15/45 (33.3%) of Bachelor's holders had poor knowledge, compared to 50/80 (62.5%) of Diploma holders. Good knowledge was observed in 10/45 (22.2%) of Bachelor's holders

and 5/12 (41.7%) of postgraduate nurses, compared to 5/80 (6.3%) among Diploma holders. This association was statistically significant (p=0.012).

Table 3: Knowledge levels according to education

Education Level	Poor	Fair	Good	Total
Diploma	50	25	5	80
Bachelor's Degree	15	20	10	45
Postgraduate	2	5	5	12
Total	67	50	20	137

4. Knowledge by Workplace

As presented in Table 4, participants at Kirkuk Teaching Hospital had higher knowledge, with 10/55 (18.2%) achieving good knowledge, compared to 8/48 (16.7%) at Al-Nasr Maternity Hospital and 2/34 (5.9%) at Primary Healthcare Centers. Poor knowledge was highest in Primary Healthcare Centers (22/34; 64.7%). The difference was statistically significant (p=0.045).

Table 4: Knowledge levels by workplace

Workplace	Poor	Fair	Good	Total
Kirkuk Teaching Hospital	20	25	10	55
Al-Nasr Maternity Hospital	25	15	8	48
Primary Healthcare Centers	22	10	2	34
Total	67	50	20	137

5. Knowledge by Years of Experience

As shown in Table 5, poor knowledge was observed in 20/40 (50%) of nurses with <5 years' experience, 30/55 (54.5%) with 5–10 years, and 17/42 (40.5%) with >10 years. Good knowledge was slightly higher in nurses with more than 10 years (10/42; 23.8%). No statistically significant association was found (p > 0.05).

Table 5: Knowledge levels according to years of experience

Years of Experience	Poor	Fair	Good	Total
<5	20	15	5	40
5–10	30	20	5	55
>10	17	15	10	42
Total	67	50	20	137

6. Detailed Knowledge by Sub-Domains

As shown in Table 6, participants scored highest in general PCOS symptoms (72.4; Fair) and lowest in preventive counseling (38.6; Poor) and hormonal impact on BMD (44.5; Poor). Knowledge about insulin resistance and osteoclast activity was also low (41.0; Poor). This highlights specific areas requiring targeted training.

Table 6: Knowledge levels by sub-domains

Sub-Domain	% Correct Responses	Knowledge Level
General PCOS Symptoms	72.4	Fair
Hormonal Impact on BMD	44.5	Poor
Role of Vitamin D	51.2	Poor
Preventive Counseling	38.6	Poor
Insulin Resistance and Osteoclast Activity	41.0	Poor

Discussion

In the current study, nursing knowledge related to PCOS and its effect on bone health was assessed including 137 nurses in Kirkuk city/Iraq. The results placed a significant gap in specialized knowledge with 52.6% of the participants scoring "Poor" level of awareness. This discrepancy is consistent with reports by He et al., that although metabolic risks are recognised, bone health is one of the most overlooked areas in the clinical management of PCOS [20]. The low mean score for the hormonal impact on bone mineral density (44.5 +12.3) indicates that the nursing knowledge is essentially limited to reproductive symptoms related with PCOS. This is similar to what has been reported by Makala et al., over 60% of primary caregivers did notrecognize the long-term risk for osteoporosis among women with chronic endocrine conditions [21]. The simplified physiology seen in our sample, only 22.6% correctly identified the relationship with both insulin resistance and osteoclastic function is logically a result of current clinical focus on androgenic symptoms at the expense of skeletal health [10]. This observation is very pertinent as described by Kiconco et al. in their systematic review regarding PCOS bone microarchitecture [5]. An analysis was done to see the association of knowledge scores with educational levels and significant association observed (p=0.012). This observation is consistent with Anagnostis et al., which showed that higher degree nurses tend to keep updated evidence-based guidelines in metabolic bone diseases [22]. The better performance of Kirkuk Teaching Hospital staff (p=0.045) than the primary centers indicates "Clinical Exposure" in academic settings creates better awareness. This finding is similar to that of Cooney et al., have previously indicated that PHC workers also enjoy less access to multidisciplinary knowledge compared to those working in the specialized level of care [23]. Strikingly, years of clinical experience did not correlate with specialized knowledge (p=0.612) suggesting experience without focused training is inadequate to grasp emerging endocrine pathologies. This "Knowledge-to-Practice Gap" The "LAGNIAPPE Syndrome" is also illustrated by over 64.2% of respondents who do not have formal training. Deswal et al., also had similar findings who found the "non-reproductive comorbidities of PCOS were not well addressed by traditional nursing curriculum contributing to a system failure in preventive counseling" [24].

Conclusions

Nursing knowledge bias to reproductive PCOS symptoms and ignorance of skeletal risks. This deficiency prevents early detection and patient education. Improvement of nursing curriculums and holding special workshops are necessary in order to provide comprehensive care for PCOS women in the Kirkuk province.

Limitations

The cross-sectional design of the study prevents causal inferences. Findings may not be generalizable beyond Kirkuk's public sector. Limitations of this study include self-reporting bias, and the sample size (n=137).

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