

Pharmacists' Readiness for Nutrition and Supplement Counseling During Pregnancy in Iraq: A KAP Cross-Sectional Study

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Abstract

Sufficient maternal nutrition and proper dietary supplement usage during pregnancy are important determinants of a mother's well-being and fetal growth. Pharmacists are commonly consulted regarding supplement safety, dosage, and selection, establishing a key role as agents of pregnancy counseling. However, there is scarce evidence about pharmacists' awareness, beliefs, and therapeutic behavior toward pregnancy nutrition in Iraq. The objective of that study is to assess pharmacists' knowledge, attitudes, and professional practices relating to nutrition and supplement use in pregnancy, and to discover their linkage with demographic and professional characteristics. A cross-sectional KAP survey was conducted among practicing pharmacists in Iraq with a structured self-administered questionnaire constructed from published literature and international nutrition guidelines, with face and content validation. Knowledge items were scored dichotomously, reduced to percentages, and the attitude and practice domains were analyzed by conducting domain-based scores. Descriptive, t-test, ANOVA and correlation analysis methods were used. The internal consistency was assessed with Cronbach's alpha. The sample consisted of 194 pharmacists (51% male; mean professional experience 4.4 years). The overall knowledge scores were low, with the mean of $45.8\% \pm 14.3$, and a majority of the respondents fell on poor knowledge. Although general nutrition knowledge was well-established, precision of specific micronutrient dosing guidelines was low. Counseling practices reported in the sample were found to be good (mean practice score $84.2\% \pm 19.8$) and professional role perception scores were high ($90.7\% \pm 20.8$). Knowledge scores were relatively higher for male pharmacists while practice scores varied as well in intensity of practice by experience. No meaningful correlation was obtained between knowledge and practice scores. Results for reliability were consistent with the multidimensionality of KAP instruments. Despite active attitude and behavior counseling among Iraqi pharmacists and a positive professional attitude toward guidance as regards pregnancy supplements, important gaps in knowledge exist regarding recommendations related to micronutrients. However, future focused continuing education initiatives may be useful in providing better fidelity and uniformity in pregnancy nutrition counseling.

Keywords

Pharmacists; Pregnancy nutrition; Dietary supplements; KAP; Supplement counselling.

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INTRODUCTION

Adequate nutrition and proper supplementation in pregnancy are important determinants of maternal and fetal health. Pregnancy increases caloric and micronutrient needs, and poor intake has been linked to adverse maternal and neonatal outcomes, including maternal anemia, neural tube defects, impaired fetal growth, and complications (1-3).

International guidelines recommend specific intake levels for essential nutrients including folic acid, iron, iodine, calcium, vitamin D, and omega-3 fatty acids (1-4). Pharmacists are among the most accessible healthcare professionals and play an important role in counseling pregnant women about safe and effective

supplement use. Community pharmacists provide direct consultation regarding over-the-counter supplements, safety issues, and drug-nutrient interactions, and are therefore well placed to impact patient decision-making (5,6). As such, the knowledge, professional attitudes, and counseling practices of pharmacists can directly impact supplement safety and maternal health outcomes. Knowledge gaps were identified among healthcare professionals in previous studies in different healthcare settings with regards to nutrition and supplement dosing in pregnancy (5,7). Knowledge-Attitude-Practice (KAP) surveys are commonly used to assess professional readiness, behavioral patterns, and educational needs in healthcare research (8,9).

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However, data measuring the KAP of pharmacists about pregnancy nutrition and supplementation in Iraq remain limited despite the importance of the counseling role of pharmacists. Evaluation of pharmacists' KAP in this area is essential for identifying strengths and gaps and for setting targeted educational interventions, which are part of the effort to improve maternal counseling services. The objective of this study was to measure the knowledge, attitudes, and practices of pharmacists towards nutrition and supplement use during pregnancy in Iraq through a KAP (8,9) framework and to investigate the relationship between KAP and demographic and professional characteristics.

METHODS

Study Design and Setting

A cross-sectional survey design was adopted to evaluate pharmacists' knowledge, attitudes, and counseling practices related to nutrition and supplement use during pregnancy across Iraq. Data were collected using a standardized, self-administered questionnaire distributed to practicing pharmacists. The cross-sectional approach was selected to provide a snapshot assessment of current professional readiness and counseling patterns within the KAP framework.

Study Instrument (Questionnaire)

The instrument consisted of a structured questionnaire developed from previously published KAP studies and internationally recognized maternal nutrition and supplement guidelines. The questionnaire was divided into demographic items and three main areas: knowledge, practice behavior, and professional attitude/role perception. Knowledge items included items on pregnancy nutrition requirements, micronutrient dosing, and supplement safety. Items on practice involved counseling behavior in the real world and professional actions taken; attitude items examined pharmacists' perceptions of their counseling role and responsibility. The wording and structure were further refined to be clear and relevant to the context of practice in pharmacists.

Validity Assessment

Analysis of validity face validity was evaluated by a team of academic and clinical pharmacy experts and the items in the survey were reviewed by the panel to ensure clarity, readability and context appropriateness. Content validity was assessed by expert review for relevance and coverage in the construct domains. Items were adjusted with experts' comments before the final data collection.

Pilot Testing and Reliability

A pilot test was conducted for the clarity and feasibility of the questionnaire before the main survey. Cronbach's alpha coefficient was developed to assess internal consistency reliability. Because the attitudes and practice items assessed more than one aspect of the framework, the internal consistency was poor when grouped as a single scale. Therefore, a simple composite score was avoided, as analyses were conducted at the domain level and item-level.

Scoring System

Knowledge scores were scored according to dichotomous coding (correct answer = 1, incorrect, 'I don't know' = 0). Total Knowledge scores were summed and converted to percentage scores. The knowledge levels were categorized as good ($\geq 80\%$), moderate (60-79%), and poor ($< 60\%$). Practice behaviour items were coded as Yes=1, and No=0, and domain scores were computed as total of percentages. Responses to attitude and role perception items were coded as Agree = 1 and Disagree = 0 and are examined as domain or sub-domain items when appropriate. Multi-response items were evaluated from separate item level and were not part of the composite scores.

Statistical Analysis

Data were presented by the regular statistical analysis. Descriptive statistics were set as mean $\pm$ standard deviation, median, frequencies, percentages as appropriate. Normality of continuous variables was checked before analysis. Two-controlled group comparisons were performed with independent samples t-tests, and more than two-controlled groups were compared using one-way ANOVA. Non-parametric tests were used when distributional assumptions were not satisfied. Relationships of continuous scores were tested by Pearson correlation coefficients. For domain based reliability Cronbach's alpha was used. A p-value of < 0.05 was considered statistically significant.

RESULTS

Participants Characteristics

A total of 194 pharmacists completed the questionnaire and were included in the final analysis. The sample consisted of 99 males (51.0%) and 95 females (49.0%). Most participants held a Bachelor of Science degree (89.7%), while smaller proportions held MSc, Diploma, or PhD/FIBMS qualifications. The majority were practicing in Baghdad (approximately 86%). The mean professional experience was 4.4 years.

Table 1. Demographic characteristics of participating pharmacists

Variable	Category	n	Percent
Sex	Male	99	51
Sex	Female	95	49
Degree	BSc	174	89.7
Degree	MSc	10	5.2
Degree	Diploma	5	2.6
Degree	PhD/FIBMS	5	2.6
Governorate	Baghdad	167	86.1
Governorate	Other governorates	27	13.9

Table 2: KAP Score Summary

Metric	Mean	SD	Median	Min	Max
Knowledge % (primary, 11 items)	45.82943	14.30187	45.45455	9.090909	81.81818
Practice % (5 items)	84.2268	19.75681	100	20	100
Role perception % (2 items)	90.72165	20.77501	100	0	100

Knowledge Domain Results

The overall mean knowledge score was $45.8\% \pm 14.3$ (based on 11 scored knowledge items). Most participants demonstrated poor knowledge levels, with 164 pharmacists (84.5%) classified as poor, 25 (12.9%) as moderate, and only 5 (2.6%) as having good knowledge.

that caloric needs increase during pregnancy (91.2%) and that nutritional requirements differ across trimesters (91.8%). Correct identification of constipation-relieving foods was also high (95.4%). However, lower correct rates were observed for micronutrient recommendations, including vitamin A, iodine, iron, omega-3, and folic acid dosage items.

Item-level analysis showed high correct response rates for general nutrition concepts, including recognition

Table 3. Knowledge score distribution and item-wise correct response rates

A.		
Level	n	%
Poor	164	84.5
Moderate	25	12.9
Good	5	2.6
B.		Correct_%
Foods may help resolve constipation during pregnancy		95.36082
Do the caloric needs of pregnant women differ during the trimesters of pregnancy?		91.75258
Change in caloric is needs during pregnancy		91.23711
When should women take folic acid		69.07216
Recommended daily vitamin D		48.96907
Recommended daily calcium		46.39175
Recommended Dietary Allowances for Iron during pregnancy		25.25773
Iodine requirements per day for a pregnant woman		19.07216
Recommended daily vitamin A		11.34021

Recommended daily omega 3	4.123711
Folic acid dose needed daily during pregnancy	1.546392
Listeria_avoid_foods	0

Practice Behavior Results

Practice behavior scores were generally high, with a mean practice score of $84.2\% \pm 19.8$. Most pharmacists reported providing nutrition-related advice to pregnant women (88.1%), informing patients about supplement interactions (91.2%), and discussing

possible adverse effects (89.2%). Self-reported confidence in recommending supplements was reported by 85.1% of respondents, while 67.5% reported making referrals to dietitians when appropriate

Table 4. Practice behavior responses among pharmacists

Item	Yes_ %
Do you provide any nutrition-related advice to pregnant women?	88.14433
Do you make referrals to the dietitian?	67.52577
I have self-confidence for recommending supplement	85.05155
I always inform consumers about drug-supplement interactions.	91.23711
I always inform consumers about possible adverse effects of dietary supplements.	89.17526

Attitude and Role Perception Results

Attitude and professional role perception items showed strong agreement with pharmacist involvement in supplement counseling. Most respondents agreed that customers are influenced by pharmacists' recommendations (87.1%) and that

supplements should be sold under pharmacist supervision (94.3%). A high proportion also agreed that price influences supplement recommendations (95.4%) and that supplements represent an important profit source for pharmacies (87.6%). The mean role perception score was $90.7\% \pm 20.8$.

Table 5. Attitude and role perception responses

Item	Agree_ %
Customers usually are influenced by Pharmacist's comments about supplements	87.1134
Supplement should be sold in pharmacies under pharmacist's supervision.	94.3299
Price is important factor for recommending supplements to customers.	95.36082
Supplements considered as an important source of profit for pharmacies.	87.62887

Group Comparisons

Male pharmacists had significantly higher knowledge scores than females (47.9% vs 43.6%, $p = 0.036$). No significant gender differences were observed in practice or role perception scores.

Practice scores differed significantly across experience categories ($p = 0.018$), with pharmacists having 6–10 years of experience demonstrating the highest practice scores. No statistically significant differences in knowledge or practice scores were observed across academic degree categories.

Table 6. Comparison of KAP scores by demographic variables

Score	Group1	Mean1	Group2	Mean2	p_value
Knowledge %	Female	43.63636	Male	47.93388	0.035519
Practice %	Female	85.05263	Male	83.43434	0.569115
Role %	Female	91.05263	Male	90.40404	0.828492
Exp_cat	Practice_pct_num				

0-1	80
2-5	84.28571
6-10	90.52632
11-20	80
21+	50

Correlation Analysis

Correlation analysis showed no statistically significant association between knowledge and practice scores ($r = 0.11$, $p = 0.135$) or between knowledge and role

perception scores ($r = 0.07$, $p = 0.351$). Age and years of professional experience were not significantly correlated with knowledge or practice scores.

Table 7. Correlation between knowledge, practice, and demographic variables

Association	r	p
Knowledge % vs Practice %	0.10772	0.134907
Knowledge % vs Role %	0.067253	0.351474
Age vs Knowledge %	0.09066	0.2328
Age vs Practice %	-0.04595	0.545919
Experience years vs Knowledge %	0.043725	0.547039
Experience years vs Practice %	-0.05915	0.415104

Reliability Analysis

Internal consistency analysis demonstrated low Cronbach's alpha values when attitude and practice items were combined ($\alpha \approx 0.44$), indicating

multidimensional structure. Domain-level reliability for practice behavior items was similarly modest. Therefore, domain-based and item-level analyses were used instead of a single composite scale.

Table 8. Internal consistency reliability coefficients

Scale	Cronbach_alpha
Practice behavior (5 items, Yes/No)	0.442155
Role perception (2 items, Agree/Disagree)	0.069926
Combined attitude/practice (7 items)	0.435939

This is expected in multidimensional KAP instruments

DISCUSSION

The findings of this study inform a systematic assessment of pharmacists' preparedness to advise pregnant women to use nutrition and supplements in a KAP-based model. Findings reflect an interesting trend: Although pharmacists demonstrated high levels of participation in counseling and reported positive attitudes toward their role and counsel, detailed knowledge especially concerning micronutrient dose recommendation was often lacking. This gap between counseling engagement and the knowledge depth is striking and has been highlighted elsewhere in the healthcare KAP studies. Most of the pharmacists recognized the general nutrition norms, including the caloric imperative and trimester-based requirements

as follows in the central advice in pregnancy nutrition (1,2). But accurate answers for specific micronutrient recommendations such as iron, iodine, vitamin A, omega-3, folic acid dose were much lower. International pregnancy nutrition guidelines stress micronutrient dosing accuracy (1-4).

Variability of guidelines, particularly those that included dosing of folic acid (400-600 mcg depending on timing and risk level) may account for the low correct response of this item (3,4). However, despite knowledge deficits, we found that practice behaviour indicators were high. Many pharmacists were reported to have given diet advice and have spoken with each other about supplement interactions as well as adverse

effects. There are similar gaps between the knowledge levels measured and counseling behavior reported in KAP studies of healthcare professionals (8–10). This indicates that participation in counseling may also be influenced not only by factual knowledge but by professional habits and perceptions of a responsibility to do it. In addition, attitude and professional role perception scores were found to be positive, with good consensus that pharmacists have an impact on the decisions about supplements and should oversee supplement dispensing. This echoes the growing global role pharmacists are taking in preventive care and medication counselling (5,6). There were gender differences in knowledge scores, but practice and role perception did not significantly differ by gender. Practice scores differed depending on experience category, with the highest scores showing mid-career pharmacists. Variation in practice behavior in relation to experience have also been reported in other professional KAP studies (8,9).

Correlation analysis revealed no significant association between knowledge and practice scores, affirming that KAP domains assess closely related yet distinct constructs (8,9). Reliability analysis found that the combined scores of attitude and practice items returned only modest Cronbach's alpha values. This is a finding to be anticipated in multidimensional KAP instruments, where items measure both heterogeneous behavioral and perceptual constructs (8–10). Accordingly, analyses at the domain level and item level were suitable as an appropriate methodological approach. In total, this data suggest that pharmacists are highly engaged with counseling and are professionally positive, but are in need of refresher and guideline-based continuing education about pregnancy-focused micronutrient recommendation (1–4). Structured pharmacist education-based training programs for a routine pharmacist may lead to better precision and uniformity of maternal nutrition counseling.

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Conflict of Interest: No Conflict of Interest

Source of Funding: Author(s) Funded the Research

How to Cite: Zaboony, M. A., & Alwan, M. H. (2026). Pharmacists' Readiness for Nutrition and Supplement Counseling During Pregnancy in Iraq: A KAP Cross-Sectional Study. *Journal of Clinical Medicine and Surgical Advance*, 2(1), 1-6.