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AWARENESS AND PRACTICES REGARDING MATERNAL NUTRITION DURING PREGNANCY AMONG SAMPLE OF IRAQI PREGNANT WOMEN

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ABSTRACT

Background: Undernutrition is a significant global health concern, particularly among pregnant women. Maternal undernutrition remains a major public health issue, affecting approximately 10% of women worldwide. Nutrition knowledge plays a crucial role in promoting optimal dietary intake during pregnancy. **Aims:** This study aims to assess the awareness and practices of pregnant women regarding maternal nutrition, identify the main sources of nutritional awareness, and determine key factors influencing knowledge and practice. **Method:** A descriptive cross-sectional study was conducted from February 1st to August 1st, 2024, involving 400 pregnant women attending the Department of Gynecology and Obstetrics at Al-Emamain Al-Kadhymain Medical City and Al-Yarmouk Teaching Hospital. A convenient sampling method was used to evaluate participants' knowledge and practices concerning maternal nutrition. **Results:** Among the 400 participants, the majority were aged 18-30 years, had a secondary education level, and resided in urban areas. Social media was the most common source of nutritional information, followed by physicians. Good knowledge was observed in 68.5% of participants, while 24.8% had moderate knowledge and 6.8% had poor knowledge. Higher knowledge and practice scores were significantly associated with age over 30, college education, parity, and employment. Good practice was reported by 65% of participants. A significant positive correlation was found between knowledge and practice scores ($P < 0.001$). **Conclusion:** Most participants demonstrated good knowledge and practice regarding maternal nutrition, with a strong positive correlation between them. Enhancing educational strategies could further improve maternal nutritional awareness and practices.

KEYWORDS: Maternal nutrition, pregnancy, awareness, practice, knowledge, cross-sectional study, undernutrition.

INTRODUCTION

Nutrition plays a vital role during the developmental period, and because it is a determinant of the lifetime risk of disease, it is potentially a modifiable risk factor. Although the World Health Organization (WHO) provides guidelines for antenatal care (ANC), comprehensive guidelines detailing the nutritional needs of women throughout reproduction from preconception through pregnancy are lacking.[1] During pregnancy, women undergo several physiological changes.[2] These physiological process aims to provide an optimal environment for proper development of the fetus. However, drastic adaptations of maternal physiology during gestation to accommodate the fetoplacental unit make the preconception- pregnancy-postpartum period especially prone to adverse maternal/fetal outcomes.[3] The nutritional needs of women increase during pregnancy and breastfeeding to support all of these changes, prepare the body for delivery and breastfeeding, and to ensure the normal development of the fetus.[2] Therefore, the requirements will be higher compared to those of a healthy no pregnant woman, and adequate maternal dietary intake is essential.[4] Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients, or impaired nutrient utilization.[5] Women's malnutrition (of any kind) not only affects their health but also has the potential to harm the health of their infants.[6] According to the current recommendations, pregnant women should consume a healthy, balanced diet consistent with guidelines on

healthy eating to guarantee the right amount of energy and nutrients, as well as an adequate supply of vitamins and minerals.[4] Over the years, there has been much evidence of the link between some nutritional deficits and increased maternal mortality. About 275,000 deaths are attributed to women who die from pregnancy-related complications yearly from preventable causes, including nutritional status-related complications.[7] Adequate knowledge and understanding of nutritional intake and dietary recommendations can help women achieve healthy weight gain during pregnancy. According to the WHO, nutritional advice was found to hold strong evidence as a mainstay intervention to improve pregnancy outcomes.[8] Objectives: To ascertain the level of awareness and practices of expectant women in relation to maternal nutrition during pregnancy. To investigate the primary sources of expectant women's awareness regarding nutrition during pregnancy. Estimate the primary factors that influence the awareness and practices of expectant women regarding nutrition during pregnancy.

METHOD

A descriptive cross-sectional study was conducted from February 1st to August 1st, 2024, at the Department of Obstetrics and Gynecology in Al-Emamain Al-Kadhymain Medical City and Al-Yarmouk Teaching Hospital, involving a convenient sample of 400 pregnant women. The sample size was determined based on the assumption that 50% of pregnant women lacked knowledge about maternal nutrition. Using the single population proportion formula, the minimum sample size was 384, but 400 participants were included for better representation. A structured questionnaire was developed after reviewing similar studies and was validated by the research supervisor. The data was collected via direct interviews, conducted three times per week for 2-4 hours per visit. The questionnaire consisted of five parts.

- Sources of information (social media, physicians, healthcare providers, family, friends).
- Sociodemographic characteristics (age, education, occupation, residency).
- Medical and obstetrical history (parity, abortion, antenatal care, chronic diseases).
- Knowledge assessment (20 questions on diet requirements, categorized as good (≥75%), moderate (51%-74%), and poor (≤50%)).
- Practice assessment (10 questions on diet practices, classified as good (≥70%) or poor (<70%)).

Inclusion and Exclusion Criteria

Included: Women aged 14-45 years who were willing to participate.

Excluded: Women unable to communicate due to critical illness, speech impairments, or those who refused participation.

Ethical Considerations: Approval was obtained from the Scientific Council of Family Medicine at the Arab Board for Health Specializations and Baghdad-Al-Karkh Health Directorate (Letter No. 95880 dated 2/7/2024). Verbal consent was obtained, ensuring participant anonymity and confidentiality.

Statistical Analysis: Data was analyzed using Microsoft Excel 2019 and SPSS 22. Descriptive statistics were used for frequencies and percentages. Chi-square tests analyzed categorical data, while Pearson's correlation assessed relationships between knowledge and practice. A P-value <0.05 was considered statistically significant.

Pilot Study: A pilot study with 20 participants was conducted to test the questionnaire's reliability. No modifications were needed, and these participants were excluded from the final analysis.

Limitations: The study did not include pregnant women attending private clinics, who may have different educational backgrounds and occupations, potentially affecting knowledge and practice levels.

RESULTS

Social media was the source of information (40.5%), followed by physicians (20.5%), HCP (13%), family members (11%), friends (8.5%), and mass media (6.5%), Regarding the distribution of the participants according to the level of knowledge: Good knowledge was more than two-thirds, or (68.5%) with scores of ≥75%. Moderate knowledge accounted for 24.8%, with 51-74% scores. Poor knowledge accounted for 6.8%, with scores of ≤50% of the correct answers. Regarding the distribution of the participants according to practice behavior: Good practice accounted for about two-thirds of the participants (65%). Poor practice accounted for more than one-third of participants (35%). As in table 1.

Table 1: distribution of participant according to studies variables.

Category	Subcategory	No.	%
Source of Information	Social Media	162	40.5
	Physician	82	20.5
	HCP	52	13.0
	Family	44	11.0
	Friends	34	8.5
	Mass Media	26	6.5
Knowledge Level	Good	274	68.5
	Moderate	99	24.8
	Poor	27	6.8
Practice Level	Good	260	65.0
	Poor	140	35.0

A total of 400 participants were enrolled in the current study. Participants with an age of 18-30 years constituted the largest proportion of the sample (42%). Participants with secondary school education constituted (37.2%) of the sample. Housewives constituted more than two-thirds of the sample (66.8%) and urban residency constituted (77.5%) of the sample. para of 1-3 constituted 43.8%, Most of the participants did not have abortions (94.8%) and About half of the participants had irregular ANC (50%). As in table 2.

Table 2: Sociodemographic characteristics of the participants.

Sociodemographic characteristics		N (%)
Age group (years)	<18	78 (19.5)
	18-30	**168 (42.0)**
	> 30	154 (38.5)
Education	Illiterate	43 (10.8)
	Primary school	116 (29.0)
	Secondary school	**149 (37.2)**
	College or higher	92 (23.0)
Occupation	Student	36 (9.0)
	Housewife	**267 (66.8)**
	Employed	97 (24.2)
Residency	**Urban**	**310 (77.5)**
	Rural	90 (22.5)

Obstetrical history		N (%)
Parity	Nulliparous	59 (14.8)
	1-3	**175 (43.8)**
	4-6	154 (38.4)
	≥ 7	12 (3.0)
Abortion	**0**	**379 (94.8)**
	1	14 (3.4)
	2	7 (1.8)
ANC	No	83 (20.8)
	Irregular	**200 (50.0)**
	Regular	117 (29.2)

The highest rate of true answers was related to question 18 (An underweight mother can affect fetal well-being and growth) (89.3%), followed by question 8 (when a diet for pregnant women lacks iron, health risks can occur, including anemia, general weakness, low birth weight) (87%), then both question 2 (A balanced diet is a diet that contains all six nutrients such as carbohydrates, lipids, proteins, vitamins, minerals, and water) and question 7 (Meat, fish, poultry, dried beans, peas, lentils, and some fruits and vegetables are some examples of iron-source food) (86.8%), followed by question 1(A balanced diet is important during pregnancy for the growth and development of the fetus) (85.3%), lastely question3 (Egg, milk and milk products, meat and products, fish and poultry, beans, lentils, soybeans, and chickpeas are good examples of protein-source food.) (85%), as shown in table 3.

Table 3: Percentages of the true answers to the knowledge questions.

Questions	True answer N (%)
1. A balanced diet is important during pregnancy for the growth and development of the fetus.	341 (85.3)
2. A balanced diet is a diet that contains all six nutrients such as carbohydrates, lipids, proteins, vitamins, minerals, and water.	347 (86.8)
3. Egg, milk and milk products, meat and products, fish and poultry, beans, lentils, soybeans, and chickpeas are good examples of protein-source food.	340 (85.0)
4. Grains, vegetables, fruits, honey, sugar, and milk are some examples of carbohydrates.	326 (81.5)
5. Vitamin C-rich food, such as fresh citrus fruits (oranges, lemons, etc.) enhances iron absorption when taken with a meal.	319 (79.8)
6. Coffee, tea, and carbonated beverages inhibit iron absorption when taken with meals	330 (82.5)
7. Meat, fish, poultry, dried beans, peas, lentils, and some fruits and vegetables are some examples of iron-source food	347 (86.8)
8. When a diet for pregnant women lacks iron, health risks can occur, including anaemia, general weakness, low birth weight	348 (87.0)
9. Inadequate nutrition can be the cause of miscarriage and/or preterm birth	324 (81.0)
10.Women's nutrition during pregnancy is different from others.	339 (84.8)
11.During pregnancy, a woman needs more folic acid and iron than a woman who is not pregnant.	312 (78.0)
12. During pregnancy, a woman needs daily calcium and Omega-3 and Omega-6 fatty acids.	298 (74.0)

3. Low intakes of essential nutrients such as protein, carbohydrate, vitamins C, Vitamin A and common causes of maternal mortality, low birth weight, and intrauterine growth retardation	328 (82.0)
14. Carrot, cabbage, mango, red pepper, liver, fish, egg yolks, and dairy products are good examples of vitamin A-source food	326 (81.5)
15. If the woman had normal weight before pregnancy, she should gain weight between 11.5 kg and 16.0 kg during pregnancy	303 (75.8)
16. Additional energy needs should be tailored based on the woman's BMI before pregnancy	309 (77.3)
17. Body mass index (BMI) of less than 18.5 kg/m2 is a suitable weight during pregnancy	322 (80.5)
18. An underweight mother can affect fetal well-being and growth	357 (89.3)
19. Obese women are at an increased risk of several pregnancy problems	334 (83.5)
20. Seafood such as fish and food fortified by iodine are good examples of iodine-source food.	336 (84.0)

There were significant associations between the knowledge level and age (P- value<0.001, education (P-value<0.001), and occupation (P-value=0.012), There were significant associations between the knowledge level and parity more than 7 was the highest (83.3%) among others with(P-value=0.002) and Regular ANC accounted (76.1%) with (P-value=0.037) as shown in table 4.

Table: Associations between the knowledge levels and sociodemographic characteristics and source of information and Associations between the knowledge levels and obstetrical history.

Sociodemographic characteristics		Knowledge score			P-value
		Poor N (%)	Moderate N (%)	Good N (%)	
Age group (years)	<18	7 (9.0)	38 (48.7)	33 (42.3)	**<0.001**
	18-30	14 (8.3)	35 (20.8)	119 (70.8)	
	> 30	**6 (3.9)**	**26 (16.9)**	**122 (79.2)**	
Education	Illiterate	8 (18.6)	17 (39.5)	18 (41.9)	**<0.001**
	Primary school	10 (8.6)	29 (25.0)	77 (66.4)	
	Secondary school	9 (6.0)	37 (24.8)	103 (69.1)	
	College or higher	**0 (0.0)**	**16 (17.4)**	**76 (82.6)**	
Occupation	Student	2 (5.6)	16 (44.4)	18 (50.0)	**0.012**
	Housewife	15 (5.6)	67 (25.1)	185 (69.3)	
	Employed	**10 (10.3)**	**16 (16.5)**	**71 (73.2)**	
Residency	Urban	22 (7.1)	74 (23.9)	214 (690)	0.693
	Rural	5 (5.6)	25 (27.8)	60 (66.7)	
Source of information	Social media	12 (7.4)	46 (28.4)	104 (64.2)	0.289
	Physicians	6 (7.3)	19 (23.2)	57 (69.5)	
	HCP	3 (5.8)	11 (21.2)	38 (73.1)	
	Family	3 (6.8)	7 (15.9)	34 (77.3)	
	Friends	0 (0.0)	13 (38.2)	21 (61.8)	
	Mass media	3 (11.5)	3 (11.5)	20 (76.9)	

Obstetrical history		Knowledge score			P-value
		Poor N (%)	Moderate N (%)	Good N (%)	
Parity	Nulliparous	4 (6.8)	26 (44.1)	29 (49.2)	**0.002**
	1-3	13 (7.4)	46 (26.3)	116 (66.3)	
	4-6	10 (6.5)	25 (16.2)	119 (77.3)	
	≥ 7	**0 (0.0)**	**2 (16.7)**	**10 (83.3)**	
Abortion	0	24 (6.3)	94 (24.8)	261 (68.9)	0.392
	1	2 (14.3)	2 (14.3)	10 (71.4)	
	2	1 (14.2)	3 (42.9)	3 (42.9)	
ANC	No	9 (10.8)	28 (33.7)	46 (55.4)	**0.037**

The highest rate of correct practice was related to question 10 (Do you smoke during the current pregnancy?) (100.0%), followed by question 1 (Do you skip any meals during the current pregnancy?) (92.8%) and question 2 (Do you take additional meals during the current pregnancy?) (88.3%) as shown in table 5.

Table 5: Percentages of participants who had correct practice.

Questions	Correct practice N (%)
1. Do you skip any meals during the current pregnancy?	**371 (92.8)**
2. Do you take additional meals during the current pregnancy?	**353 (88.3)**
3. Do you take iron supplements during the current pregnancy?	352 (88.0)
4. Do you eat carbohydrate-rich food such as (bread, rice, pasta, or potatoes) daily during the current pregnancy?	333 (83.3)
5. Do you eat protein-rich food such as (chicken, meat, yoghurt, milk, or eggs) daily during the current pregnancy	300 (75.0)
6. Do you eat fresh vegetables daily during the current pregnancy?	312 (78.0)
7. Do you eat fruits daily during the current pregnancy?	322 (80.0)
8. Do you follow your weight during pregnancy?	244 (61.0)
9. Do you reduce caffeine intake (tea or coffee) during the current pregnancy?	172 (43.0)
10. Do you smoke during the current pregnancy?	**400 (100.0)**

A significant association was obtained between the correct practice and age (P-value<0.001), education (P-value=0.031), and occupation (P-value=0.013). Significant associations were obtained between the correct practice and parity (P-value=0.001) in which parity more than 7 was the highest among others (91.7%) with good practice, as shown in table 6.

Table 6: Associations between the correct practice and socioeconomic characteristics and source of information and Associations between the practice levels and obstetrical history.

Socioeconomic characteristics		Practice score		P-value
		Poor N (%)	Good N (%)	
Age group (years)	14-17	47 (60.3)	31 (39.7)	<0.001
	18-30	49 (29.2)	119 (70.8)	
	≥ 30	44 (28.6)	110 (71.4)	
Education	Illiterate	21 (48.8)	22 (51.2)	0.031
	Primary school	43 (37.1)	73 (62.9)	
	Secondary school	54 (36.2)	95 (63.8)	
	College or higher	22 (23.9)	70 (76.1)	
Occupation	Student	19 (52.8)	171 (47.2)	0.013
	Housewife	96 (36.0)	171 (64.0)	
	Employed	25 (25.8)	72 (74.2)	
Residency	Urban	110 (35.5)	200 (64.5)	0.707
	Rural	30 (33.3)	60 (66.7)	
Source of information	Social media	67 (41.4)	95 (58.6)	0.078
	Physicians	32 (39.0)	50 (61.0)	
	HCP	14 (26.9)	38 (73.1)	
	Family	9 (20.5)	35 (79.5)	
	Friends	11 (32.4)	23 (67.6)	
	Mass media	7 (26.9)	19 (73.1)	

Obstetrical history		Practice score		P-value
		Poor N (%)	Good N (%)	
Parity	Nulliparous	33 (55.9)	26 (44.1)	0.001
	1-3	61 (34.9)	114 (65.1)	
	4-6	45 (29.2)	109 (70.8)	
	≥ 7	1 (8.3)	11 (91.7)	
Abortion	0	132 (34.8)	247 (65.2)	0.413
	1	4 (28.6)	10 (71.4)	
	2	4 (57.1)	3 (42.9)	
ANC	No	36 (43.4)	47 (56.6)	0.198
	Irregular	66 (33.0)	134 (67.0)	
	Regular	38 (32.5)	79 (67.5)	

There was a significant positive correlation between the knowledge score and practice score, in which if knowledge scores increases, the practice scores will also increase, as shown in figure 1.

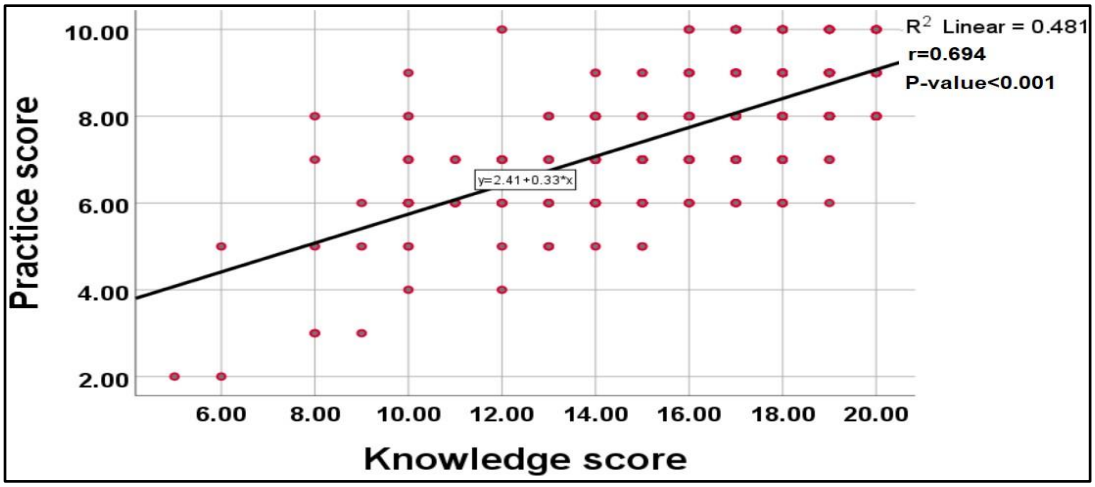

Figure 1: Correlation between the knowledge score and practice score.

DISCUSSION

Maternal dietary knowledge and practice are crucial for ensuring positive pregnancy outcomes, appropriate gestational weight gain, reduced complications, and overall maternal and fetal health.[9] The demographic characteristics of the study population reflect the regional distribution, with more than one-third of participants aged 18-30 years (42%) and having a secondary education level (37.2%), aligning partially with Sindhu et al.'s (2017) study in India, where these groups represented 88% and 66%, respectively.[10] The majority of participants (66.8%) were housewives, consistent with Esmat et al.'s (2022) study in Giza (52.2%) but contrary to Lim et al.'s (2018) study in Malaysia (58% employed).[11,12] Additionally, 77.5% of participants lived in urban areas, supporting findings from Esmat et al. (2022) in Giza (87.8%) and Abdalla et al. (2024) in Egypt (62.6%).[12,13] Regarding obstetrical history, most participants had 1-3 children (43.8%) and no history of abortion (94.8%), consistent with Mirsanjari et al. (2012) in Malaysia (38.8% and 73.9%).[14] The primary source of nutritional information was social media (40.5%), followed by physicians (20.5%), contrasting with Abdalla et al. (2024) in Egypt, where family and friends (60%) and doctors (45%) were dominant sources.[13] Similarly, Lee et al. (2016) and Lobo et al. (2019) in Australia reported doctors and health professionals as primary information sources, highlighting the role of accessibility and personal preferences.[15,16] A balanced diet is crucial for maternal and fetal health. In this study, most participants correctly answered knowledge questions (85.3% and 89.3%), comparable to Lim et al. (2018) in Malaysia (94.3% and 93.2%).[11] The overall knowledge levels showed that 68.5% had good knowledge, 24.8% moderate, and 6.8% poor, aligning with Lim et al. (2018) (63.6%, 31.8%, and 4.5%), Tesfa et al. (2022) in Ethiopia (59.1%), and El-Dessouki et al. (2018) in Egypt (79.3% and 82.9%).[9,11,17] Differences in knowledge levels across studies may be due to variations in age, education, occupation, obstetrical history, and cultural influences. Significant factors associated with higher knowledge scores included age >30 years (79.2%), college education (82.8%), and employment (73.2%), consistent with Esmat et al. (2022), Abdalla et al. (2024), and Popa et al. (2013) in Romania, but in contrast to Tesfa et al. (2022) in Ethiopia, where no significant association with age was found.[9,12,13,18] Additionally, higher knowledge scores were linked to multiparity (>7 children) and regular antenatal care (ANC) visits (P = 0.002, P = 0.037, respectively), in agreement with Tesfa et al. (2022), Esmat et al. (2022), and Popa et al. (2013) [9,12,18]. However, previous abortion history was not significantly associated with knowledge (P = 0.392), differing from Abdalla et al. (2024) in Egypt, which reported no association with parity [13]. Regarding dietary practices, 88.3% of participants reported taking additional meals, 88% took iron supplements, and 75% consumed protein-rich foods, whereas 57% did not reduce caffeine intake, findings consistent with El-Dessouki et al. (2018) in Egypt.[17] Overall, 65% of participants had good practice, aligning with Mazloomy et al. (2022) in Iran (63.9%), Tesfa et al. (2022) in Ethiopia (63%), and El-Dessouki et al. (2018) in Egypt (58.7%).[9,17,19] Differences in practice scores among studies may be due to variations in knowledge levels, cultural influences, and access to healthcare information. Participants aged >30 years, with a college education, employed, and with >7 children had the highest good practice scores, partially aligning with Tesfa et al. (2022) in Ethiopia.[9] Finally, a significant positive correlation was found between knowledge and practice scores (P < 0.001), confirming findings by El-Dessouki et al. (2018) in Egypt, reinforcing the idea that higher knowledge leads to improved dietary practices.[17]

CONCLUSION

The study found that over two-thirds of participants had good knowledge, with factors such as older age, higher

education, employment, and obstetrical history (para and ANC) positively influencing knowledge levels. Similarly, about two-thirds practiced good nutrition behavior, with higher age, education, employment, and para significantly impacting nutritional practices. A strong positive correlation was observed between knowledge and practice scores.

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