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KNOWLEDGE, ATTITUDES, AND PRACTICES ABOUT HEALTHY NUTRITION AMONG PRIMARY HEALTH CARE PHYSICIANS IN BAGHDAD / AL-RUSAFA – 2025

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ABSTRACT

Background: Primary health care providers must acquire and regularly update the appropriate knowledge during their medical school and continued practice to deliver clear and correct dietary advice to their patients. **Aim of study:** To evaluate the knowledge, attitudes, and practices about healthy nutrition among a sample of primary health care physicians in Baghdad, and to examine the factors that may influence these scores. **Methods:** A cross-sectional study including analytical components was performed in 40 primary health care centers in Baghdad from November 1, 2024, to April 1, 2025. It comprised 224 healthcare physicians employed in basic health care centers. Data was gathered by a self-administered questionnaire comprising five sections: Participants' socio-demographic attributes, knowledge, attitudes, and practices on nutrition, as well as the primary obstacles to effective healthy nutrition counselling. **Results:** In this study, 43.8% of participants had good level of knowledge, 67.9% showed positive attitudes, and 38.8% were with good practices. Physicians who had good level of knowledge were significantly younger, more experienced in primary health care centers, family physicians, those who finished higher education, who had private sector experiences, and those who depend on academic resources as a source of information. Family physicians and physicians who finished higher education had significantly more positive attitudes for healthy nutrition. Physicians who had a significantly good level of practice were young, family physicians, physicians who finished higher education, and those who had private sector experiences. **Conclusion:** More than half of the primary health care physicians had fair or poor levels of knowledge about healthy nutrition; two thirds of them demonstrated a positive attitude towards the role of nutrition in health, and about only one third of them exhibited good nutrition-related practices.

KEYWORDS: Nutrition, knowledge, attitude, practice, physicians, PHCC.

INTRODUCTION

Food and nutrition constitute one of the most fundamental human needs. Nutrition is an essential component of the healthcare delivery system and significantly contributes to the maintenance of individuals' health and welfare.[1] Dietary alterations can aid in the prevention of numerous chronic diseases; once a problem manifests, modifications to an individual's standard diet are frequently required to facilitate disease or symptom management.[2] For encouraging habits of healthy eating, a comprehensive understanding of nutrition is crucial. However, improving dietary behaviors may require more than just nutrition knowledge; a good attitude towards healthy eating practices must also be fostered. Individuals must be equipped with the knowledge and attitudes to make appropriate dietary choices, particularly given the contemporary move towards Western eating patterns and the increase in broadcast food ads.[3] PHC physicians are internationally acknowledged as the initial point of contact and custodians of the healthcare system, barring emergency services. They are essential in delivering preventive medicine and ensuring access to scheduled medical treatment for people requiring assistance.[5] Primary care or family physicians are anticipated to offer nutritional advice, guidance, and counselling to promote health, as the rising incidence of diet-related chronic diseases is expected to heighten the demand for nutrition care in the future. Additionally, several research indicate that patients favor general practitioners over dietitians for

nutritional therapy.[6] The continued patients' identification who are at malnutrition risk due to poor consumption of food and in the provision of supportive therapy of nutrition are essential roles for physicians.[7] Certain investigations indicated that concise nutritional counselling by physicians can yield positive effects on diet, weight, and blood lipid levels. Despite physicians' time constraints, insufficient knowledge, inadequate counselling skills, deficiencies in medical education, and patient noncompliance were the most often mentioned obstacles to delivering nutritional care in PHCCs.[8] Evidence indicates a prolonged deficiency in physicians' proficiency in nutritional science and diet, resulting from inadequate nutritional education in their medical training, which contributes to elevated morbidity and mortality rates among patients.[9] Consequently, PHC physicians must obtain and consistently enhance the requisite knowledge throughout their medical education and ongoing practice to provide precise and correct dietary guidance to their patients.[10] The aim of this study is to evaluate the knowledge, attitudes, and self-reported practices about healthy nutrition among a sample of PHC physicians in Baghdad, and to investigate the factors that may influence their knowledge, attitudes, and practices related to healthy nutrition.

METHODS

Study design, setting and data collection time: A cross-sectional study with analytical components was executed at 40 PHCCs in the Al-Rusafa region of Baghdad over a five-month period from November 1, 2024, to April 1, 2025. The Al-Rusafa Health Directorate comprises eleven health districts.

Study population and sample size: There were 369 healthcare physicians working in the PHCCs belonging to Al-Rusafa Health Directorate. To calculate the sample size for a cross-sectional study with a finite population, we used the following formula.[11]

$$n = \frac{N * Z^2 * P * (1-P)}{e^2 * (N-1) + Z^2 * P * (1-P)}$$

Where

N: It's the total population (369 physicians); Z: It's the Z-value corresponding to the desired confidence level (for 95% confidence, Z=1.96); P: It's the estimated proportion of the population with the characteristic of interest (unknown), we used P = 0.5; e: It's the margin of error (commonly 5%, or 0.05).

According to this calculation, the initial sample size was determined to be 187 physicians. To account for a 20% non-response rate and to increase the power of the study, the final sample size was adjusted to 224 physicians.

Sampling Technique: In this study, a multi-stage sampling technique was used to select the sample physicians within Al-Rusafa Health Directorate. Initially, a simple random sampling technique was used to select six of the 11 Districts in Al-Rusafa Health Directorate. In the second stage, a simple random sampling technique was used to select five PHCCs from each of the selected Districts. As the required sample size was not met, an additional two PHCCs were randomly chosen from each of the selected Districts to reach the target sample size.

Data Collection Tools: Data was gathered by a self-administered questionnaire comprising five sections: participants' socio-demographic characteristics, knowledge, attitudes, practices about nutrition, and the primary obstacles to effective healthy diet guidance. It was administered immediately to the participants and subsequently retrieved upon completion. The questionnaire was derived from prior material.[12] The research instrument, initially created prior to 2000 and previously employed in Middle Eastern investigations, underwent reliability assessment. Cronbach's alpha demonstrated acceptable internal consistency for physicians' nutritional practice (0.74 for 7 items), attitudes (0.70 for 4 items), and knowledge (0.50 for 16 items).

The first part included sociodemographic characteristics, specialty, years of experience, years of Experience in PHCC, private sector practice, and source of nutritional knowledge (Books, medical curriculums, articles, social media, seminars, friends, or others). The second part included physicians' knowledge about healthy nutrition. It included 16 questions that measure knowledge of physicians about healthy nutrition. The questions that show how physicians can understand nutrition are multiple choice questions. One mark was given for the correct answer, while questions that were answered wrongly, no mark was given. The total score may range from 0 to 16 with higher scores reflecting better knowledge.

The levels of knowledge were 0 – 33% (0 – 5) represented poor knowledge, 34% – 66% (6 – 10) represented fair knowledge, and > 66% (11 – 16) represented good level of knowledge.[13] The third part included physicians' attitude towards healthy nutrition. It included four items measure physicians' response toward attitudes about healthy nutrition. The items are rated on a 5- point Likert scale, which is, strongly disagree - 1, disagree - 2, neutral- 3, agree- 4 and strongly agree - 5. The four Likert scale items were summed together to give a total score ranging from 4 to 20, in which a higher score reflects a more positive attitude. It is used for scoring responses in an attitude part. It is a type of ordinal scale and generally used to quantify attitude and behavior with the use of quartile score as 0 - 59% (4 – 11) represented negative attitude, 60% – 79% (12 – 15) represented neutral attitude, and ≥ 80% (16 – 20) represented positive attitude.[14] The fourth part included physicians' practice about healthy nutrition. It included seven items measure physicians' response toward practice about healthy nutrition. Likert scale was used for categorizing the answers to questions (All / most / some /

minority of / never). From 5 to 1 scores were recorded respectively. The range was from 7 to 35 with better practice considered when there are higher scores. It is used for scoring responses in the practice part, which was categorized by percentage based on summed scores as 0 - 59% (7 – 20) represented poor practice, 60% – 79% (21 – 28) represented fair practice, and ≥ 80% (29 – 35) represented good level of practice.[14]

Ethical considerations and official approvals: The research was executed in compliance with the ethical norms established by the Scientific Committee in the Department of Community and Family Medicine, subsequently endorsed by the Council of the College of Medicine at Baghdad University, and in line with the Helsinki Declaration of 1975, as amended in 2013. A facilitation letter was acquired from the College of Medicine and delivered to the Al-Rusafa Health Directorate, which was thereafter provided to the management of each designated PHCC. All participants were verbally approved of the study and requested to grant consent to partake in it. All personal information was kept anonymous. Data were utilized solely for the purposes of this investigation.

Statistical analysis: Statistical Package for Social Sciences (SPSS) version 26 was used to analyze the data. The data is displayed as mean, standard deviation, and ranges. Categorical data displayed as frequencies and percentages. The X^2 test was employed to evaluate the correlation between knowledge, attitude, and practice scores and independent variables. Logistic regression analysis was conducted, utilizing poor KAP scores as the dependent variable, while the significant variables identified in the binary analysis were used as independent variables in the model. A P-value threshold of less than 0.05 was deemed significant.

RESULTS

The ages of study participants varied from 28 to 52 years, with a mean of 36.32 ± 5.1 years. In this study, 68.8% of participants were female; 74.1% were currently married; 42% were family medicine specialists; 66.1% had completed a bachelor's degree; 48.7% had 10 to 14 years of post-graduation experience, while 42.4% had less than 5 years of experience in PHCC; 53.1% had experience in the private sector; and the predominant source of nutritional knowledge was books (27.7%).

Table 1: Distribution of study patients by general characteristics.

Variable	No. (n= 224)	Percentage (%)
Age (Year)		
< 40	138	61.6
≥ 40	86	38.4
Gender		
Male	70	31.2
Female	154	68.8
Marital status		
Single	32	14.3
Married	166	74.1
Divorced / Widowed	26	11.6
Specialty		
Family Medicine	94	42.0
General Practitioner	130	58.0
Qualification		
Bachelor	148	66.1
Diploma	9	4.0
Master	3	1.3
PhD or Board	64	28.6
Years of experience after graduation		
< 10	72	32.1
10 – 14	109	48.7
≥ 15	43	19.2
Years of experience in PHCC		
< 5	95	42.4
5 – 9	76	33.9
≥ 10	53	23.7
Private sector experience		
Yes	119	53.1
No	105	46.9
Source of nutritional knowledge		
Books	62	27.7
Curriculum	46	20.5

Social media	43	19.2
Articles	33	14.7
Seminars	23	10.3
Friends	17	7.6

The greatest proportion of accurate responses (92.9%) pertained to the inquiry on the nutrient significantly linked to the avoidance of neural tube abnormalities. The greatest percentage of wrong responses (34.8%) occurred when participants were queried about whether nutritional excesses would elevate body calcium loss. The study observed that 30.8% of the enrolled physicians were uncertain regarding the effects of substances on HDL-cholesterol levels. (Table 2)

Table 2: Distribution of participants' responses about knowledge of healthy nutrition.

Knowledge Questions	True Responses n= 224 (%)
What type of dietary fiber is helpful in lowering the blood cholesterol level?	143 (63.8)
Excess of which nutrient may increase body calcium loss.	95 (42.4)
A nutrient to help prevent thrombosis is.	178 (79.5)
The adequate intake level of calcium for adult aged 51–70 years is:	131 (58.5)
The major type of fat in olive oil is.	142 (63.4)
Compared with unprocessed vegetable oil, hydrogenated fats contain.	155 (69.2)
Which nutrient is protective against hypertension?	205 (91.5)
Which vitamin is likely to be toxic if consumed in excess amount for long period of time?	149 (66.5)
The most concentrated source of vitamin B12 is:	138 (61.6)
Which substance raises the blood HDL-cholesterol level?	116 (51.8)
In general, dietary recommendations are intended to:	187 (83.5)
The type of food to have a preventive effect on various types of cancer is:	196 (87.5)
The number of kilocalories in one gram of fat is:	107 (47.8)
Which of the following is not an antioxidant nutrient?	144 (64.3)
The nutrient strongly associated with the prevention of neural tube defects is:	208 (92.9)
Short-term (diet) plans are usually successful at achieving weight loss because they:	133 (59.4)

The analysis of participants' responses to attitude questions indicated that 43.8% strongly concurred with the statement, "Nutrition is a significant component in the prevention and progression of many chronic diseases," while 29.9% strongly agreed that "Nutrition counselling in the family practice setting is effective at changing patients' behavior." Conversely, 21.4% strongly disagreed and 28.6% disagreed with the assertion that "Counseling patients about nutrition is one of the responsibilities of physicians. We discovered that 29.9% of physicians recommended regular exercise to all patients, and 43.8% advised most patients, whereas 45.1% never assessed patients' height and weight to calculate their BMI. (Table 3),

Table 3: Attitude and practice of the participants.

Attitude Questions	Responses				
	S. Agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	S. Disagree N (%)
Counseling patients about nutrition is one of the responsibilities of the physician.	31 (13.8)	28 (12.5)	53 (23.7)	64 (28.6)	48 (21.4)
Nutrition is a significant component in the prevention and progression of many chronic diseases.	98 (43.8)	66 (29.5)	32 (14.3)	18 (8.0)	10 (4.4)
Nutrition counseling in the family practice setting is effective at changing patients' behavior.	66 (29.5)	43 (19.2)	32 (14.3)	46 (20.5)	37 (16.5)
I feel that patients want more information on nutrition than I am able to provide	23 (10.3)	26 (11.6)	75 (33.5)	64 (28.6)	36 (16.1)
Participants' response towards practice questions					
Practice Questions	**All N (%)**	**Most N (%)**	**Some N (%)**	**Minority N (%)**	**Never N (%)**
Assess the patient's height and weight and calculate their BMI.	1 (0.4)	12 (5.4)	33 (14.7)	77 (34.4)	101 (45.1)
Ask patients about dietary intake as a	37 (16.5)	54 (24.1)	74 (33.0)	46 (20.5)	13 (5.8)

preventive strategy.					
Offer nutritional advice.	42 (18.8)	87 (38.8)	61 (27.2)	18 (8.0)	16 (7.1)
Teach patients how to read a nutrition fact label.	22 (9.8)	26 (11.6)	59 (26.3)	71 (31.7)	46 (20.5)
Ask patients to keep a food diary.	35 (15.6)	54 (24.1)	62 (27.7)	47 (21.0)	26 (11.6)
Refer patients to a dietician if they have a nutrition-related disorder.	44 (19.6)	58 (25.9)	47 (21.0)	50 (22.3)	25 (11.2)
Advise patients to exercise regularly.	67 (29.9)	98 (43.8)	32 (14.3)	18 (8.0)	9 (4.0)

In this study, 46.4% of participants had fair level of knowledge; 67.9% showed positive attitude and 43.8% had fair practice level about healthy nutrition. (Table 4)

Table 4: Levels of total KAP scores.

Variable	No. (n= 224)	Percentage (%)
Knowledge score		
Good	98	43.8
Fair	104	46.4
Poor	22	9.8
Attitude score		
Positive	152	67.9
Neutral	51	22.8
Negative	21	9.4
Practice score		
Good	87	38.8
Fair	98	43.8
Poor	39	17.4

Logistic regression analysis was applied (table 5) using results of physicians' KAP levels about healthy nutrition as the dependent variable. Five factors were found to be important independent risk factors for poor knowledge level. These factors were increasing one year in age (Increasing one year of physicians' age are 1.21 more likely being poor than younger physicians (OR= 1.21 with 95% Confidence Interval (CI): 1.09 to 2.2), decreasing one year of physicians' experience in PHCC are 1.24 more likely increase the poor knowledge level (OR= 1.24 with 95% CI: 1.12 – 2.1), being general practitioner (OR= 4.34 with 95% CI: 1.34 to 9.8), had Bachelor's degree of education (OR= 3.31 with 95% CI: 1.23 to 8.33), and social media and friends' source of nutritional knowledge (OR= 3.15 with 95% CI: 1.17 to 6.9).

Two factors were found to be important independent risk factors for negative attitude level. These factors were being general practitioner (OR= 4.18 with 95% CI: 2.31 to 11.41), had bachelor's degree of education (OR= 5.72 with 95% CI: 1.91 to 14.23).

Four factors were found to be important independent risk factors for poor practice level. These factors were increasing one year in age (OR= 1.31 with 95% CI: 1.08 to 2.6), being general practitioner (OR= 5.22 with 95% CI: 2.12 to 12.7), had bachelor's degree of education (OR= 4.88 with 95% CI: 1.84 to 10.7), and lack of private sector experience (OR= 7.31 with 95% CI: 3.63 to 18.2).

Table 5: Logistic regression analysis of possible risk factors for poor physicians' KAP levels about healthy nutrition.

Variables	Odd's ratio	95% CI for odd's ratio
Poor knowledge level		
Increasing one year in age	**1.21**	1.09 – 2.2
Decreasing one year in PHCC	**1.24**	1.12 – 2.1
General practitioner	**4.34**	1.34 – 9.8
Bachelor's degree of education	**3.31**	1.23 – 8.33
Social media and friends' source of nutritional knowledge	**3.15**	1.17 – 6.9
Negative attitude		
General practitioner	**4.18**	2.31 – 11.41
Bachelor's degree of education	**5.72**	1.91 – 14.23
Poor practice level		
Increasing one year in age	**1.31**	1.08 – 2.6

General practitioner	**5.22**	2.12 – 12.7
Bachelor's degree of education	**4.88**	1.84 – 10.7
Lack of private sector experience	**7.31**	6.63 – 18.2

Table 6 shows the most important barriers to successful healthy nutrition counselling. The most common barrier mentioned by the physicians was time limitation (74.6%) followed by inadequate physicians' knowledge (51.8%). Some of the participants added another point of view as a barrier as changing of some of physicians' place of work from one PHCC to another, which results in disrupting the continuity of care with the patients.

Table 6: Distribution of participants' responses about most important barriers to successful healthy nutrition counseling.

Barrier	No. (n= 224)	Percentage (%)
Time limitation	167	74.6
Inadequate physicians' knowledge	116	51.8
Inadequate follow up	95	42.4
Inadequate patients' knowledge	83	37.1
Lack of patients' motivation for nutritional habit change	66	29.5
Resource limitations (dietitians or materials)	41	18.3
Poor communication skills	32	14.3

DISCUSSION

Optimal nutrition is fundamental to the prevention and control of numerous non-communicable diseases, including diabetes, cardiovascular disease, and obesity. Despite poor diets, frequently resulting from insufficient nutrition, accounting for 74% of global fatalities from non-communicable illnesses, nutrition has seldom received significant emphasis in the educational programs for healthcare professionals.[15,16] Identifying deficiencies in nutritional knowledge among physicians may inform strategies to enhance their understanding of nutrition, while also advocating for the required inclusion of nutritional courses in medical curricula rather than their optional status.[17] The current study revealed that 43.8% of physicians had good knowledge which is approaching to that obtained in Bhaskar A et al study (41.1%)[18] and lower than that in Al Shammari E et al (73%)[19] and Hseiki RA et al (80%)[20] studies. The explanation for this gap might be the misinformation and misconceptions regarding lifestyle modification, particularly in nutrition. This study showed that five factors were found to be important independent risk factors for poor knowledge level (increasing in age, decreasing duration of physicians' experience in PHCC, being general practitioners, had bachelor's degree of education, and social media and friends' source of nutritional knowledge. Different results observed in different studies as Al-Gassimi O et al (Younger age and males)[21] and Dumic A et al (Males).[22] The reported discrepancy among the aforementioned studies is multifactorial, potentially attributable to variations in sample size and study design, as well as factors influencing physicians' nutritional knowledge, including the existing educational framework, confidence levels, knowledge, and attitudes towards nutritional care, alongside strategies for enhancement. Furthermore, certain research indicates that specialists attained the greatest average knowledge score among all physicians. This may be ascribed to recent training and the attainment of their board (specialist) certification, which encompasses nutrition care training. Moreover, female physicians tend to conduct lengthier consultations and are more inclined to incorporate lifestyle behavioral modifications into standard therapy.

In this study, overall attitude score in this study showed that 67.9% of participants had positive attitudes which is higher than that reported in Naser IA et al study (47.9%).[9] Being a general practitioner and had a bachelor's degree of education were found to be important risk factors for negative attitude level which was different than that in Al-Gassimi O et al.[21] Family physicians and those with higher educational attainment often exhibit more favourable attitudes towards nutrition counselling. Moreover, the study's methodology and sample size, along with demographic variables such as age, years post-graduation, and tenure in PHCCs. This study noticed that practice scores about healthy nutrition revealed that 38.8% of physicians had good practices and this is lower than that noticed in Bhaskar A et al study (82%).[18] In this study, good level of practice was significantly observed among younger physicians, among family physicians, those with higher education, and those who had private sector experiences. Inadequate nutrition care delivery would have adverse clinical consequences, as numerous patients would ultimately forfeit the opportunity to receive nutritional support, potentially aiding in the management of their existing ailments and enhancing their health. It may also diminish the influence of primary care physicians on public health. To enhance community health, it is recommended that medical education more thoroughly integrates principles of health behaviour and change. These principles encompass motivational interviewing and the capacity and readiness for change concepts. Senior PHC physicians ought to exemplify positive role models by integrating nutrition care into standard clinical practices.[23] The deficiency in nutrition counselling

among physicians is mostly attributed to insufficient expertise, and a distinct correlation exists between physicians' confidence in their nutritional knowledge and communication abilities and their delivery of nutritional care. These connections indicate that physicians' attitudes towards nutrition education are likely impacted by their understanding of nutrition.[24]

In Conclusion, more than half of the PHCC physicians had fair or poor levels of knowledge about healthy nutrition; two thirds of them demonstrated a positive attitude towards the role of nutrition in health, and about only one third of them exhibited good nutrition-related practices. Older physicians, those less experienced in PHCC, general practitioners, physicians who didn't complete higher education, those who didn't have private sector experiences, and those who depend on social media or friends as a source of information had lower levels of knowledge than others. Positive attitudes were significantly associated with family medicine specialization and higher academic qualifications. The lower level of practice was associated with being older, a general practitioner, not completing a higher qualification, and lacking prior private sector experience. The major barriers to effective nutrition counseling included lack of time during patient consultations, insufficient physician training or knowledge in nutrition, and inadequate follow-up.

We require enhanced initiatives to elevate the understanding of PHCC physicians on healthy nutrition, including the incorporation of more extensive and practical nutrition teaching into both undergraduate and postgraduate medical curricula, providing ongoing continuing medical education workshops and training sessions centered on clinical nutrition to enhance physicians' understanding and refine their counselling abilities, promoting institutional and governmental initiatives that emphasize the significance of nutrition in illness prevention and management, disseminating messages to enhance community knowledge on good nutrition through television, radio, newspapers, and social media, while ensuring PHCCs are supplied with educational materials and BMI tools, and access to dietitians for nutrition counselling, offering training in effective consultation strategies to facilitate the incorporation of concise yet powerful nutrition counselling into standard practice, promoting collaboration between physicians and dietitians may enhance the overall efficacy of nutritional therapy delivered to patients. It is advisable to conduct such extensive studies in other parts of Iraq with a wider participant pool to provide researchers and policymakers with a comprehensive understanding of physicians' awareness regarding good eating and its correlation with disease prevention and management.

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