



Original Article

ISSN : 2277-3657
CODEN(USA) : IJPRPM

Diabetes-related Nutrition Knowledge among Nurses in Primary Health Care: A Cross-Sectional Study

Amani Busili^{1*}

¹Department of Nursing, College of Sabya, Jazan University, Saudi Arabia.

*Email: Drfatimah667@gmail.com

ABSTRACT

Diabetes is a prevalent global health issue that can be diagnosed and managed in primary health care (PHC). Nurses are the largest number of health care providers who work with diabetic patients to manage its complications. One of the significant diabetes management components is nutrition. This study aimed to: (1) investigate PHC nurses' level of diabetes-related nutrition knowledge; (2) assess PHC nurses' perception about knowledgeability and role in the provision of diabetes nutrition education; (3) explore the relationship between nurses' diabetes-related nutrition knowledge with nurses' background and organizational support. A descriptive cross-sectional, correlational study was conducted on 163 PHC nurses in Jazan, Saudi Arabia. A self-administered survey was used for each nurse two times for test-retest reliability. Data were analyzed using descriptive statistics and correlational tests. Nurses had limited diabetes-related nutritional knowledge with a mean score of 11.65 out of 20, but the majority perceived themselves as competent and responsible in providing nutrition education to diabetic patients. The availability of time to attend courses and study on diabetic nutrition, and being informed about the time and venue programmers of diabetes diet were positively correlated with nurses' diabetes-related nutritional knowledge. The study highlighted the need to improve the education of PHC nurses in the field of diabetes nutrition, in particular, the majority of PHC nurses regarded themselves as responsible for the nutrition education of diabetic patients. As well, organizational factors, such as availability of time and support, should be considered to enhance nurses' knowledge.

Key words: Primary health care, Nursing, Knowledge, Diabetes nutrition, Organizational support

INTRODUCTION

Over the past few decades, several studies have focused on the impact of diet on diabetes incidence and prevalence [1, 2]. The literature underscores not only the widespread effects of nutrition on diabetes progression and complications but also the role that nurses play in the empowerment of diabetic patients [3]. Helping patients with chronic health problems acquire self-management skills is one of the major responsibilities of professional nurses. This is often achieved by educating and counseling them [4]. It is nurses who are primarily responsible for providing diabetic patients with essential information to enhance their quality of life [5]. Past studies have shown that patient education has a positive effect on patient outcomes [6]. Therefore, nurses should possess adequate knowledge to provide patients with the required information. Patients with diabetes have higher hospitalization rates and tend to be hospitalized for longer durations than their nondiabetic counterparts [7]. Glycemic control is a cost-effective means of reducing the risk of diabetes complications, and it can be achieved through effective management [8, 9]. Nutritional management of diabetes, such as consuming a calorie-restricted and/or low-glycemic-index diet has a great capacity to improve insulin sensitivity [10] reduce the number of hypoglycemic

and hyperglycemic events [10], and control glycated hemoglobin (HbA1c) levels [11]. Affordable and easily implementable nutritional alternatives that enhance the prevention and management of diabetes are highly valuable [12]. Yet, selecting healthy dietary choices and judging whether a food item is suitable for consumption based on the dietary requirements is considered challenging for diabetic patients [13]. This lack of understanding has a major barrier to diabetes self-management regimens [13]. Primary Health Care (PHC) is the first contact of individuals with the health care system to receive comprehensive services, such as prevention, diagnosis and treatment, health promotion, referral, etc. [14, 15]. Nurses in PHC, worldwide, are seen as a key in the successful delivery of primary care services for chronic disease patients [16]. Yet, the majority of previous studies that look to nurses' diabetes-related nutrition knowledge focused on nurses in an acute care setting, with very limited studies look to PHC nurses [17]. Moreover, most people who benefit from primary health services are patients with chronic diseases such as diabetes [18]. To address these gaps in the literature, this study aimed to (a) investigate PHC nurses diabetes-related nutrition knowledge, (b) assess PHC nurses' perception about knowledgeability and role in providing diabetes nutrition education, and (c) examine the relationship between PHC nurses' diabetes-related nutrition knowledge with background characteristics and organizational support.

MATERIALS AND METHODS

A cross-sectional descriptive correlation research design was undertaken. The study was conducted in the province of Jazan, Saudi Arabia. Jazan was selected because approximately 74% of diabetic patients in Jazan have poor glycemic control and a lack of understanding about diabetes management [19], with increases in diabetes complications [18]. This province has 173 PHC centers, which provide free curative, preventive, health-promoting, and rehabilitative services. For this study, 25 PHC centers, located in different neighborhoods and having the highest numbers of nurses, were selected.

A convenience sample of 163 nurses who had been working in PHC centers was recruited. Nurses were eligible if they had been working in PHC centers for more than six months and provide direct patient care. A total of 200 questionnaires were distributed, and 163 were returned resulting in an 81.5% completion rate. To determine the required sample size, Sample Size Calculator by Raosoft was used and showed that the required sample size was 163. Rates of item-level missing data were <1% for all variables. Also, to determine the required sample size for two tails correlation test, G-Power was used with an alpha of 0.05, power of 0.80, and medium effect size ($\rho = .3$). The minimum sample size was 82.

RESULTS AND DISCUSSION

Participants' background characteristics

The background characteristics of the participants are presented in **Table 1**. Their mean age was 32.49 years (SD = 5.460, range = 23-50). The mean duration for which they had been working was 9.39 years (SD = 6.222, range = 1-34), and a majority (90.8%) of them were female nurses. About their educational level, 79.8% held a diploma in nursing, 18.4% had a baccalaureate (Bachelor of Science in Nursing) degree, and 1.8% of them had a master's degree.

Table 1. Background characteristics of the participants (N = 163)

Characteristic	Mean	SD	Range
Age	32.49	5.46	23–50
Years of experience	9.39	6.22	1–34
Number of nutrition-related courses attended	1.11	0.49	0–5
Characteristic	Frequency (n)	Percentage (%)	
Gender			
Female	148	90.8	
Male	15	9.2	
Educational level			
Diploma	130	79.8	

Bachelor	30	18.4
Master	3	1.8

Nurses' diabetes-related nutrition knowledge

The mean score of knowledge was 11.65 (SD = 2.60, range = 1-18) out of 20. The total percentage of correct result ranged from 5% to 90% (median = 60%, Interquartile Range = 50-65). Only 49.1% of the nurses believed that patients with diabetes should limit trans fats in their diet, and 54% did not know that patients with diabetes should restrict their intake of animal fats. Approximately 62% of nurses did not know that the carbohydrate contents of foods can be ascertained by referring to food labels. In addition, 49.1% did not know that nonfat or low-fat milk has fewer calories than whole milk. Moreover, 79.1% did not know that daily cholesterol intake should be limited to 300 mg. Regarding the items that assessed basic knowledge about diabetes, more than half of the nurses (46.4%) could not correctly identify the fasting plasma glucose levels that are indicative risk of diabetes. As well, 31.9% of nurses did not provide correct responses to the items that pertained to the treatment of the symptoms of hypoglycemia.

Perceived knowledgeable ability and role in provision of diabetes nutrition education

As shown in **Table 2**, the majority (71.2%) of PHC nurses perceived their competency to provide nutrition advice to diabetic patients as "excellent" or "good", but 79.8% of them reported that they need to update their knowledge about diabetes nutrition. Fewer than half of the nurses (42.3%) were satisfied with the nutritional education that they had received. Most of them believed that the nutritional management of diabetes falls within the scope of their practice. Nurses' responsibilities include the following: 1) providing basic nutrition education, 2) reinforcing nutrition education, 3) providing comprehensive nutrition education, and 4) teaching patients the principles of the daily nutritional management of diabetes and assist them with meal planning.

Table 2. Nurses' Perceived Knowledgeability and Role in Diabetes Nutrition Education (N = 163)

Items	Frequency	Percentage
Do you believe that you need to update your knowledge about diabetes nutrition?		
Yes	130	79.8
Level of satisfaction regarding nutrition education		
Very satisfied/satisfied	69	42.3
Perceived competence in one's ability to provide nutrition advice		
Excellent/good	116	71.2
Fair/poor	47	28.8
Perceptions regarding Nurses' Responsibilities		
Providing basic nutrition education	145	89
Providing comprehensive nutrition education	119	73
Reinforcing nutrition education	125	76.7
Assisting with meal planning	115	70.6
Teaching daily management	115	70.6
Not responsible for providing nutrition education	40	24.5

Organizational support

With respect to diabetes management policies, 76.1% of nurses reported that their PHC centers had such policies, but only 31.9% reported that they "always or frequently" referred to these policies when providing care to a patient with diabetes. Most nurses (84%) did not have the time to attend continuing education programs on diabetes, and only 6.1% "always" had the time to read about diabetes nutrition at work. Only 9.8% of them had access to the resources that were necessary to acquire or update their knowledge about diabetes nutrition. Most of them (73.6%) reported that their head nurses rarely helped them improve their knowledge about diabetes nutrition. Nineteen percent of the participants had "rarely" been informed about existing diabetes nutrition programs.

Variables associated with nurses' diabetes-related nutrition knowledge

With regard to nurses' background characteristics, their level of knowledge was unrelated to their age, years of clinical experience, and the number of nutrition-related courses completed because $P > 0.05$. But, results of the

Spearman correlation indicated that there was a significantly positive correlation among nurses' diabetes-related nutrition knowledge with previous experience in counseling diabetic patients ($r_s(161) = .332, P = .00$). Nurses' organizational background was positively associated with diabetes-related nutrition knowledge. Among organizational factors, nurses' level of knowledge was positively correlated with the availability of time to attend courses on diabetes ($r_s(161) = .197, P = .012$) and read about diabetes nutrition at work ($r_s(161) = .255, P = .001$), and being informed about time and venue programmers of diabetes diet ($r_s(161) = .186, P = .018$), but there is no significant correlation between knowledge level related diabetes nutrition and other organizational support variables (referring to the diabetes management guidelines/policy in providing care to diabetic patients, having diabetes management policy guidelines on the center, accessing needed resources to update diabetes-related nutrition knowledge, and support from head nurses in developing diabetes knowledge) ($P > 0.05$).

This study yielded the following important findings: 1) nurses' diabetes-related nutrition knowledge was poor; 2) most nurses had not attended nutrition-related courses during the past five years; 3) a majority of the nurses believed that they have a role and competency in the provision of diabetes nutrition education to patients; and 4) there was a positive relationship between the nurses' diabetes-related nutrition knowledge and organizational factors. Healthcare professionals who work in PHC centers are perceived as those who primarily offer care to patients with chronic diseases [20]. However, 75.5% of PHC nurses possess below-average levels of knowledge. The finding is consistent with previous studies which found that the mean of nurses' diabetes-related nutrition knowledge was 12.13 out of 20 [21] and 49.44 out of 100 [22]. In contradistinction to the ADA and WHO guidelines for diabetes management [23], only 50.9% of the nurses believed that diabetic patients should limited trans fats from their meals. Simultaneously high cholesterol and LDL levels in diabetic patients increase their risk of developing heart disease [24], but more than half of nurses did not know that diabetic patients should restrict their intake of animal fats and daily intake of cholesterol. Their lack of knowledge about the need to restrict one's intake of fats may pose challenges to dietary adherence among patients, increase complication rates, length of hospital stay, readmission rates, mortality, and cost of care [25]. Moreover, very few nurses were able to correctly indicate the average amount of calories that should ideally be derived from carbohydrates and proteins daily. This result is consistent with the findings reported by [26]. It means that learning daily calories requirement for diabetic patients based on the evidence needed to address in nursing curriculum with focuses on patient preference and update guidelines. Hypoglycemia is a serious and common issue as the prevalence of hypoglycemia is found to be 65.2% among patient with diabetes [27]. In this study, 68.1% of nurses were able to correctly identify the appropriate initial treatment for hypoglycemia. The corresponding figures were 62% in past studies [21, 28]. It means the current finding is consistent with previous studies in different part of the world. Yet, one-third of the nurses in the current study could not identify the appropriate treatment for hypoglycemia; their lack of knowledge can lead to serious consequences for patients, such as loss of consciousness, seizures, and mortality. Nurses need to educate patients and "significant other" in dealing with hypoglycemia.

Although nurses in the current study have limited diabetes-related nutrition knowledge, more than half of them (69.3%) had provided dietary education to diabetic patients. This is more than the result of PHC physicians who counsel their patients on diet (66%) [29]. This finding raises concerns about the quality of the advice that nurses provide to diabetic patients. Nurses' low levels of knowledge can cause them to provide incorrect and inappropriate nutrition advice to patients. Diabetic patients may also feel upset and confused when they learn that the health information that they have been provided with is inaccurate. The ADA has observed that education in the area of nutrition is an important element of the curriculums that should be used to train all healthcare professionals [30]. In the current study, a majority of nurses reported that their level of confidence in their ability to provide nutrition education was "excellent" or "good". This result is consistent with past findings, which suggested that nurses overestimate their knowledge about nutrition and diabetes (i.e., perceived knowledgeability > actual knowledgeability) [21, 28]. 42.3 % of nurses were satisfied with the nutrition education they had received as part of their nursing program. Compared to another study in the US, more than 70 % of nurses and nursing students surveyed were satisfied with the nutritional education they received during their nursing program [28] and (77.5%) were satisfied with the nutritional education they received during school education in another study [21]. This study indicates a lower level of satisfaction among nurses than the previous study (42.3%). This suggests that at least two-thirds of them will respond favorably to changes in the nutrition education that is provided as a part of nursing programs.

There have been inconsistencies related to the effect of background characteristics on nurses' knowledge about nutrition. In this study, there was no significant relationship between nurses' educational level, work experience, and age with their levels of diabetes-related nutrition knowledge. This indicates that knowledge about the

nutritional management of diabetes may not be acquired across the years of one's work experience. The present findings are consistent with the results that have been reported by previous studies. They found that there was no significant correlation between years of experience and nurses' knowledge about nutrition [26, 31]. The number of courses that nurses had attended did not have a significant association with their level of knowledge. The insignificant relationship might be rationalized by the limited number of attended courses among these nurses because on average, they attended 1.1 nutrition-related courses and only 22.1% of them have ever attended. Updating nutrition knowledge by participating in continuing education programs has been proven to be important [31] so redesigning the existing education programs might be required. In this study, organizational factors had a significantly positive relation with nurses' diabetes-related nutrition knowledge. It means receiving organizational support can increase PHC nurses' knowledge. The availability of support and guidance assistance for nurses can increase their ability in acquiring and updating their knowledge. The majority of nurses believed that the organization played an important role in improving nurses' knowledge of diabetes care by organizing workshops and seminars. Managers' support for nurses to participate in continuing diabetes education and training was perceived as a priority [32]. Past studies have shown that educational programs are effective in helping nurses bridge gaps between their knowledge and skills [33]. In this regard, the present findings can be used to develop evidence-based educational programs for nurses to improve their knowledge about diabetes. These educational programs can be offered as in-service training (continuing nursing education). Further, clinical guidelines that focus on delivering diabetes nutrition education can be developed and implemented in PHC centers. In addition, based on the study findings, nursing curriculums can be redesigned to ensure that future nurses become adequately competent in the provision of diabetes nutrition education. Moreover, by understanding the role that organizational support plays in nurses' diabetes-related nutrition knowledge, pertinent factors can be addressed to enhance their knowledge.

CONCLUSION

This study highlighted the lack of diabetes-related nutrition knowledge among PHC nurses and how it is associated with the availability of time to attend courses and read as well as being informed about the time and venue programmers of diabetes diet. PHC nurses are at the front line in dealing with diabetic patients but they need to be well equipped to take their role. Thus, nutrition-related courses ought to be offered as a part of undergraduate nursing programs or in-service training to equip nurses with adequate knowledge. The selected teaching methods should include interactive strategies to enhance student learning. This will help nurses develop their skills, acquire knowledge, and transform theoretical concepts into practical advice. Studies should also examine the effects of such programs on nurses' diabetes-related nutrition knowledge and patient outcomes. Our study suggests that organizational factors influence nurses' knowledge. Specifying time for these nurses to attend courses and read up-to-date materials related to diabetes nutrition is an important strategy. Managerial support in acquiring and updating knowledge is a key imperative in making PHC nurses prepared. Education programs should focus on improving nutrition management in patients with diabetes for primary health care nurses with a focus on the weakest point among nurses such as reading food labels as well as treatment of hypoglycemia symptoms.

ACKNOWLEDGMENTS : The authors are grateful to all support and guidance of Eman Alhalal.

CONFLICT OF INTEREST : None

FINANCIAL SUPPORT : Deanship of scientific research funded and supported this research through the initiative of DSR Graduate Students Research Support (GSR).

ETHICS STATEMENT : None

REFERENCES

1. Sami W, Ansari T, Butt NS, Ab Hamid MR. Effect of diet on type 2 diabetes mellitus: a review. *Int J Health Sci.* 2017;11(2):65.
2. McMacken M, Shah S. A plant-based diet for the prevention and treatment of type 2 diabetes. *J Geriatr Cardiol.* 2017;14(5):342. doi:10.11909/j.issn.1671-5411.2017.05.009

3. Siminerio LM, Funnell MM, Peyrot M, Rubin RR. US nurses' perceptions of their role in diabetes care. *Diabetes Educ.* 2007;33(1):152-62. doi:10.1177/0145721706298194
4. Grady PA, Gough LL. Self-management: a comprehensive approach to management of chronic conditions. *Am J Public Health.* 2018;108(S6):S430-6. doi:10.2105/AJPH.2014.302041
5. Pera PL. Living with diabetes: quality of care and quality of life. *Patient Prefer Adherence.* 2011;5:65-72. doi:10.2147/PPA.S16551
6. Adams RJ. Improving health outcomes with better patient understanding and education. *Risk Manag Healthc Policy.* 2010;3:61. doi:10.2147/RMHP.S7500
7. Nikitara M, Constantinou CS, Andreou E, Diomidous M. The role of nurses and the facilitators and barriers in diabetes care: A mixed methods systematic literature review. *Behav Sci.* 2019;9(6):61. doi:10.3390/bs9060061
8. Degli Esposti L, Saragoni S, Buda S, Sturani A, Degli Esposti E. Glycemic control and diabetes-related health care costs in type 2 diabetes; retrospective analysis based on clinical and administrative databases. *Clinicoecon Outcomes Res.* 2013;5:193. doi:10.2147/CEOR.S41846
9. Mirghani HO, Alatawi SA, Alsharif KF. The Diet-Induced Gut Microbiota Diversity Improved Glycemic Control: A Meta-Analysis. *Pharmacophore.* 2020;11(5):51-60.
10. Russell WR, Baka A, Björck I, Delzenne N, Gao D, Griffiths HR, et al. Impact of diet composition on blood glucose regulation. *Crit Rev Food Sci Nutr.* 2016;56(4):541-90. doi:10.1080/10408398.2013.792772
11. Andrews RC, Cooper AR, Montgomery AA, Norcross AJ, Peters TJ, Sharp DJ, et al. Diet or diet plus physical activity versus usual care in patients with newly diagnosed type 2 diabetes: the Early ACTID randomised controlled trial. *Lancet.* 2011;378(9786):129-39. doi:10.1016/S0140-6736(11)60442-X
12. Pasin G, Comerford KB. Dairy foods and dairy proteins in the management of type 2 diabetes: a systematic review of the clinical evidence. *Adv Nutr.* 2015;6(3):245-59. doi:10.3945/an.114.007690
13. Mikhael EM, Hassali MA, Hussain SA, Shawky N. Self-management knowledge and practice of type 2 diabetes mellitus patients in Baghdad, Iraq: a qualitative study. *Diabetes Metab Syndr Obes.* 2019;12:1-17. doi:10.2147/DMSO.S183776
14. Ashcroft R. Health promotion and primary health care: examining the discourse. *Soc Work Public Health.* 2015;30(2):107-16. doi:10.1080/19371918.2014.938395
15. Alali SM, Alghamdi RL, Al Bosroun ZA, Al Dokhi AA, Alabdulrahim ZA, Almazyad AZ, et al. Role of Physicians in Diagnosis and Management of Diabetes Mellitus in Primary Health Care. *Arch Pharm Pract.* 2019;10(2):12-5.
16. Parkinson AM, Parker R. Addressing chronic and complex conditions: what evidence is there regarding the role primary healthcare nurses can play?. *Aust Health Rev.* 2013;37(5):588-93. doi:10.1071/AH12019
17. Daly BM, Arroll B, Scragg RK. Diabetes knowledge of primary health care and specialist nurses in a major urban area. *J Clin Nurs.* 2019;28(1-2):125-37. doi:10.1111/jocn.14684
18. Bani IA. Prevalence, knowledge, attitude and practices of diabetes mellitus among Jazan population, Kingdom of Saudi Arabia (KSA). *J Diabetes Mellit.* 2015;5(02):115-22. doi:10.4236/jdm.2015.52014
19. Badedi M, Solan Y, Darraj H, Sabai A, Mahfouz M, Alamodi S, et al. Erratum to "Factors Associated with Long-Term Control of Type 2 Diabetes Mellitus". *J Diabetes Res.* 2019;2016(8). doi:10.1155/2019/8756138
20. Khan AT, Lateef NA, Khamseen MA, Alithan MA, Khan SA, Ibrahim I. Knowledge, attitude and practice of ministry of health primary health care physicians in the management of type 2 diabetes mellitus: A cross sectional study in the Al Hasa District of Saudi Arabia, 2010. *Niger J Clin Pract.* 2011;14(1):52-9. doi:10.4103/1119-3077.79241
21. Mogre V, Ansah GA, Marfo DN, Garti HA. Assessing nurses' knowledge levels in the nutritional management of diabetes. *Int J Afr Nurs Sci.* 2015;3:40-3. doi:10.1016/j.ijans.2015.07.003
22. Yalcin N, Cihan A, Gundogdu H, Ocakci A. Nutrition knowledge level of nurses. *Health Sci J.* 2013;7(1):99-108.
23. American Diabetes Association. Standards of medical care in diabetes—2020 abridged for primary care providers. *Clin Diabetes.* 2020;38(1):10-38.
24. Jones J, Schilling K, Pesut D. Barriers and benefits associated with nurses information seeking related to patient education needs on clinical nursing units. *Open Nurs J.* 2011;5:24. doi:10.2174/1874434601105010024

25. Tappenden KA, Quatrara B, Parkhurst ML, Malone AM, Fanjiang G, Ziegler TR. Critical Role of Nutrition in Improving Quality of Care: An Interdisciplinary Call to Action to Address Adult Hospital Malnutrition. *J Acad Nutr Diet.* 2013;37(4):482-97. doi:10.1016/j.jand.2013.05.015
26. Ghani M, Akhtar T, Shuaib N, Khan NA. Female Nurses Knowledge regarding Dietary Advice to type II Diabetes patients. *Israel Med J.* 2018;10(4):239-43.
27. Ratzki-Leewing A, Harris SB, Mequanint S, Reichert SM, Brown JB, Black JE, et al. Real-world crude incidence of hypoglycemia in adults with diabetes: results of the InHypo-DM Study, Canada. *BMJ Open Diabetes Res Care.* 2018;6(1):e000503. doi:10.1136/bmjdr-2017-000503
28. Carney T, Stein SE, Quinlan JJ. The need for additional training for nutritional management of diabetes. *Br J Nurs.* 2013;22(9):512-7. doi:10.12968/bjon.2013.22.9.1234
29. Al-Gassimi O, Shah HB, Sendi R, Ezmeirly HA, Ball L, Bakarman MA. Nutrition competence of primary care physicians in Saudi Arabia: a cross-sectional study. *BMJ open.* 2020;10(1):e033443.
30. Kris-Etherton PM, Akabas SR, Bales CW, Bistrian B, Braun L, Edwards MS, et al. The need to advance nutrition education in the training of health care professionals and recommended research to evaluate implementation and effectiveness. *Am J Clin Nutr.* 2014;99(5):1153S-66S. doi:10.3945/ajcn.113.073502
31. Al-Shwaiyat NM, Sinjillawi AB, Al-Rethaiaa AS, Fahmy AE, Al-Sarairoh RM, Aqel MM, et al. Assessment of therapeutic nutritional knowledge of Jordanian nurses. *Int J Nutr Food Sci.* 2013;2(3):142-8. doi:10.11648/j.ijnfs.20130203.18
32. Alotaibi A, Gholizadeh L, Al-Ganmi AH, Perry L. Factors influencing nurses' knowledge acquisition of diabetes care and its management: A qualitative study. *J Clin Nurs.* 2018;27(23-24):4340-52. doi:10.1111/jocn.14544
33. Wakefield PL, Wilson MA. Enhancing nurses' knowledge regarding the complex care of hospitalized patients on insulin. *J Nurses Prof Dev.* 2014;30(4):174-80.