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Assessing nurses' knowledge levels in the nutritional management of diabetes

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ABSTRACT

Although nutrition education for diabetes patients is the responsibility of dieticians and/or nutritionist, nurses have an important role to play. This study measured the knowledge level of nurses' and associated factors in the nutritional management of diabetes. In this cross-sectional study a sample of 200 nurses completed a 21-item nutritional management of diabetes knowledge test developed based on the ADA and WHO guidelines for the nutritional management of diabetes. Using Cronbach's alpha, reliability was 0.62. The nurses (n = 200) had almost a 1:1 male to female ratio (n = 99, 49.5% and n = 101, 50.5%) and a mean age of 27.24 ± 3.66 years. Total mean score was 12.13 ± 3.17 (44.9% correct). Over 70% of the nurses said diabetes patients could exclude any of the major nutrients from their meals. Almost 90% (n = 179) of the nurses did not know the recommended daily caloric intake of carbohydrates for diabetes patients. Higher mean scores were found in nurses who have ever had a refresher course in nutrition, ever counseled a diabetes patient and took 2–3 nutrition courses during school. Nurses' knowledge in the nutritional management of diabetes was poor. It raises questions about the adequacy of nurses' knowledge in the nutritional management of diabetes.

1. Introduction

Nurses play an important and critical role in educating the individual with diabetes. Their role has become more pertinent in these recent times of the rising prevalence of diabetes (especially type 2) in every country. The sixth edition of the IDF Diabetes Atlas reports that 382 million people have diabetes and will rise to 592 million by the year 2035 (Aguiree et al., 2013). It reports that 80% of people with diabetes live in low- and middle-income countries (Aguiree et al., 2013). An estimated 522, 600 people in Sub-Saharan Africa died from diabetes-related causes in 2013 (Aguiree et al., 2013).

With a clinical feature of high blood glucose, the major goal of diabetes treatment and management is to maintain normal or near normal blood glucose levels (Carney, 2010; Nelms, Sucher et al., 2010) in affected individuals. It has been shown that maintaining normal or near normal blood glucose levels in people with diabetes reduces complications (Nelms, Sucher et al., 2010). Diabetes care is largely self-care requiring the active participation of the patient in decision making, goal setting and daily management processes (Kaur & Walia, 2007). Effective self-management care is provided by a multidisciplinary team of healthcare professionals including nurses, dieticians, pharmacists, physicians, and diabetes educators.

An important component of the self-management care is nutrition. Patients are usually educated on basic meal planning, carbohydrate counting and exchanges as well as how to read food labels with the goal of making them independent (Bantle, Wylie-Rosett et al., 2008).

Although nutrition education is the responsibility of dieticians and/or nutritionist, nurses have an important role to play. The role of nurses in the multidisciplinary team is very crucial due to their regular contact with the diabetes patient. In the hospital setting, nurses are always available to patients 24 h per day, making them more easily accessible to patients compared to other members of the healthcare team. For instance, in the US, nurses are 40 times more than dieticians and 100 times more than certified diabetes educators to meet diabetes patients daily in the ward (Bureau of Labor Statistics, 2011). Patients are more likely to trust them and seek for advice from them regarding the treatment and management of their condition. A study each from the US and Australia have reported that 90% of nurses routinely receive request for nutrition advice from patients (Lindseth, 1990; Schaller & James,

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2005). This puts nurses in a critical position to ensure that patients get the best of care.

Nurses must be adequately knowledgeable about nutrition therapy for diabetes patients (Scheiderich et al., 1983; Evert et al., 2013, 2014) in order to provide effective advice. The provision of inaccurate information to patients could lead to poor adherence of the diabetes patient to dietary recommendations resulting in diabetes complications and increased healthcare cost (Carney et al., 2010).

Several studies have assessed nurses' knowledge in diabetes but not their knowledge in the nutritional management of diabetes. Our search of the literature yielded a few studies that included nutrition as a component of the knowledge questionnaire used in assessing the nurses' knowledge. None have elaborately covered nurses' knowledge in the nutritional management of diabetes.

The purpose of this study was to measure nurses' knowledge in the nutritional management of diabetes. In furtherance, factors associated to the nurses' knowledge were also measured.

2. Methods

2.1. Sample and setting

Using a cross-sectional study design, this study was conducted in three randomly selected hospitals located in Tamale, Ghana between January and July 2014. Lying between latitude 9°22 N and longitude 0°50′ W, Tamale is located about 500–600 km North of Accra, Ghana's capital city and has a population of 371, 351 inhabitants and four hospitals. All of the hospitals had no designated diabetes educator or a team responsible for diabetes patient education. However, all of them had a nutrition unit responsible for providing general nutrition care for all forms of conditions. The four hospitals were listed and three hospitals were selected for the study through the process of lottery. The target population for this study included all professional staff nurses working in the three hospitals. Excluded from the study were student nurses; those who were awaiting results from the Nurses and Midwives Licensure examinations and head nurses. Age, years of experience or type of employment (full or part-time) were not limitations for participation in the study. Permission to have access to the hospitals was obtained from the administrators. Ethical approval was granted by the Ethics Committee of the School of Medicine and Health Sciences, Tamale, Ghana. A team of research assistants together with the second and third authors visited the selected hospitals for purposes of data collection. Nurses were approached at the unit in which they worked. All nurses working in the unit were approached by a research assistant to participate in the study. The purpose of the study as well as the inclusion and exclusion criteria was explained to the nurses by the research assistant. Questionnaires were given to all nurses that consented, voluntarily to participate in the study. Included in the questionnaire was a cover letter that assured the nurses anonymity and confidentiality of all data provided. Nurses were at liberty to take the questionnaire home if need be. A total of 465 nurses were approached to participate, 235 (participation rate = 50.5%) consented and were given questionnaires. From all the three hospitals, 200 questionnaires were returned yielding a response rate of 85.1%.

2.2. Questionnaire

The questionnaire consisted of two sections including demographic data and nutritional management of diabetes knowledge test (NMDKT). A total of nine questions assessed the demographic data of the nurses including their professional background. The NMDKT consisted of questions that assessed nurses' knowledge levels in the nutritional management of diabetes. The content of the NMDKT was developed based on the WHO and the American Diabetes Association nutrition guidelines and published studies that assessed diabetes and/or nutrition knowledge levels among nurses (Crogan et al., 2000; Carney et al., 2010; Al-Shwaiyat et al., 2013). The test was submitted to a panel of three experts in nutrition and health for evaluation of content validity, test format and item construction. All items were revised based on the initial comments of the review panel and resubmitted for further evaluation. All the items were approved by the panel as appropriate assuring good content validity. Using Cronbach's alpha to measure internal consistency, a reliability coefficient of 0.62 was attained for the NMDKT. From a total of 21 items, six assessed general concepts of diabetes; 13 tested knowledge in basic meal planning for diabetes patients and one on basic treatment for a hypoglycemic patient. With regards to format, 12 items were multiple choice questions and the rest were statements that expected nurses to indicate as true or false. An option of "I do not know" was included to all the items to cater for nurses who did not have an idea at all about a test item. The questionnaire took approximately 15–20 min to complete.

2.3. Statistical analysis

Descriptive statistics of mean and standard deviation was used to analyze achieved knowledge scores. All categorical data were expressed as frequencies and proportions. Reliability and internal consistency of the questionnaire were evaluated using Cronbach's alpha. Student *t*-test was used to compare means among the study variables.

Cronbach's alpha analysis was performed using the IBM Statistical Package for the Social Sciences (IBM SPSS) version 21.0. Student *t*-test analysis was computed using GraphPad Prism version 5 (GraphPad software, San Diego, California, USA, www.graphpad.com).

A p-value of <0.05 was considered significant.

3. Results

Table 1 describes the general characteristics of the nurses. The nurses had a mean age of 27.24 ± 3.66 years and have been practicing nursing for a mean duration of 2.71 ± 1.80 years. One hundred and fifty-five nurses (77.5%) were satisfied with the nutrition education they received during training in school and 185 (92.5%)

Table 1
General and professional background of the nurses ($n = 200$).

Variable	Frequency (%)
Age	
⩽30	171(85.5%)
>30	29(14.5%)
Gender	
Male	99(49.5%)
Female	101(50.5%)
No. of years in nursing	
⩽5 years	184(92.0%)
>5 years	16(8.0%)
No. of nutrition courses taken in school	
0–1	148(74.0%)
2–3	52(26.0%)
Ever had a refresher course in diabetes management	
Yes	6(3.0%)
No	194(97.0%)
Ever counseled a diabetes patient	
Yes	141(70.5%)
No	59(29.5%)

reported that it is the responsibility of the nurse to provide basic nutrition education to diabetes patients.

The nurses achieved a mean ± SD score of 12.13 ± 3.17 (44.9% correct) on the knowledge questionnaire. With a median score of 12 (46.2% correct), the test frequency indicated a bell-shaped curve. Table 2 shows the frequency of distribution of the scores.

Included in the questionnaire were questions regarding basic knowledge on diabetes (Table 3). A large proportion of the nurses could recognize that diabetes is not caused by high sugar intake. However, 54.5% ($n = 91$) of the nurses could not correctly identify the recommended fasting plasma glucose level for diabetes.

The questions answered correctly by the nurses relating to knowledge in basic meal planning are presented in Table 4. Over 70% said diabetes patients could exclude any of the major nutrients from their meals. Fifty one percent ($n = 102$), 17.5% ($n = 35$) and 54.0% ($n = 108$) of the nurses said carbohydrates, protein and fat respectively should be excluded from the meals of diabetes patients. Almost 90% ($n = 179$) of the nurses were unable to identify the recommended daily caloric intake from carbohydrates for diabetes patients.

Sixty-five percent ($n = 130$) of the nurses did not know the effect of Trans fats on LDL cholesterol levels in the body and 29% ($n = 58$) did not know that non-fat or low fat milk are lower in calories than whole milk.

Student *t*-test was used to measure the differences in mean scores stratified by age, gender, duration of service, number of nutrition courses taken in school, participation in refresher courses and experience in counseling diabetes patients and presented in Table 5. Significantly ($p = 0.003$) males scored higher than females.

4. Discussion

Scoring a mean knowledge score of 12.13 (44% correct), our nurses knowledge on the nutritional management of diabetes was poor. Direct comparison to other studies may be difficult due to limited studies assessing nurses' knowledge in the nutritional management of diabetes as most reported studies either assessed nurses' general knowledge in diabetes and/or its management, with a few including nutrition as a component of the questionnaire. However, comparing our findings with the few ones available, the mean score achieved by the nurses in this study was lower than 58.8% reported by Al-Shwaiyat et al. (2013) in a sample of Jordan nurses using a 31-item questionnaire that assessed their nutritional therapeutic knowledge. Another study that assessed the knowledge of nurses and student nurses on the nutritional management of diabetes found a mean knowledge score of 53% and 50% for nurses and students respectively using a 20-item questionnaire (Carney et al., 2010). Comparing our findings with other studies that had nutritional component as part of the general diabetes knowledge questionnaire, the mean score achieved by the nurses in this study is higher. These studies have reported a mean diabetes-related nutrition knowledge score of 0.7–22.3% (Feustel, 1976), 14% (Knight et al., 1984) and 20% (Modic et al., 2009). The inconsistency in the mean knowledge scores between the studies could be due to the use of variable questionnaires to assess knowledge. It could also be related to curricular differences and focus.

Table 2
Frequency of distribution of the knowledge scores.

Raw scores	% correct	Frequency (%)
<5	<20	4(2.0%)
5–7	20–29	10(5.0%)
8–10	30–39	41(20.5%)
11–13	40–49	81(40.5%)
14–16	50–59	53(26.5%)
17–19	60–69	6(3.0%)
20–22	70–79	5(2.5%)

Maximum score = 27.

Table 3
Basic knowledge on diabetes: percentage of correct responses among the nurses (*n*-200).

Questionnaire item	Frequency (%)
Diabetes is indicated by an FPG of 6.1–6.9 mmol/dl	91(45.5%)
Exercise plays an important role in the prevention and management of diabetes	177(88.5%)
Symptomatic hypoglycemia could be treated using 3–4 cubes of sugar	124(62.0%)
Diabetes and obesity are closely related	171(85.5%)
Diabetes is related to hypertension	140(70.0%)
Diabetes is caused by high sugar intake	31(15.5%)

Table 4
Knowledge on basic meal planning for diabetes management: percentage of correct responses among the nurses ($n = 200$).

Questionnaire item	Frequency (%)
Diabetes patients should not exclude any nutrient from their diet	50(25.0%)
Use total carbohydrates on food labels to determine amount of carbohydrates per serving	23(11.5%)
The total amount of carbohydrates is more important than the type of carbohydrate	84(42.0%)
50–60% of the daily caloric intake of diabetics should come from carbohydrates	40(20.0%)
Diabetes patients should consume fruits	160(80.0%)
Diabetes patients should consume alcohol with meals	75(37.5%)
Non-fat or low fat milk contains less fat and low calories than whole milk	142(71.0%)
Trans-fats increases LDL cholesterol levels	40(20.0%)
Animal fat should be restricted for diabetes patients	97(48.5%)
10–15% of the daily caloric intake of diabetics should come from protein	20(10.0%)
Cholesterol should be restricted to 300 mg daily for diabetes patients	71(35.5%)
Diabetes patients should eat balanced diets	80(40.0%)

Table 5
A comparison of nurses' knowledge on the nutritional management of diabetes with some general and professional background of the nurses.

Variable	Mean	95% CI	*p* value
Age			
⩽30 years	12.28 ± 3.29	11.78, 12.78	0.091
>30 years	11.21 ± 2.10	10.38, 12.04	
Gender			
Male	12.93 ± 3.10	12.31, 13.55	0.003
Female	11.34 ± 3.05	10.73, 11.94	
Duration of service			
⩽5 years	12.17 ± 3.19	11.71, 12.64	0.460
>5 years	11.56 ± 2.96	9.98, 13.14	
No. of courses in school			
0–1	11.99 ± 3.39	11.44, 12.54	0.322
2–3	12.50 ± 2.42	11.83, 13.17	
Ever had a refresher course			
Yes	12.67 ± 2.07	10.50, 14.83	0.672
No	12.11 ± 3.20	11.66, 12.56	
Ever counseled a diabetes patient			
Yes	12.23 ± 2.98	11.73, 12.72	0.483
No	11.88 ± 3.59	10.95, 12.82	

Generally, nurses' knowledge on basic meal planning for diabetes patients was found to be deficient. Contrary to the ADA and the WHO guidelines for the management of diabetes, over three-quarters of the nurses would recommend that diabetes patients should exclude one or more macronutrients (carbohydrates, protein and lipids) from meals. More evidently about 60% of the nurses did not know that it is important for diabetes patients to eat balanced diets as 51% ($n = 102$), 17.5% ($n = 35$) and 54.0% ($n = 108$) of them indicated that carbohydrates, protein and fats respectively should be excluded from the meals of diabetes patients. The ADA and the WHO guidelines recommend that the meals of diabetes patients should be adequately balanced containing all the nutrients.

Furthermore, nurses' knowledge on the daily macronutrient requirements of diabetes patients was found to be one of the weakest. Respectively, 20%, 10% and 14% of the nurses were able to correctly indicate the average amount of calories expected from carbohydrates, protein and lipids daily. While about 60% selected wrong options, over 40% of them indicated that they did not have an idea at all as to the daily macronutrient requirements of diabetes patients. Furthermore, over 50% of the nurses did not know that the total amount of carbohydrates consumed per meal is generally more important than the type of carbohydrate consumed. With over 70% of the nurses ever providing dietary advice to diabetics; these findings makes one to worry about the quality of advice provided to the diabetes patients. Nurses' knowledge in this regard requires improvement probably through refresher courses.

The coexistence of high cholesterol and LDL levels in diabetes patients puts them at a higher risk of developing the metabolic syndrome. As such advising diabetes patients to reduce their intake of fat especially animal fat is very important. However, the nurses' knowledge in this regard was found to be weak. Even though over 70% of the nurses were able to correctly identify that non-fat or low-fat milk was lower in fat and calories than whole milk, 80% of them did not know that trans-fats increases plasma LDL cholesterol levels. In fact over 70% of them did not know trans-fats and their food sources. In furtherance, over 50% did not know that animal fat should be restricted for diabetes patients. Also, over 60% did not know the recommended daily intake of cholesterol for diabetes patients. The lack of knowledge among the nurses in the dietary management of fats may pose risks to the adherence of the diabetes patients to dietary recommendations.

Another important finding of this study was that, 62.0% of the nurses were able to correctly identify the appropriate initial treatment for hypoglycemia. This is higher than the 6.5% reported by Drass et al. (1989); consistent with the 62.9% reported by Carney (Carney et al., 2010) but lower than the 73% reported by Ahmed et al., (Ahmed et al., 2012). Notably, in this study as between 4% and 7% of the nurses said they will recommend either a piece of cake with icing, 1 cup of milk or a slice of bread for the initial treatment of hypoglycemia, 23.5% did not know what to do with a patient experiencing hypoglycemia. Even though about 62.0% of nurses could treat hypoglycemia, it is of concern that over one-third of them did not know the appropriate treatment for hypoglycemia.

Commendably, nurses' knowledge in the general concepts of diabetes was found to be good. Over 70% of them were able to recognize the relationship between diabetes and hypertension, and obesity. Furthermore, they correctly overcame the general misconception that diabetes is caused by the excessive consumption of sugar.

Even though the differences were not significant we found that higher knowledge scores were associated with nurses aged 30 years or younger; and those having worked for 5 years or lower. Furthermore nurses who took 2–3 nutrition courses in school; ever had a refresher course in nutrition; and ever counseled a diabetes patient; had higher knowledge scores than their counterparts, even though the differences were not significant. This demonstrates that improving the curricula of nursing programmes with regards to nutrition could help improve the nutrition knowledge of nurses during training. These findings also indicate that making refresher courses available to nurses may help improve their knowledge in the nutritional management of diabetes.

5. Conclusion

Nurses' knowledge in the nutritional management of diabetes was poor. It raises concerns about the adequacy of nurses' knowledge in the nutritional management and the quality of dietary information provided to patients. The curricula of nurses training could revised to improve nurses' knowledge in nutrition during training. Continuing education through workshops and refresher courses could be organized for nurses already in service to improve their knowledge in nutrition.

Conflict of interest

We have no conflict of interest to declare.

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Student *t*-test performed using GraphPad Prism version 5.00 for windows (2009), GraphPad Software, San Diego California USA. <www.graphpad.com>.