

Patients' knowledge of diabetes complications and self-management practices in Ghana

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Abstract

Background

The prevalence of diabetes is increasing and over two-thirds of these are not diagnosed, especially in low and middle-income countries (LMICs). As a consequence, diabetes complications usually exist at the time of diagnosis.

Purpose

To assess the knowledge and experiences of adult patients with Diabetes on diabetes complications and self-management practices with emphasis on foot care.

Methodology

Twenty patients attending Diabetes clinics were purposively sampled from two hospitals in Ghana. Face-to-face interviews were conducted to evaluate patient's understanding of diabetes and self-management practices. The interviews were audio-taped, transcribed, and analysed to generate themes using the constant comparison method.

Results

Three-quarters of the participants in the study correctly defined diabetes as high blood glucose levels, but few knew the risk factors and complications of diabetes. Stroke and Hypertension were the most popular complications known, while diabetes foot complications were the least known. Almost all participants showed awareness of dietary self-management practices, but few had limited knowledge in foot care practices.

Conclusion

Diabetes education in LMICs should promote self-management practices, especially foot care and clear dietary guidelines. There is also opportunity to invest in specialist diabetes training for healthcare providers and increase community-based care for people living with diabetes in Ghana.

Introduction

The prevalence of diabetes worldwide has surged in the past two decades, and it has become a growing threat in low and middle-income countries (LMICs). The global estimate of adults living with diabetes is over 460 million currently, which is an increase by 62% from 285 million in 2009. This is estimated to rise further to about 578 million adults in 2030 (International Diabetes Federation-IDF, 2019).

Although gestational diabetes and Type 1 diabetes are all prevalent in low- and middle-income countries (LMICs), Type 2 Diabetes is the commonest form of diabetes (Kerner & Bruckel, 2014). With a growing prevalence of obesity, unhealthy diets and widespread physical inactivity in developing countries, the burden of Type 2 diabetes is expected to increase further. The majority of the people living with diabetes in Africa, especially type 2 diabetes, remain undiagnosed (IDF, 2017). One in 52 adults in Ghana, for example, has diabetes and about 71.4% of these are undiagnosed. As a consequence, diabetes complications such as

neuropathy, renal failure, stroke, cardiovascular conditions and retinopathy usually exist at the time of diagnosis.

Up to 25% of people with diabetes develop a foot ulcer in their lifetime, which accounts for 85% of all lower limb amputations (Alavi et al., 2014). Limb amputation has a direct bearing on the individual's value of life, and it is accompanying with high mortality and socio-economic cost (IDF, 2017). The burden is even greater in poor communities with little support for disabled people or populations that are engaged in manual jobs such as farming. To prevent this unwanted disability from occurring, IDF recommends foot assessment and foot care practices at least annually for people with diabetes (IDF, 2014). Yet, in Ghana, scheduled diabetes foot assessment is rarely practised in some parts of the country, though most patients with diabetes have been shown to have peripheral neuropathy (Yeboah et al., 2016).

Diabetes self-management (DSM) forms a significant part of diabetes management, and there is evidence that adults with diabetes who perform self-management activities experience better health outcomes and improved quality of life (Cochran & Conn, 2008). The main concepts of DSM behaviours that predict good health outcomes include; adherence to a dietary regime, physical activity, blood glucose monitoring, medication adherence, healthy coping skills and risk reduction behaviours such as foot care practices (Saleh et al., 2012).

The ability to self-manage their condition depends on sociodemographic factors as well as clinical factors including complexity of treatment regime and co-morbidities. In addition, systemic factors such as social support and communication with health care providers play a critical role (Schulman-Green et al., 2012). In a systematic review, Nam et al., (2011) found that a lack of knowledge, negative attitude and beliefs about diabetes and its management, divergent cultural and spiritual values, social support and financial constraints hinder patients from managing their condition effectively. It is likely that these factors also undermine diabetes self-management in Africa (Iregbu & Iregbu, 2016).

The majority of literature on diabetes in Ghana have explored patients knowledge of diabetes condition, and very few studies have assessed patients' knowledge of diabetes complications (Obirikorang et al., 2016), dietary management (Doherty et al., 2014), ocular manifestations (Ovenseri-Ogbomo et al., 2013) and explanatory models for type 2 diabetes (De-Graft Aikins et al., 2014). To the best of our knowledge, none of these studies evaluated patient's knowledge on foot care practices.

The aim of this study, therefore, is to evaluate the knowledge and experiences of adults with Diabetes on diabetes complications and self- management practices with emphasis on foot care in two Ghanaian hospitals. The study findings will guide diabetes care providers to strengthen their support for patients, by redesigning effective educational sessions to boost self-management practices, prevent diabetic foot complications and enhance patients' quality of life.

Methodology

Research Design

This study adopted a phenomenological design to evaluate patient's understanding of diabetes, its complications and their personal experiences with self-management practices. Face-to-face in-depth interviews

(semi-structured) were conducted using tools designed by the researchers. A phenomenological approach was considered as suitable because it describes a phenomenon or concept from the subject's own perspectives and experiences (Brinkmann & Kvale, 2015).

Study Setting

The study was conducted in two public district hospitals in central Ghana: Sampa Government Hospital and Mankranso Government Hospital. Sampa is the largest community in the Jaman North district in the Bono Region of Ghana with a population of over 26,000. It is a largely urban area, with about 80% of the inhabitants engaged in agriculture and forestry. About 19 and 37 percent of the male and female populations are non-literates respectively. (Ghana Statistical Service, 2014a). Mankranso is the capital of the Ahafo-Ano South district in the Ashanti region of Ghana. About 28% of the people aged 11 years and above are illiterates and the predominant occupation is agricultural forestry and fisheries (Ghana Statistical Service, 2014b).

These secondary level hospitals, which serve as a major referral centre for the surrounding rural health centres, have an out-patient department, psychiatry unit, laboratory services, maternity unit, HIV/anti-retroviral clinic, public health services, medical and surgical units, as well as a Diabetes and Hypertension clinics.

Sample Recruitment

Twenty patients who have been diagnosed with Diabetes and attending the Diabetes clinic in the selected hospitals were purposively sampled for the current study. Adults (above 18 years) with diagnosis of diabetes for at least six months were included in the study. The rationale was to select patients who have prior experience with managing diabetes for a period following their diagnosis. Furthermore, the principle of data saturation has been appropriate to determine the appropriate sample size in many qualitative studies (Mason, 2010). Hence, for this qualitative study, we aimed to interview at least 20 patients, as this was considered sufficient to provide rich and accurate data about patients' knowledge and understanding of diabetes complications.

Data Collection

Data for this study were collected using a researcher-developed semi-structured face-to-face interview. The interview guide was designed through reviewing of relevant qualitative studies and a pre-identified conceptual framework: the self-regulation model (SRM) or the Personal model. The model emphasises people's representation of their illness, and how it directs them to engage in self-care behaviours to prevent disease complications (Browning et al., 2009). The guide served as a checklist during the interview and also ensured that the same basic lines of inquiry were pursued systematically for each person interviewed.

The interview guide was piloted among 10 patients attending a diabetes follow-up clinic at Dormaa East public hospital, which helped to assess the suitability of the study tools in the sample. The patient interview guide was structured in English but was conducted in the Akan language, the local dialect of the study population as 70% of the sample were not fluent in English.

The interview guide was in two parts; the first part recorded the patient's demographic and vital statistics including age, sex, body mass index, blood pressure, fasting blood glucose, educational status, occupation, past and present medical history, duration of diabetes, previous foot ulcer and medication history. The variables age, sex, educational level, occupation, duration of diabetes and medical history were self-reported by the patients.

Information on the patient's fasting blood glucose level, body mass index and blood pressure recordings were retrieved from the patient's latest medical records. The second part assessed the patient's knowledge of diabetes complications, self-management practices, diabetes foot ulcers, foot care practices and experience in diabetes foot assessment. In addition, participants were encouraged to speak up their mind in case they had anything further to tell related to the topic, and we used follow-up questions to clarify unclear or ambiguous statements.

All interviews were conducted in one of the private rooms in each facility to ensure privacy. The interview took place over two weeks; one week each at Sampa and then at Mankranso Government hospitals. The interview proceedings for each participant lasted for about 20–30 minutes, and were audio recorded with respondents' verbal and written permission. In addition, short notes on patients' comments were jotted in a journal during the interview to aid in reflection for transcription purposes. Following the interview, the research team assessed the feet and vision of all patients attending the diabetes clinic (both participants and non-participants of the study) for ulcers, risk of neuropathy, diabetes retinopathy and structural deformity in a one-to-one consultation. Based on patient's risk status, they were educated and referred for appropriate treatment.

Data Analysis

Thematic analysis was used to analyse the interview data. Verbatim transcriptions for all recorded interviews were conducted in the Akan language, and subsequently, translated into English. All the transcripts were read thoroughly to find recurring themes or excerpts that conveyed the relevant information. The researchers used hand coding to note key words or phrases in the transcript, which helped to identify sections for allocating initial codes. Although no special computer-assisted software for qualitative analysis was used for the coding, the “find and search” functions of the Microsoft Word office software helped to locate recurrent statements in the transcript. We developed emerging code statements from thoroughly reading patients' responses in the transcript and compared to existing literature.

Using constant comparison, the significant code statements were grouped into broad themes supported by participants' critical quotes. Data saturation was reached on most of the themes. In addition, embedded quotes approach was used to bring in the voice of participants in the study. The anonymity of participants was protected by masking their names in the data. According to Creswell (2013), using these quotes provide specific real evidence in the participants' words, to support the theme. Finally, the qualitative data files were organised, stored and backed up on a password protected computer for future reference.

Results

Characteristics of participants

Overall, 20 patients with Diabetes were selected in this study. The characteristics of the study participants are shown in Table 1. The majority of patients were women, had no formal education, were farmers and had been diagnosed with diabetes within five years of the study. Most of the participants had at least one comorbid condition and the commonest was Hypertension, but fewer had a history of foot ulcer and one had an amputation.

Table 1
Characteristics of participants

Characteristics	Participants (N = 20)	Percentage (%)
Sex		
Female	15	75
Male	5	25
Age (years)		
≤ 49	4	20
50–59	5	25
60–69	7	35
≥ 70	4	20
Education		
No education	14	70
Basic education	6	30
Occupation		
No occupation	4	20
Farmer	12	60
Trader	3	15
Security guard	1	5
Duration since diagnosis (years)		
< 1	1	5
1–5	12	60
6–10	4	20
> 10	3	15
Comorbidities		
No other condition	4	20
Hypertension	14	70
Peptic ulcer disease	2	10
Diabetes foot disease history		
No history of ulceration	15	75
Previous ulceration	3	15

Characteristics	Participants (N = 20)	Percentage (%)
Active ulcer	1	5
Previous amputation	1	5

Thematic analysis of the interview transcripts identified four main themes: knowledge of diabetes and its related complications; Beliefs and experiences about foot complications of diabetes; Diabetes self-management practices and Experience with diabetes foot assessment. Each of these themes

Knowledge of diabetes and its related complications

Participants had good understanding of diabetes and its symptoms, but with limited knowledge about the risk factors and complications. Three-quarters of the patients in this study defined diabetes as a condition associated with high blood glucose levels, and described the disease based on the individual symptoms they experienced such as dizziness, frequent urination and tremors. Although few (n = 5) participants recalled a family history of diabetes, they could not associate it as a risk factor.

“Yes, I was aware of the diabetes condition because both parents had diabetes,” (60-year-old female farmer)

Stroke and Hypertension were well-known complications of diabetes among two-thirds of the respondents; only two of the participants cited foot ulcer and vision problems as possible complications of diabetes, with one participant not knowing about any diabetes complications.

I know diabetes can lead to stroke, and one can develop an ulcer that will be difficult to manage and heal (48-year-old female respondent)

The main source of diabetes knowledge among the study participants was from attending diabetes clinic and participants placed positive value on the education they received from the diabetes clinic, but others based their knowledge of diabetes on their personal experiences.

“Yes, the education is beneficial, and the educators seek to clarify any concerns anyone may have as well.” (65-year-old male with 7 years duration of diabetes)

With regards to self-management practices, most of the participants were confident they had received enough education on dietary management of diabetes. However, more than half of the participants reported having received very limited education with regards to foot care practices.

Beliefs and experiences about diabetes foot complications

There were varied perspectives with regards to patients’ beliefs and experience of diabetes foot complications. The majority of respondents who had no previous history of foot ulcer were ignorant of the causes of diabetes foot ulcers, while others with previous foot ulcer or an active ulcer were aware of diabetes foot complications. Likewise, patients with long duration of diabetes (more than 5 years) who experienced abnormal sensations/symptoms on the foot were particularly more alert of diabetic foot complications as compared to their counterparts with short duration of diabetes (less than 2 years) and with no abnormal feet problems. Other patients had knowledge because an immediate relative with diabetes had a chronic diabetes foot ulcer.

"... an aunt of mine died from a complicated foot ulcer. She had a sore on the foot which spread through to her bones and other parts of the body." (59-year-old female respondent with 18 years history of diabetes)

About five of the participants mentioned there was an association between glycaemic control and foot complications. Some attributed the causes of diabetes foot ulcers to a noticeable open sore from an external injury. Although most of the participants reported symptoms like numbness, tingling and burning sensations, they did not know its association with diabetes, and they resorted to self-medication.

"Yes, I learnt that if you have diabetes and develop a cut from anything sharp, it leads to diabetes foot problems. However, I suddenly saw this ulcer developed coupled with sudden pains in my feet akin to having an electric shock without having a prior cut or wound." (49-year old female with less than a year history of diabetes)

Few patients also remarked that the slow healing rate of foot ulcers in diabetes was a major problem.

I have been told that when someone with diabetes develops an ulcer, it may become problematic if unattended to (49-year-old with less than a year history of diabetes)

Despite the lack of concrete knowledge about diabetes foot complications, slightly over half of the subjects knew that lower limb amputations could occur in people with diabetes. Their knowledge stemmed from direct personal experiences or indirect involvement with victims of diabetes-related lower limb amputations.

Diabetes self-management practices

Overall, participants exhibited general knowledge on the day-to-day activities they undertake for their diabetes management. The main aspects of their management mentioned included: dietary practices, exercises, medicines adherence and foot care practices. These are described under sub-themes below;

Nutrition therapy

In all cases, patients referred to diet as the core component of their diabetes self-management practice. Almost all patients (90%) had knowledge about dietary practices and believed that engaging in good eating habits had beneficial effects on their blood glucose levels. Most participants emphasised "*no or low sugar consumption*" in their meals.

"Please, from the education, we're told not to eat sugar. As a result, I don't take sugar. Even though I like tea, I make raw tea without sugar..." (75-year female respondent)

Furthermore, some of the patients controlled their portion sizes as well as incorporating fruits and vegetables in their diets. One respondent indicated "*...Previously, if you are used to eating 2 balls of banku [a staple food made from corn dough and cassava dough], now you must eat 1 ball only. If I was eating 4 fingers of boiled plantain, I should eat two*"

"I know it's about my diet. I must take lots of vegetable soup, 'nkontomire' [cocoyam leaves sauce] and garden-eggs" (added by a 65-year old female)

Despite the majority who knew about portion size control, there was still some level of confusion regarding the dietary recommendations. This was due to the several misperceptions and confusing messages from the media and other contacts on the specific foods to eat. Some of the foods advised as preferable for people with diabetes could either be expensive, hard to come by or were simply not consistent with traditional recipes.

“with respect to the food aspect; getting the recommended food has been a problem. I have been advised to eat plantain [and not cassava because cassava has lots of starch] as my main food which I find it difficult to eat most times” (82-year-old female)

Exercise

Exercise was one of the least mentioned self-management practices undertaken by the respondents. Only two out of the 20 participants replied engaging in any form of exercise as part of their diabetes self-management or having knowledge of the benefits of exercising. Some narrated walking long distances to their farmlands that keeps them physically active.

“I have been told to engage in exercises. When you exercise in the mornings, it helps reduce your high blood sugar levels.” (a 49-year-old male respondent)

Adherence to Medication

Most patients said they were compliant with their medications, as well as visiting the clinic regularly for their repeat prescriptions.

“I take my medicine regularly and attend review appointments a” (80-year-old female)

Foot care practices

In contrast to dietary practices which majority of patients followed recommendations from their healthcare providers, more than half (n = 13) were limited in their knowledge in diabetes foot care practices. Some patients indicated that they had not received any education on foot care practices.

“we discuss about the dietary management of the disease but not about foot care practices” (46-year-old male farmer),.

The few who had received some information reported inspecting their feet occasionally or wearing appropriate footwear to protect themselves, especially low-heeled shoes to prevent wounds from accidents.

“the previous staff mentioned that for patients with diabetes, we should moisturise our feet by applying shea butter on our legs and feet, if possible...I also realised that for people with diabetes, wearing a high-heel can cause you to fall. Therefore, it is better to wear a low-level shoe” (59-year-old female)

Furthermore, some of the participants who were farmers were conversant with measures to protect themselves from developing a cut or sore at their workplace.

“I wear protective clothing like socks and long trousers before putting on shoe to protect my foot from risk of injury whilst working on the farm” (63-year female farmer)

Some of the patients, however, engaged in behaviours that put them further at risk for foot complications. For instance, some patients said they treated their leg wounds at home.

"If I get hurt deeply, I will report to the facility. However, with minor sores, I manage them myself at home" (67-year-old female with a one-year history of diabetes)

Other patients, while attempting to engage in healthy behaviours, rather put themselves at risks of injury.

"Sometimes I do not put on footwear. I learnt that when I walk on gravels with my barefoot, it provides some form of healing and improved circulation." (82 years with 10 years duration of diabetes)

Experiences with Diabetes foot assessment

When asked if they have undergone any form of diabetes foot assessment, 90% of the respondents reported never having their feet checked as part of their routine management plan. A few who had a previous foot ulcer or amputation shared experiences of having their feet examined for treatment purposes whilst on admission. Some patients otherwise noted that their care providers were willing to attend to them if they had any problems with their feet.

"No, my foot has not been assessed before. However, we are being told to report any foot problems or ulcers when we notice them." (65 year old male with 7 years duration of diabetes)

Discussion

Knowledge of diabetes and its related complications

This study showed that the majority of patients had some form of knowledge about diabetes and its complications, though their knowledge of the latter was limited. This is similar to the study by Obirikorang et.al (2016) in Ghana that found that 60 percent of the patients with diabetes had no knowledge, 26.9% had inadequate knowledge and only 13.1% had sufficient knowledge about diabetes complications. Stroke and hypertension were the commonly known complications of diabetes among the sample. This is likely because most of the participants in this study also had hypertension, as found elsewhere (Cheung & Li, 2012) and both are common non-communicable diseases in Ghana (De-Graft Aikins, 2007).

Foot complications were the least mentioned consequence of diabetes in this study. This finding contradicts a previous survey by Obikorang et al (2016) at Sampa Hospital, where a slight majority of the participants (51.5%, n = 325) knew about diabetic foot as the common complication followed by hypertension (35.4%, n = 223). Their approach, which involved a closed-ended structured questionnaire, differs from the semi-structured face-to-face interview employed in this study, where patients were asked open-ended questions on diabetes complications, and their responses were followed up with probes that allowed them to share their views and experiences freely and more extensively. However, the results in this study are similar to a descriptive study results in India where only 10 percent of the sample knew diabetes foot problems as a complication of diabetes (Kavitha & Aruna, 2014).

The causal pathways for diabetes foot ulcers (DFU) include peripheral neuropathy (PN), peripheral vascular diseases, foot deformity or trauma (Bowling et al., 2015). Consistent with the findings from the UK, participants in this study with some form of neuropathy were unaware of its connection with foot ulceration (Gale et al., 2008). Excluding those with contact or personal experience with foot ulcer or a previous amputation, most participants were not aware of diabetes foot ulcer complication and its associated burden.

Most of the patients were knowledgeable of the chronic complications as compared to the acute complications of diabetes mainly from their previous history or care providers. They acknowledged the education they receive from their care providers and pay attention to them. It is known from experiential learning theory that people who learn from their experiences acquire knowledge from the transformation of those experiences (Kolb et al., 2001). As a result, diabetes care providers in Ghana should have specialist knowledge to interact frequently and effectively with their clients to provide adequate information that dismisses any misconceptions about diabetes and self-management practices. These suggest that there may be a knowledge deficit and in line with that, specialist training for diabetes care providers as well as regular interactions to provide information to patients would be beneficial.

Diabetes self-management practices

Generally, all-inclusive diabetes self-management practices among the patients were uncommon. Most of the respondents relied on their medications and adhered to some dietary recommendations to manage their condition. They paid less attention to self-care practices like foot care due to lack of education and support from their care providers.

Nutrition therapy plays a fundamental role in the overall management of diabetes (American Diabetes Association-ADA, 2018). Participants' responses indicated that majority were conversant with reduced intake of sugary foods and controlled portion sizes of food in managing their diabetes. Misconceptions regarding the intake of specific starchy foods like plantains to manage diabetes were present among some of the participants, which in fact, deviate from the dietary recommendation for an individualised meal plan instead of a one-size-fits-all eating pattern (ADA, 2018). This is also testament to the lack of an adequate nutritional guideline tailored for people with diabetes in Ghana. Further identified factors to non-dietary adherence which corroborates with findings from previous works include: determining the appropriate portion food sizes; lack of knowledge about carbohydrate sources and glycaemic index; cost of food; and family food traditions (Doherty et al., 2014; Uchenna et al., 2010).

Engaging in exercise is essential in the prevention and management of type 2 Diabetes by regulating blood glucose, in addition to positively affecting blood pressure, lipids, cardiovascular incidents, mortality, and quality of life (Colberg et al., 2010). One obvious finding from the study was that majority of the participants were active from working as farmers and traders, which certainly incorporates exercise in their daily lifestyle. This overall active lifestyle is typical in most rural African communities (Werfalli et al., 2016). Physical activity thus appeared a component of less concern in managing their diabetes. However, old age and retirement can affect peoples' capacity to remain active overtime (Lekoubou et al., 2010). As a result, patients must be reminded about the benefits of remaining active always and guided on engaging in alternative forms of exercises.

It was striking to find that foot self-care practices were the least acknowledged and practised self-care activity in the setting, especially given that farming, the predominant occupation, put them at risk for foot ulcers. Only a

quarter of the participants with an ulcer or history of ulcer or amputation were aware of engaging in daily foot care practices. Certain foot care beliefs held by some of the participants to be helpful including walking barefooted and self-treatment of minor wounds, however put them at increased risk of ulceration (Gale et al. 2008). These beliefs were mostly from non-clinical sources like radio, peers and relations. While mass media, including radio, is a good source of information especially among rural folks, it may be important that personnel who are invited to speak on health topics have locus and expertise to ensure the information shared is evidence based and consistent with national guidelines. It would also be helpful for patients to have reliable contacts with community health personnel to validate any concerns they may have.

Some patients cited receiving minimal foot care instructions compared to dietary advice from their HCPs, which may account for their poor foot care knowledge. It is largely known that an individualised foot care education coupled with comprehensive diabetes foot assessment for patients with diabetes lead to improved knowledge, self-protective behaviour, and reduction of foot complications (Matricciani, Jones 2015). Accordingly, HCPs providing these instructions should receive continuous training to improve their skills and knowledge to support their patients in that regard (Schaper et al. 2016). As described in the literature, foot care activities include: daily feet inspection, annual diabetes foot examination by a professional, foot hygiene, seeking early professional care for sores or cuts, appropriate footwear, not walking barefoot, and not removing ingrown toenails, calluses or corns by oneself (Jordan, Jordan 2011). Though foot care practices do not preclude the risk of developing foot ulcers, high ulcer risks have been reported in patients that do not engage in such practices (Shaya et al. 2007).

Diabetes foot assessment

Diabetes foot assessment refers to examinations to identify individuals at high risk for diabetes-related foot conditions. It includes taking a detailed medical history, screening for foot complications, reviewing appropriate footwear, education on foot care, providing early treatment and referral for specialist foot care when necessary (Weinsier 2013). In both hospitals, patients indicated there were no scheduled foot assessment plans for them, and nearly all, except for those with previous ulcer or amputation have not previously undergone a diabetes foot assessment by a HCP. The probable explanation could be the lack of standardised diabetes foot care and prevention guideline for the whole of Ghana. This do not correspond to standard international guidelines which recommends performing at least an annual foot examination for people with diabetes (International Diabetes Federation Guideline Development Group 2014). Others may include limited skilled personnel and the lack of resources to conduct foot examinations in most diabetes care centres in the country.

Conclusion

This study has shown that patients in rural Ghana with diabetes receive information from their care providers and learn from their own and contact experiences. The education received on diabetes-self management practices have focused much on dietary aspects but less on foot care activities. Hence, some of the patients rarely participate in daily foot care practices which increases their risk of ulceration. Also, there are no scheduled diabetes foot examination plans for patients, and majority have not undergone a foot examination with a professional before except for those who have developed active foot complications. HCPs such as diabetes educators, nurses, physicians and podiatrists may play vital roles in improving patient's metabolic control and prevention of diabetes complications among patients by providing early education and treatment to them.

Implications for clinical practice

The current study reveals that many patients with diabetes in rural Ghana have limited knowledge about the condition and have different perceptions regarding diabetes self-management practices. Therefore, it is beneficial to increase diabetes awareness campaigns and encourage self-management practices in the rural and urban setting through mass media and education campaigns. This also emphasises the need for community approach in the delivery of diabetes care. Diabetes self-management education programmes should be delivered in a tailored, organised and frequent manner, with a demonstration of skills that correspond to the level of knowledge of targeted individuals (Schaper et al., 2016). The government through its Ministry of Health must establish policies that will implement effective diabetes management national guidelines particularly, annual foot checks for patients with diabetes in the country. HCPs in diabetes care should receive specialist training to deliver person-centred diabetes care as well as effective consultation skills for people with diabetes. More specialist podiatrists should be trained across the different parts of the country to assess, manage and treat foot complications especially for patients with diabetes.

Strengths And Limitations

This is an important piece of study assessing the knowledge of people living with diabetes in a predominantly rural setting in Ghana. Using a qualitative research approach provided an in-depth understanding of patients' knowledge of diabetes and detailed experience of self-care practices. This study would have benefited more from the views of HCPs involved in the care of diabetes to connect with the patients' perspectives explored. Therefore, future studies should examine both sides for better comparable results. Selection bias is another potential concern because there were more women than men in the study. This could be because more women visited the hospital as a result of the higher prevalence of diabetes and obesity in females than males in Ghana (WHO, 2016). This study did not assess self-monitoring of blood glucose as part of diabetes self-care practices. In Ghana and elsewhere in Sub-Saharan Africa, most individuals with diabetes lack personal glucose monitoring devices in their homes for self-monitoring. Therefore, monitoring of blood glucose occurs only during routine appointment at the diabetes clinic and periods of patients' illnesses (Tewahido, Berhane 2017).

Abbreviations

ADA: American Diabetes Association; DFU:Diabetic foot ulcer; DSM:Diabetes self-management; HCP:Healthcare professional; IDF:International Diabetes Federation; LMIC:Low and middle-income countries; WHO:World Health Organization.

Declarations

Ethics approval

The study was approved by the Ethics Review Board at Glasgow Caledonian University (ref no: HLS/LS/A17/010). In addition, permission to interview patients was sought from each of the participating hospitals, and individually- signed consents were obtained from all participants before participation. Prior to consenting, an information sheet which described what the study was about, participants' rights to voluntary

participation or withdrawal at any point during the study, and the risks and benefits for participation were explained to them. In addition, participants were assured of anonymity and confidentiality.

Consent for publication

None required

Availability of data and materials

The data for this study are audio-recordings of some patients and healthcare providers in Ghana. As a result, making these publicly available will lead to potentially identifiable information. Upon reasonable request from the corresponding author and agreeing to abide by the ethics requirement, the data for this study could be shared with interested persons.

Competing interests

None

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Author contributions

Conceived study: IFB, SD and BAO; Collected the data and analysed data: IFB, SD, BO, PKB; and JN was the overall supervisor. All authors contributed to the writing and revision of this manuscript. All authors have read and approve this version of the manuscript.

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