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Knowledge of diabetic foot ulcer and foot care practices among individuals with diabetes receiving care at tertiary health facility in Nigeria

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Abstract
This is a descriptive survey that determined the Knowledge of Diabetic Foot Ulcer and Foot care Practices among individuals with diabetes receiving care at Tertiary Health Facility in Nigeria. A total of 140 diabetics (91 males and 49 females) were sampled for the study through stratified random sampling technique. Instrument for data collection was investigators' developed questionnaire which was ascertained for validity. The reliability was determined using split-half method. Values obtained were analyzed using Spearman Brown Rank order Correlation Coefficient which yielded an index of 0.86. Data generated from the study were analyzed using descriptive statistics. Findings revealed that a good number of the diabetic patients receiving treatment at NAUTH, (71.4% males and 73.5% females) have knowledge of DFU and the cause. Majority of the patients know the combination of Oral drugs, insulin and nutrition as treatment modality. Minimal number are aware that daily inspection of feet, trimming of toes, foot bath, exercise practices, use of shoe inserts and wearing of stockings form part of the treatment modality. Greater number of the patients manages their blood glucose level with combination of insulin, oral hypoglycemic agents and nutrition which 44% males and 40.8% females perceive as more adequate than other measures.

Keywords: knowledge, diabetic, foot ulcer, foot care, practices, diabetes

1. Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by elevated level of glucose in the blood (hyperglycemia) resulting from defects in insulin secretion, insulin action or both (American Diabetic Association (ADA, 2004; College, Walker & Ralston, 2010) [16]. Diabetes is classified on the basis of pathogenic process that leads to hyperglycemia (Kasper, Braunwald, Fauci, Hauser, Longo & Jameson, 2005) [23]. Two broad categories of DM are designated, type I and type II (ADA, 2003).

Majority of diabetics (90%-95%) suffer from type II DM with onset from age 40 (Black, Hawks & Keene, 2011). In the opinion of Whittermore, Chase, Mandle and Roy (2002) [35], type II DM accounts for 80%-90% of all cases of DM in the United States of America. There is no known data for Africa and Nigeria.

Global incidence of diabetes was 124 million (Levitt & Cowoker cited in Shillubane, Cur, Potgleter & Litt-et Phil, 2007) [37]. DM affects about 17 million people, 5-9 million of whom are undiagnosed (Smetzer, Bare, Hinkel & Cheever, 2010) [39]. This is expected to double by 2030 (College, Walker & Ralsorton, 2010) [16]. In the United States, approximately 800,000 new cases of diabetes are diagnosed yearly (Mokdad, *et al.* 2000) [27].

In the United States of America, cases of DM increase by 49% from 1990-2000 and a similar increase is expected to continue (Centre for Disease Control and Prevention (CDC, 2002). It is estimated that 40million individuals in developing countries are diabetic (Banjaj, 1986) [8]. In Nigeria, with over 140 million people, an estimate prevalence of diabetes in Nigeria is 2.2 percent (Ogundipe, 2015).

Diabetes is a major burden upon health care facilities in all countries and patients with long standing diabetes are at risk of developing a variety of complications including foot disease (ulceration) (College, Walker & Ralston, 2010) [16]. DM causes non-traumatic amputations (Shallubane, Cur, Potgleter & Littet, Phil, 2007) [37]. In the opinion of College, Walker and Ralston (2010) [16], the foot is a frequent site for complication in individuals with diabetes and tissue necrosis in the feet is a common reason for hospital admissions in diabetic patients. Such admissions are often prolonged and may end with amputation. Diabetic foot is one of the main complications of DM (Dondola, Bano, Moin, Afridi, Masood & Ahmed, 2007) [22].

Approximately 40%-60% of all amputations of the lower extremity are performed in patients with diabetes (Apelqvist, & Larsson, 2000) [6]. More than 85% of these amputations are precipitated by a foot ulcer deteriorating to deep infection or gangrene (Apelqvist & Larsson, 2000) [6]. They further asserted that the prevalence of diabetic foot ulcer has been estimated to be 3-8%. DM is a major cause of morbidity with resultant amputation which imposes a heavy emotional and physical burden on patients (William & Hopper, 2007) [44]. Triad of neuropathy, deformity and trauma is present in almost two thirds of patients with foot ulcers (Boulton, Kirsner & Vileikyte (2004). In the opinion of Ogundipe (2015), DM foot syndrome was responsible for 55.14 percent of all amputations.

Bapane, *et al*, (2002), are of the opinion that 80% of diabetics develop complication due to non-compliance to treatment. Mason (1985), cited in Shallabene, *et al.* (2003), Asserts that the diabetics lacked essential information pertaining to management of their disease. It is essential that people with diabetes understand their disorders and how to handle all aspects of their management as comprehensively as possible to avoid complications (College, Walker & Ralston, 2010) [16]. Strauss (2002) [41], suggests that patients' education programme can help decrease the rate of diabetic foot ulcers. Patients have to acquire essential knowledge and skill to monitor urine, blood glucose levels and take preventive measures towards the complications of diabetes (Matwa, Chabeli, Muller & Levitti, 2003) [26]. Knowledge of diabetic foot ulcer and good management practices among individuals with the disease will help in reducing the incidence of foot ulcer and the number of amputations due to the disease (Gondal, *et al*, 2007). Generally prevention requires appropriate knowledge and understanding (Shaper, Apelqvist & Bakker, 2003) [36]. To assess the ability to effect change, the need to measure not only knowledge but also understanding and change of behaviour remains indispensable (Tedd, Armstrong & Liswood, 1996) [42]. The above notwithstanding, the seeming carefree attitude of some diabetics towards adherence to management regimen and foot care have been a great concern to the researchers and hence this study.

This study determined the knowledge of DFU and management practices of foot care among individuals with diabetes receiving care at tertiary health facility in Nigeria. Specifically, the objectives of the study include to:

1. Determine the diabetics awareness of what diabetic foot ulcer is all about
2. Determine their awareness on the causes of diabetic foot ulcer
3. Determine the extent of foot care practices among the diabetics
4. Determine their perception on the effectiveness of modern medical management.

Method and Materials

- **Design:** Descriptive survey design was utilized for this study to comparatively determine the knowledge of the male and female diabetics receiving treatment in a tertiary hospital on diabetic foot ulcer and foot care practices.
- **Setting:** The study was conducted at the Diabetic Clinic and Medical/Surgical wards of Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, South East Nigeria. It is a tertiary health institution that has six states as its catchment areas and servers as referral centre for the primary, secondary, mission and private health facilities in and around the catchment area.
- **Instrument for data collection:** Questionnaire was the instrument used for data collection. It was structured based on extensive literature review and objectives of the study. The instrument was subjected to content, construct and face validation by two research experts. It was pilot tested for reliability using diabetics in a similar institution which yielded an index of 0.92 after analysis with Spearman Brown Rank order Correlation Coefficient. Items determining the knowledge of DFU, cause and management were set in with simple YES or NO responses but the items for testing the perceived effect of modern medical management were ranked in 5 point- scale of; very effective (5 points), moderately effective (4 points), mildly effective (3 points), not sure (2 points) and ineffective (1 point).
- **Ethical Considerations:** A summary of the research protocol was submitted to the Research and Ethics Committee of the hospital, and approval was given via ref. (NAUTH/CS/66/VOL.5/43). Consents were also obtained from the participants before the administration of the questionnaire. Principles of confidentiality, anonymity and voluntary participation were maintained throughout the period of the study.
- **Procedure for data collection:** The instrument was administered to the participants on their clinic days in the Diabetic clinic, and Medical wards on convenient technique basis. They were approached during their calm and restful time. The researchers administered the questionnaire to each respondent in a quiet environment and had them retrieved after 30 minutes to one hour. Clarifications were made to those that requested for such. Data collection lasted for four months utilizing the morning and afternoon shifts.

Method of Data Analysis

Data generated from the study were analyzed using descriptive and inferential statistics with SPSS version 20 and presented in tables. Decision rule for the perception of effectiveness of modern medical management for DFU was set at mean score of 3.0; where mean score of 3.0 and above indicate positive perception of effectiveness of treatment while mean score below 3.0 indicates negative perception of effectiveness of treatment.

Results

Table 1: Sociodemographic variables of the respondents N=144(91/49)

Parameters	Male	Female
Total Number (Gender)	91(65%)	49(35.%)
Mean Age (Yrs)	36.2 ±7.2	34.4 ±6.9
Level of education:		
▪ Formal education	85(93.4%)	30(61.2%)
▪ No formal education	6(6.6%)	19(38.8%)
Duration of diabetes (yrs)		
	43(55.3%)	27(56.1%)
	20(13.8%)	6(11.2%)
	28(30.8%)	16(32.7%)
Presently with DFU		
	15(16.5%)	4(8.2%)
	76(83.5%)	45(91.8%)
Undegone amputation?		
Yes	2(0.99%)	0(0.00%)
No	89(97.80%)	49(100%)

Table 1 shows that out of the 144 diabetic that participated in the study, 91 (65%) were males while 49 (35% were females. The mean age for the respondents is 36.2 and 34.4 years for males and females respectively. 85 (93.4%) males and 30(61.2%) females had formal education while 6(6.6%) males and 19(38.8%) females did not have formal education. 43(55.3%) and 27(56.1%) males and females respectively

have suffered from DM between 0-5 years, 20(13.8%) males and 6(11.2%) females have been with DM for 6-10 years while 28(30.8%) males and 16(32.7%) females have suffered from DM for over 10 years. Only 15(16.5%) male respondents and 4(8.2%) female respondents are currently with DFU while the rest have not developed DFU.

Table 2: Respondents' awareness of what DFU means and its causes N=140(91/49)

In your opinion what is diabetic foot ulcer (DFU)? *Choose one*		
▪ Complication of DM	65(71.4%)	36(73.5%)
▪ Witchcraft inflicted injury	9(9.9%)	4(8.25%)
▪ Incurable wound	10(11.0%)	6(12.2%)
▪ Wound from untreated DM	3(3.3%)	2(4.0 %)
▪ Wound in old people with DM	4(4.4 %)	1(2.0 %)

To the best of your knowledge, what cause(s) DFU (choose one		
After effect of poor control of blood		
▪ Glucose level	65(71.4%)	36(73.5%)
▪ Poor foot care	9(9.9%)	4(8.2%)
▪ Non adherence to medical treatment	13(14.3%)	8(16.3%)
▪ Witchcraft/ diabolic inflicted injury	4(4.4%)	1(2.0%)

Table 2 shows that 65(71.4%) males and 36(73.5%) females are aware that DFU is a complication of DM. 10(11.0%) males and 6(12.2%) female respondents are of the opinion that it is incurable wound. 9(9.9%) male respondents and 4(8.3%) female respondents saw DFU to be witchcraft inflicted injury. 4(4.4%) male respondents and 1(2.0%) female respondents believe that DFU is a wound seen in old people with DM.

Table also shows that out of the 144 respondents 65(71.4%) males and 36(73.5%) females know DFU to be caused by poor control of blood glucose level. 13(14.3%) males and 8(16.3%) females said that it is caused by non-adherence to medical treatment. 9(9.9%) males and 4(8.2%) females were of the opinion that DFU is caused by poor foot care while 4(4.4%) males and 1(2.0%) female respondent are of the opinion that DFU is witchcraft inflicted injury.

Table 3: Respondents' knowledge of modern management modality N=140(91/49)

Which of these of these management modalities do you know? (choose the most conversant)		
▪ Combination of oral drug and nutrition	23(25.3%)	13(26.5%)
▪ Combination of wound dressing, insulin & oral drugs	9(9.9%)	2(4.1%)
▪ Amputation (only)	7 (7.7%)	1(2.0%)
▪ Combination of oral drugs, insulin, nutrition and amputation	31(34.1%)	18(36.7%)
▪ Application of Terrasil care ointment	1(1.1%)	0(0.0%)
▪ Daily inspection of feet	4(4.4%)	3(6.1%)
▪ Trimming of toes	5(5.5%)	4(8.2%)
▪ Foot bath	2(2.2%)	2(4.1%)
▪ Exercise practices	3(3.3%)	3(6.1%)
▪ Use of shoe inserts	2(2.2%)	1(2.0%)
▪ Wearing of stockings	4(4.4%)	2(4.1%)

Table showed that the majority of the respondents, 31 (34.1%) males and 18 (36.7%) females know the use of combination of oral drugs, insulin and nutrition as modern treatment modality, followed by 23(25.3%) males and 13(26.5%) female respondents who know combination oral drugs and nutrition as modern management modality. 9(9.9%) male and 2(4.1%) female respondents respectively know that the use of wound dressing, insulin and oral drugs is management modality for DFU. Limited number of respondents, 7 males (7.7%) and 1(2.0%) females) know amputation as an option for the management of DFU. Other management measures identified by the respondents include: application of Terrasil care ointment {1(1.1%) male with no female respondent), Daily inspection of toes, 4(4.4%) males and 3(6.1%) females; Trimming of toes, 5(5.5%) males and 4(8.2%) females; Foot bath, 2(2.2%) males and 2(4.1%) females; Exercise practices, 3(3.3%) males and 3(6.1%) females; use of shoe inserts, 2(2.2%) males and 1(2.0%) female; and wearing of stockings 4(4.4%) males and 2(4.1%) females.

Table 4: Respondents' management practices and foot care N=144(91/49)

Management Practices and foot care		
Blood glucose control measures in use		
▪ Oral hypoglycemic	30(33%)	17(34.7%)
▪ Oral hypoglycemic agents and nutrition only	26(28.5%)	13(26.5%)
▪ Insulin, oral hypoglycemic agents and nutrition	35(38.5%)	19(38.8%)
Perceived outcome of your glucose control measure		
▪ Poor	21(23.1%)	15(30.6%)
▪ Adequate	40(44%)	20(40.8%)
▪ Good	30(32.9%)	14(28.6%)
Trimming of toes		
▪ No	37(40.7%)	19(38.8%)
▪ Yes	54(59.3%)	30(61.2%)
Time interval for trimming of toes		
▪ Weekly	11(29.8%)	6(31.6%)
▪ Monthly	8(21.6%)	3(15.8%)
▪ Occasionally	18(48.6%)	10(52.6%)
Daily inspection of feet		
▪ yes	39(42.9%)	19(38.8%)
▪ No	52(57.1%)	30(61.2%)
Drying and lubricating the feet		
▪ Yes	42(46.2%)	23(46.9%)
▪ No	49(53.8%)	26(53.1%)

Inspection of feet during following care by healthcare provider		
▪ No	61(67. %)	38(77.6%)
▪ Yes	30(33.0%)	11(22.4%)
Foot bath		
▪ Yes	15(16.5%)	8 (16.3%)
▪ No	76 (83.5%)	41(83.7%)
Disinfecting the skin around the ulcer (for those that have developed foot ulcer)		
▪ Yes	6 (40.0%)	1(25.0%)
▪ No	9(60.0%)	3(75.0%)
Regular follow up		
▪ No	32(35.2%)	18(36.7%)
▪ Yes	59(64.8%)	31(63.3%)
Diabetic shoes		
▪ Yes	2(2.2%)	0(0.0%)
▪ No	89(97.8%)	49(100.0%)
Use shoe inserts		
▪ Yes	17((18.7%)	3(6.1%)
▪ No	74(81.3%)	46(93.9%)
Shoe materials		
▪ Hard	11(12.1%)	8(16.3%)
▪ Soft	80(87.9%)	41(83.7%)
Wearing stocking with shoes		
▪ No	61(67%)	31(63.3%)
▪ Yes	30(33%)	18(36.7%)
Exercise practices		
▪ No	20(22%)	12(24.5%)
▪ Yes	71(78%)	37(75.5%)
Sometimes walk barefooted		
▪ No	82(90.1%)	46(93.9%)
▪ Yes	9(9.9%)	3(6.1%)

Table shows that greater number of the respondents 35(38.5%) males and 19(38.8%) females utilize the combination of insulin, oral hypoglycemic agents and nutrition for blood glucose control; 30(33%) male and 17(34.7%) female respondents opted for only oral hypoglycemic agents. 26(28.5%) male respondents and 13(26.5%) female respondents lauded the combination of oral hypoglycemic agents and nutrition as blood glucose control measure. Further, 40(44%) of male and 20(40.8%) female respondents perceived the outcome of the blood glucose control measures to be adequate, 30(32.9%) male respondents and 14(28.6%) female respondents perceive the measures to be good, while 21(23.1%) and 15(30.6%) males and females respectively perceive the use of only oral hypoglycemic agents to have poor outcome in the control of blood glucose.

Table also shows that 54(59.3%) male respondents and 30(61.2%) female respondents trim their toes as care practices while 37(40.7%) and 19(38.8%) male and female respondents respectively do not trim their toes. Out of the number that trim their toes, greater number, 18(48.6%) male respondents and 10(52.6%) female respondents trim their toes occasionally, 8(21.6%) male and 3(15.8%) female respondents trim monthly while 11(29.8%) male respondents and 6(31.6%) female respondents do trim their toes weekly. 52(57.1%) male and 30(61.2%) female respondents do not inspect their feet while 39(49.9%) male and 19(38.8%) female respondents respectively inspect their feet daily. 49(53.8%) male and 26(53.1%) female respondents do not dry and lubricate their feet while 42(46.2%) male respondents and 23(46.9%) female respondents dry and lubricate their feet. 61(67.0%) male respondents and 38(77.6%) female respondents do not have their feet inspected by healthcare providers during follow up care while 30(33.0%) male and 11(11.4%) female respondents respectively do have their feet inspected by healthcare providers. Regarding foot bath, 15(16.6%) male respondents and 8(16.3%) female respondents do practice foot bath, while majority, 76(78.0%) male and 41(83.7%) male respondents respectively do not practice foot bath.

Out of the 15 male participants who have developed foot ulcer, 6(40%) do disinfect their skin around the ulcers and 9(60%) do not. Among the 4 female diabetics that have developed foot ulcer, 1(25%) do disinfect the skin around their ulcers while 3(75%) do not. 32(35.2%) male respondents and 18(36.7%) female respondents do not go for regular follow up while 59(64.8%) males and 17(34.7%) female respondents go for regular follow-up. Responding to the item on the type of shoes worn, 32(35.2%) males and 32(65.3%) females wear open shoes while 59(63.8%) males and 17(34.7%) females wear covered shoes. 2(2.2%) male respondents claim that they wear diabetic shoes such claim was not found among the females. 89(97.8%) male and 49(100%) female respondents so not wear diabetic shoes.

The shoe materials worn by 11(12.1%) male and 8(16.3%) female respondents are of hard type while 80(87.9%) male respondents and 41(93.9%) females wear soft shoe materials. 61(67%) male and 31(63.3%) female respondents do not wear shoes with stockings while 30(30.3%) males and 18(36.7%) females do not wear stockings with shoes. In their response to exercise practices, 71(78.0%) males and 37(75.5%) females do not embark on exercise while 20(22.0%) males and 12(24.5%) females embark on exercise. Lastly, 82(90.1%) male and 46(93.9%) of the respondents sometimes walk barefooted.

Table 5: Respondents' perceived general effect of modern medical management for the diabetics as means to prevent DFU

Parameter	Very effective	Moderately effective	Mildly effective	Not sure	Ineffective	–	Very effective	Moderately effective	Mildly effective	Not sure	Ineffective	×
Administration of insulin	49(54.0%)	15(16.4%)	14(15.3%)	8(8.8%)	5(5.5%)	×	29(59.2%)	11(22.4%)	3(6.1%)	2(4.1%)	4(8.2%)	4.2
Oral hypoglycemic agents(OHA)	57(62.6%)	21(23.0%)	11(12.1%)	2(2.2%)	0(0%)	4.0	36(73.5%)	7(14.3%)	3(6.1%)	2(4.1%)	1(2.0%)	4.4
Application of Terrasil care cream	7(7.7%)	8(8.8%)	7(7,7%)	63(69%)	6(6.6%)	4.4	5(10.2%)	8(16.3%)	6(12.2%)	26(53.1%)	4(8.7%)	2.7
Nutrition/Dietary management	38(41.8%)	21(23.1%)	11(12.1%)	13(14.3%)	8(8.8%)	2.4	30(61.2%)	10(20.4%)	7(14.3%)	0(0.0%)	2(4.1%)	4.3
Foot care practices	25(27.5%)	15(16.5%)	7(7.7%)	43(47.3%)	1(1.1%)	3.7	11(22.4%)	8(16.4%)	3(6.1%)	21(42.9%)	6(12.2%)	2.9

Table shows that 49(54.0%) male respondents believe that insulin administration is very effective in preventing DFU, 15(16.4%) perceive it as moderately effective, 14(15.3%) perceived it to be mildly effective, 8(8.8%) are not sure of its effectiveness while 5(5.5%) perceived it as non effective. These yielded a mean score of 4.0 indicating positive perception. The female respondents,29(59.2%) perceived administration of insulin as been very effective means to prevent DFU. 11(22.4%) perceive it as moderately effective, 3(6.1%) perceived it as mildly effective 2(4.1%) are not sure of the effectiveness while 4(8.2%) perceived the use of insulin as ineffective. A men score of 4.2 was recorded.

The use of oral hypoglycemic agents (OHA) was perceived by the male respondents, 57(62.6%) as very effective means to prevent DFU. 21(23.0%) perceived it as moderately effective. 11(12.1%) perceived it as mildly effective. 2(2.2%) are not sure of the effectiveness of OHA. Generally the mean score is 4.4 indicating positive perception. The female respondents, 36(73.5%) perceived OHA as being very effective means to prevent DFU. 7(14.3%) perceived OHA as being moderately effective; 3(6.1%) was perceived as mildly effective, 2(4.1%) are not sure of the effectiveness of OHA as preventive means for DFU while 1(2.0%) perceived it as ineffective. A mean score of 4.4 was recorded.

Application of Terrasil care cream was perceived by 7(7.7%) male respondents as very effective; 8(8.8%) perceived it moderately effective; 7(7.7%) perceived it as mildly effective, 63(69.0%) are not sure of its effectiveness while 6(6.6%) perceived is ineffective. These yielded a mean score of 2.4. Female respondents, 26(53.1%) said that they are not sure of the effectiveness of Terrasil care cream. 5(10.2%) and 8(16.3%) perceived is very effective and moderately effective respectively while 4(8.7%) perceived as ineffective. Mean score of 2.7 was recorded on this item.

Male respondents, 38(41.8%) perceived dietary management as very effective means of preventing DFU, 21(23.1%) perceived it to be moderately effective, 11(12.1%) perceived it as mildly effective, 13(14.3%) were not sure of the effectiveness while 8(8.8%) felt that it is ineffective. Mean score of 3.7 was recorded. The female respondents had 30(61.2%) and 10(20.4%) perceiving dietary management to be very effective and moderately effective respectively. 7(14%) perceive that it has mild effect while 2(4.1%) perceive it as ineffective means to prevent DFU. A mean score of 4.3 was recorded.

The respondents' perception of foot care practices as means of preventing DFU had 25(27.5%) and 15(16.5%) males seeing it as very effective and moderately effective respectively. 7(7.7%) perceived it to be mildly effective; 43(47.3%) are not sure of its effectiveness while 1(1.1%) perceive it as ineffective. Mean score of 3.2 was reached. The female respondents, 11(22.4%) and 8(16.4%) perceived foot care practices as very effective and moderately effective respectively. 21(42.9%) respondents are not sure of the effectiveness of foot care practices as preventive means for DFU while 6(12.2%) perceived it as ineffective.

Discussion

A total of 140 diabetics participated in the study made up of 65% males and 36% female with mean age and SD 36.2±7.2 and 34.4±6.90 respectively. 93.4% males and 61.2% females had formal education with majority (55.3%) males and (57.1%) females having suffered from the disease between 0.5years; (30.8%) males and (32.7%) females have suffered from the health challenge for over 10years. Less number, (16.5%) males and (8.2%) females have developed DFU with 2.19% males amputated. Past studies showed exponential relationship between worsening glycaemic control and complication (Moss, Klein & Klein, 1996) [28]. Prolonged healing increases the risk of amputation in the diabetics (Apelquit, 1998; Birke, *etal,* 2000; Sinacares, Muscaa & Musca, 2000) [11].

Study shows that majority of the diabetics know DFU complication of DM and were able to state the cause as after effect of poor control of blood glucose in the diabetics (71% males and 73.5% females). This does not agree with the findings of Shillabane, Potgleter and Phil (2007) [37], where their participants could not explain the term "diabetes". The high level of knowledge of DFU could be due to the level of education of the participants as most of them (93.4% males and 61.2% females) had formal education. Mason (1985) cited in Shillabene, *et al.* (2003) also had the same result as in this study. Education helps in the understanding of health issues and possible implementation of best health practices for health promotion and prevention. Past studies showed that people at high risk for DFU benefits from education and regular reinforcement of the education (ADA, 2001; CDA, 2003). The high knowledge of the DFU and the causative factor withstanding, some of the participants still believe that DFU is Witchcraft inflicted injury. This is likely going to have influence in the adherence and response to treatment among the diabetes.

Study also shows that the participants have good knowledge of the modern treatment/management modalities for DFU with majority identifying the combination of oral drugs, insulin, nutrition (diet) and wound dressing as the best management

modality. Limited number of the patients (7.7% males and 2.0% females) is aware that amputation is an option for DFU. Other management options like daily inspection of feet, trimming of toes, foot bath, exercise practice and application of Terrasil care ointment had expression of poor knowledge their use by the diabetics.

Study showed that the participants undertake blood glucose measures and foot care practices with majority (38.5%) males and (38.8%) females controlling their blood glucose through combination of insulin, oral hypoglycemic agents and nutrition. This agrees with the opinion of Everlt & Mathioudakir (2018) that control of blood glucose is one of the diabetic ulcer treatments. Majority of the participants (44% males and 40% females) perceived the outcome of their glucose control measure to be adequate. Majority (59.3%) males and (61.2%) females trim their toes out of which those that trim occasionally outnumber those that trim weekly or monthly. Irregular trimming of toes by the diabetics is increases the risk of injury and subsequent ulcer. The tendency to leave the toes untrimmed over a long time is possibly placing the patient at risk of untrimmed calluses becoming very thick, break down and turn into ulcers (ADA, 2018). The diabetics inspect their feet (57.1%) males and (61.2%) females but limited number 33.0% males and 22.4% females have their feet inspected by healthcare providers during follow up care. Self-inspection of feet may lack pain staking action very essential in early detection of DFU. This agrees with the study of Ogedengbe in Lagos, Nigeria where 51% do the recommended routine self-examination on their feet (Martin, 2011) [24]. Constant observation of the feet of the diabetics will not only limit foot ulcers but will also make the patients to develop sense of participation in their care and protect patients from emotional disorders, illness perception and thus facilitating self-management behaviour and better physical health (Chew, Sherift-Ghazali & Fernandez, 2014) [7]. People with DM should be assessed regularly to detect foot deformity and should have prompt intervention to reduce foot pressure and ulcer risks (Autralia Centre for Diabetes Strategies, 2001; Royal Melbourne Hospital, 2002) [35]. Mason, *et al* (1999) [25] asserted that nurses should observe patients carefully. In the diabetics this will help to reduce risk of ulcer and aid early detection of complication(s) such as foot ulcer and prompt management.

Study also revealed that 46.2% males and 46.9% females dry and lubricates their feet as foot care measure but limited number 16.5% males and 16.3% females do have foot bath and limited number disinfect skin around the ulcer for those that have developed foot ulcer. Rowe (2018) [34], is of the opinion that daily saline bath is essential in the management of foot ulcer. 97.8% of the males and 100% female do not wear diabetic shoes. Martin (2011) [24] reiterated the words of Stephen Ogedengbe MD, in a presentation where he stated that there is nothing like perfect footwear for persons with diabetes mellitus but that there are shoes that can help to prevent or delay the onset of foot ulceration in the diabetics and shoes that can accelerate the development of foot ulcer. The diabetics are expected to wear shoes that will not give excessive pressure to the toes which may lead to bruises which may metamorphose to ulcer.

DM shoes are wider, with more padding and more breathable than other shoes (Good Looking, 2017. They have no inner seams and can expand with swelling of the feet without causing blisters or injury to the patient. Findings also revealed that greater number of the male patients (87%) wear shoes with soft leader, 83.7% females). Soft leather shoes are good option for the diabetics (Good Looking, 2017) [21]. 67% male patients wear stockings with shoes while 63.3% of females do not. In African cultural context, stockings are worn mostly by men and this could have affected this practice. This notwithstanding, stockings improve blood circulation, relieve aching legs, protect leg against scratches, keep legs clear and warm during colder month (Creative Care, 2018) [18]. Majority of the patients do not use shoe inserts. American Diabetic Association (2017), remains of the opinion that diabetic shoes and inserts are useful in the prevention of callus. Wearing shoes without inserts may still predispose the patients to DFU.

Study equally revealed that most of the patients do not walk bare footed and majority 78% males and 75.5% females do not practice exercise. Exercise helps to improve circulation and prevent vascular complications which may lead to ulcer in the long run. Findings from the study also revealed that majority of the patients have positive perception about the general effectiveness of modern medical management for the diabetic as means of to prevent DFU with average mean score and standard deviation (SD) of 3.5±0745 and 3.738±0.779 for male and females patients respectively. In spite of this perception, there was poor perception on the general effectiveness of application of Terrasil care cream. This poor perception towards this care cream may be connected with the poor knowledge exhibited by the patients about the cream. Yet still the female diabetics also recorded close to poor perception on foot care practices (2.938±0.612). This may not be unconnected with the women's inability to carryout proper inspection of feet and not wearing stockings with shoes.

Implication of the study

A situation where the diabetics have the knowledge of DFU and possible predisposing factors but do not optimally embark on foot care practices to help in reducing the incidence of DFU is an indication that many more of the patients may possibly develop DFU in the future. This calls for more health education on DFU among the diabetics.

Conclusion/Recommendations

Study indicated that the diabetic patients have knowledge of the DFU, causative factor and modern management modality. They also practice foot care which is essential to the prevention of DFU but majority do not carry out self inspection of their feet, have foot bath, wear diabetic shoes, wear shoes inserts or apply Terrasil care ointment. This calls for more education on foot care among the diabetics. The researchers recommend that nurses should include foot care for the diabetics in their routine practices to reduce the incidence of DFU which often and with amputation.

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