DETERMINANTS OF FOOT SELF-CARE PRACTICES AMONG DIABETIC PATIENTS ATTENDING DIABETIC CLINIC AT A REFERRAL HOSPITAL, MERU COUNTY - KENYA

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Abstract- *Foot self-care practices are regarded as fundamental in prevention of diabetic foot ulcers*[2].*Globally, it is estimated that the prevalent cases of persons living with type 2 diabetes mellitus (DM) were more than 500 million* [17]. *Patients with type 2 DM suffer diabetic foot ulcer (DFU), one of the DM complication most costly to treat and with huge impact on global health* [3]. *The purpose of the study was to assess the determinants of foot self-care practices among patients with type 2 Diabetes Mellitus. This research was a descriptive cross sectional, conducted among 133 type 2 DM clients who were selected using systematic random sampling technique. Data was collected using an interviewer administered semi-structured questionnaire. Analysis of data was done using SPSS version 21. Socio-demographic characteristics such as age of the respondents (p=0.003), level of education (p=0.006 and monthly income (p=0.014) significantly influenced foot self-care practices. 51.2% of the respondents demonstrated low level foot self-care practice while48.8% demonstrated high level foot care practice. 61% were found to have low knowledge level while 39% had high level of knowledge on foot self-care. Low level of knowledge on foot care influenced the practice of foot self-care among the type 2 DM patients attending out-patient diabetic clinic at a referral hospital in Meru County. There was a significant association between knowledge and practice of foot self-care practice (p=<0.001). Those with high level of knowledge were 4.3 times more likely to have high level of foot self-care practice.*

Index Terms- *Diabetes mellitus type 2, Foot self-care, Knowledge on foot self-care, practice on Foot self-care.*

I. INTRODUCTION

Self-care implies to daily activities that individual person initiate and perform by their own so as to remain healthy [14]. Foot self-care by type 2 DM patients involves meticulous care of all parts of the lower limb to include the foot, toes, nails and around the ankle [17]. The standard foot care for diabetic persons involves inspection of the feet, washing the feet, oiling the feet, trimming of toe nails, inspecting the inner parts of the shoes and use of appropriate foot wear [2].

Type 2 DM is estimated to cause 5 million deaths annually thus increasing prevalence of type 2 DM has a huge impact on global health [17]. Sub-Saharan Africa is experiencing an increasing prevalence of type 2 DM. In 2017, 15.5 million adults aged 20-79 years were estimated to be living with type 2 DM in Africa region and it is projected to increase to 23.9 million by 2030 [17]. The prevalence of type 2 DM in Kenya was 6 % in 2014, a 150 % rise as compared to 2.4 % in 1990 and the number of people who died from type 2 DM and its complications in 2014 were 12,890 [16]. Moreover, it is anticipated that every one in 17 Kenyans has DM [16]. In Kenya, Poor foot hygiene and walking bare foot were identified as among the top 5 most common predisposing factors for diabetic foot ulcers and recommended that the primary health care provides should educate patients on low cost measures that can limit diabetic foot ulcers [12].

Foot ulceration is generally preventable and relatively simple interventions such as foot self-care can reduce foot amputations by up to 80% [2]. There are strong indications that the number of amputations can be drastically reduced through the implementation of meticulous daily care of the feet. Studies investigating the effects of foot self-care reported foot ulceration and amputation reduction rates between 44 and 85% [6].

Studies have demonstrated that type 2 DM patients' socio-demographic factors such as age, educational status and average monthly income may influence foot self-care. Moreover, knowledge on foot self-care may also significantly influence the practice of foot self-care among type 2 DM patients [9]. Knowledge on foot care can strongly influence individual care of the feet and those with adequate knowledge on foot self-care are likely to take care of their feet more meticulously as compared to those with deficient knowledge [5].

II. DATA COLLECTION METHODS

The study was conducted at Meru Teaching and Referral Hospital -Kenya. A descriptive cross-sectional study design was used. The study population was adult patients with Diabetes Mellitus Type 2; aged 18 years and above, attending out-patient Diabetic clinic. Interviewer administered semi-structured

questionnaire was used and the process started after approval of Mount Kenya University ethical review committee, a research permit from National Commission on Science, Technology, and Innovation and the clearance at Meru Teaching and Referral Hospital. The tool used to collect data was pretested on 10% of the sample size in another similar health. Four trained research assistants were involved in data collection that took place from 3rd December 2018 to 31st December 2018. A sample size of 133 Diabetes Mellitus Type 2 patients was selected using the Systematic random sampling technique where the 1st respondent was selected using simple random sampling followed by every 2nd Diabetes Mellitus Type 2 patients as per the patients clock-in

register, consent sort and assessed for inclusion criteria. The research assistant guided the literate participants to fill the questionnaire and filled the questionnaire for illiterate patients. They also clarified the questions to ensure simplicity and validity. This was repeatedly done every clinic day till the required sample size of 133 Diabetes Mellitus Type 2 was attained in a period of one month. The questionnaires were sorted, checked for correctness, data was coded and entered for analysis using SPSS version 21. Chi squared test was used to test significance of association between the study variables at a p value of <0.05.

III.   STUDY FINDINGS

Majority of the respondents (51%) were males while 54% were females with 65% aged 40 years and below while 49% were aged above 40 years. 48% were educated up to primary level and below while 59% were educated up to secondary level and above. Concerning respondents' occupations, 56 % employed while 46% were unemployed, 62% were rural dwellers while 51% of the respondents were urban dwellers.61% were earning 20,000 shillings and above while 50% were earning less than 20,000 shillings. 54% had been on therapy for 10 years or less, while 61% had been on therapy for over 10 year, 48% had previous history of a foot ulcer while 54% did not, 48% had a positive history of previous foot amputation while 53% had no history of foot amputation.

Age, level of education and monthly income significantly influenced diabetic foot self-care practices (p=0.003), (p=0.006) and (p=0.014) respectively as indicated in table 1 below.

Table 1: Influence of socio-demographic characteristics on foot self-care

| Variable	Category	Score	Chi	P
Age	≤40 years	65%	8.62	0.003*
	>40 years	49%		
Education	Primary & below	48%	7.68	0.006*
	Secondary & above	59%		
Monthly income	≤20000	50%	6.09	0.014*

Foot self-care practices

The foot self-care practice among patients with DM type 2 were assessed using a set of practice questions where responses were a likert scale of "often, sometimes and never" in the past one week. The total correct practice mean score was 60%, range of 10-95% and standard deviation of 20.6. The practices done correctly by most respondents were washing feet daily by 85%(108) and not wearing high heeled shoes (>2.5inches) by 81.1% (103) while the worst performed practice was wearing sandals when performing outdoor activities where only 15.7%(20) were likely to have the correct practice and 84.3 % (107) were likely to have the incorrect practice of the same as indicated in table 2 below.

Table 2: Self-reported practice on foot self-care

Variables (Self-reported practice on foot self-care in the past 7 days)	Often %(f)	Some-times %(f)	Never %(f)
Examined feet	56.7(72)	28.3(36)	2.4(3)
Washed feet	85(108)	13.4(17)	0
Soaked feet for more than 10 minutes	20.5(26)	28.3(36)	47(47)
Used moisturizing cream on the feet	52.8(67)	22.8(29)	19.7(25)
Cut and filled toenails	18.1(23)	62.2(79)	2.4(3)
Used a razor blade or knife to cut toenail	20.5(26)	44.9(57)	22(28)
Wore high heeled shoes (>2.5inches)	3.1 (4)	7.1 (9)	81.1(103)
Inspected shoes before putting them on	45.7(58)	24.4(31)	15.7(20)
Wore sandal/ slippers outdoor	18.9(24)	56.7(72)	15.7(20)
Wore shoes without socks/ stockings	11.8(15)	43.3(55)	27.6(35)
Walked outside the house bare feet	4.7(6)	22.8(29)	63(80)

Level of foot self-care practice
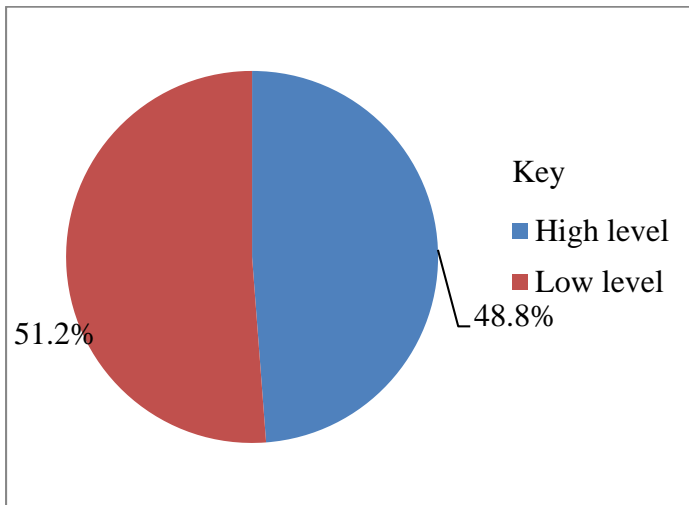
Figure 1: Level of foot self-care practice

The level of practice was divided into two based on the number of variables that respondents practiced correctly. Those with at least 12 total correct variables out of 20 (60%) were considered as having high level of foot self-care practice while those with below 12 total correct variables were considered as having low level of foot self-care practice.

*Influence of Knowledge on foot self-care practice*

Knowledge was determined using a set of 15 questions, 10 of which were true/correct and reverse coded statements, while the other five were open-ended. The investigator went through the responses of open-ended questions and coded them as either "correct" or "wrong response" as indicated in the table 3 below. The knowledge item with the highest percentage of correct response was on washing the feet daily, whereby 94.5% (120) of the respondents answered correctly. On the other hand, the item with the lowest percentage of correct response was on the reason why a diabetic person should not soak feet for more than 10 minutes whereby only 38.6% (49) gave the correct reason. The knowledge on diabetic foot self-care mean score was 68%, range 7-100% and standard deviation was 22.

Table 3: Knowledge on foot self-care

Variables	Correct response	
	F	**%**
Feet examination	107	84.3
Washing feet	120	94.5
Drying between toes after cleaning the feet	116	91.3
Apply moisturizing oil on the feet	95	74.8
Trim toenails straight across once a week	94	74
Use lazar blades or knife to trim the toenails	73	57.5
Change Socks / stockings daily	88	69.3
Inspected shoes before wearing them	87	68.5
Not walk bare foot both in-door and out-door	95	74.8
Wear soft, closed, low heeled shoes when working outdoors	111	87.4
Reason for not soaking the feet for more than 10 minutes	49	38.6
Action taken if the feet have redness, blisters, cuts of wounds	107	84.3
Reason for cleaning the feet with lukewarm water at 37 °C	52	40.9
Reasons for not using moisturizing oil between the toes	54	42.5
Reasons for wearing shoes with socks	50	39.4

Mean=68, Range =7-100,SD=22

Knowledge level on diabetic foot self-care
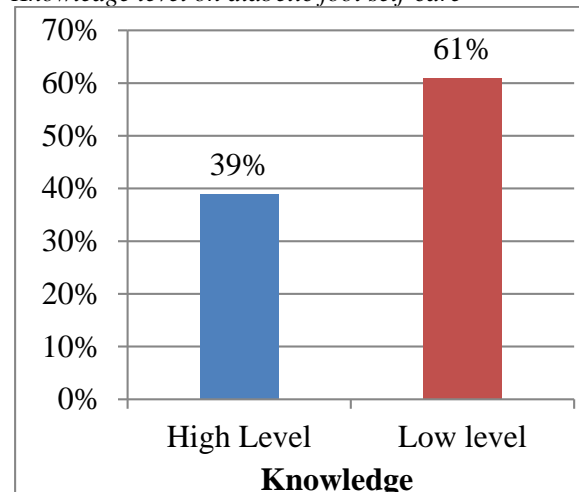
Figure 2: Knowledge level on diabetic foot self-care

Respondents were divided into two groups, based on the knowledge items they answered correctly whereby those who answered at least 12 items correctly were considered to have high knowledge level, while those who answered less than 12 items correctly were considered to have low knowledge level. Majority 77 (61%) of the respondents were found to have low knowledge levels while 50 (39%) had high knowledge levels as illustrated in the figure above.

Study sought to investigate the association between knowledge and foot self-care practices. The knowledge level was cross-tabulated against foot self-care practice which revealed a significant association (p=<0.001). Respondents with high level of knowledge were 4.3 times more likely to have high foot self-care practice level as indicated in table 4 below.

Table 4: Association between knowledge and practice

Knowledge level	Practice mean score	Significance level
High	64%	χ^2 = 14.808, p=<0.001, OR=4.3
Low	44%	

Binary logistic regression analysis where all the socio-demographic characteristics were included as covariates alongside knowledge level was done. There was an association between knowledge level and the following variables. Those with high knowledge level were likely to wash their feet daily (p=0.045), were unlikely to soaking feet for more than 10 minutes (p=0.029), were likely to clean feet at lukewarm water at 37 degrees (p=0.001), were likely to dry between toes after cleaning the feet (p=0.000), were likely to using moisturizing cream on feet (p=0.003), were unlikely to use of razor blade or knife to cut toe nail (p=0.008), were unlikely to use corn remedies/plaster/paint to remove corn (p=0.011), were likely to inspect shoes before putting them on (p=0.000), were likely to inspect shoes after removing them (p=0.03), were likely to wear closed soft /leather shoes during outdoor activities (p=0.006) and were unlikely to wear nylon socks (p=0.025).

Pearson correlation was done whereby knowledge mean score was run against correct practice mean score. These findings indicated that there was a significant positive relationship between knowledge mean score and correct practice mean score (r (125) =.506, p=0.01) as shown in the table below.

Table 6: Correlation table between knowledge and Practice of foot self-care

		Knowledge score	Practice score
Knowledge score	Pearson Correlation	1	.506**
	Sig. (2-tailed)		.000
	N	127	127
Practice score	Pearson Correlation	.506**	1
	Sig. (2-tailed)	.000	
	N	127	127

**. Correlation is significant at the 0.01 level (2-tailed)

IV.   DISCUSSION

Age, level of education and monthly income significantly influenced diabetic foot self-care practices (p=0.003), (p=0.006) and (p=0.014) respectively. These study findings were consistent with a case control study in Brazil [11] that showed that type 2 DM patients who were likely to practice correct foot self-care were more likely to be of middle and high economic status, less than 50 years and with high school education level and above.

The health educators may consider patients' social-demographic factors such as age, educational and economic status while considering individualized foot care education since advanced age, low educational background and low income were found to influence the practice of foot care significantly.

Foot self-care among type 2 DM clients at the study hospital was low since majority of the respondents (51.2%) reported low level on foot self-care practices and less than a half 48.8% reported high level on foot self-care. These findings were close to the findings of a study in Kenya that illustrated that over 50% of the type 2 DM patients had unsatisfactory foot self-care practice [13]. The practice done correctly by most (85%) of type 2 DM patients was washing feet daily and wearing flat shoes less than 2 inches. This agree with findings of a study that highlighted that in Ethiopia, most of the respondents (93.6%) were washing feet once or twice daily [8]. 65.4 % of respondents were likely to often use a razor blade or knife to cut toenail [4], a practice which is contraindicated in DM patients, instead one should use a nail cutter and leave the edges smooth by use of a file (American College of Foot and Ankle Surgeons., 2018). These findings agree with a study in Tanzania that showed that over 80 % of study participants were practicing dangerous behaviors, like cutting the nails with very sharp instruments such as razor blades and knives which can lead to Diabetic foot ulcers [7].

Diabetic patient should inspect and shake out shoes and feel the inside before wearing them to remove any invisible object and detect roughness [1]. The study revealed that only 45.7% type 2 DM patients were likely to inspect their shoes before putting them on and the rest were likely to have incorrect practice, while only 22.8 % were likely to inspect their shoes after removing them and the rest were likely to have incorrect practice on the same. These findings are similar to a study in Ethiopia were 38.7% type 2 DM patients had never checked their shoes before they put them on and (45.7%) had never checked their shoes when they took them off [4]. The worst performed practices in the study were wearing sandals, slippers (open shoes) when performing outdoor activities where majority 84.3 % were likely to have incorrect practice and were often or sometimes not wearing closed soft shoes when carrying out outdoor activities. These findings were similar to the findings of a study carried out in Dar es Salaam, Tanzania showed that majority of type 2DM patients were wearing open shoes when performing outdoors activities [7].

Since the level of practice of foot self-care among DM clients was low, the study hospital administration may establish a specialized DM clinic so that follow-up and education services may be well integrated. The study hospital also may establish Health Education Program supported with standard operating guideline for educating patients on practice of foot self-care so as to promote the correct foot care practice among type 2DM clients.

The level of knowledge on foot self-care was low since majority of the respondents (61%) were found to have low knowledge level while 39% had high knowledge level. Similar findings were reported in Johannesburg where more than 75% of the patients had insufficient knowledge on foot washing, foot wear inspection, characteristic of the foot wear and foot wears practice [8].

The findings of this study revealed a significant association between knowledge and practice of foot self-care practices (p=<0.001), those with high level of knowledge were 4.3 times more likely to have high practice levels. Similar findings were corroborated in studies in China [15,8].

Policy makers in the study hospital may give due attention to chronic non-communicable diseases such as DM so as to prevent its complication through affordable measures such as educating type 2 DM patients on practices of foot self-care at home. In order to emphasize foot care education, policy makers may also start a program of developing professional diabetic educators and may be podiatrists (foot and ankle surgeon) to contribute in the efforts made to control the type 2 DM and minimize complications like diabetic foot ulcers and amputation of lower limbs.

CONCLUSION

Poor practices of foot care among type 2 DM clients at the study hospital may be an indication that some social demographic characteristics such as low income, old age, low educational status may have significantly influenced foot self-care practice. Low knowledge level on foot self-care practices among type 2 DM patients attending diabetic out-patient clinic at the study hospital may also have significantly influenced the practice of foot care since the study findings demonstrates that those respondents with low level of knowledge on foot care had low scores on practice of foot self-care.

The health educators at the study hospital may consider patients' social-demographic factors such as age, educational and economic status while considering individualized foot care education since advanced age, low educational background and low income were found to influence the practice of foot care significantly. The study hospital administration may establish a specialized DM clinic so that follow-up and education services may be well integrated. Finally, the investigator would like to suggest other researchers to investigate the prevalence of type 2 diabetes in Meru County and also to conduct interventional studies in order to determine the magnitude of diabetic foot ulcer and lower limb amputation decreased by preventive education program on foot self-care.

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