

Knowledge Evaluation and Educating Diabetic Patients on Self Foot Care at Diabetic Out Patients` Clinic, Muhimbili National Hospital.

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Background: *Diabetic foot infection, ulcers and amputations remain very common in diabetics worldwide and extremely affect patients` quality of life. The objective of this survey was to assess the level of knowledge and educate diabetic patients on self foot care at diabetic outpatient clinic at Muhimbili National Hospital*

Methods: *A cross-sectional survey of diabetic patients was conducted at Muhimbili National Hospital at the diabetic outpatient clinic from mid September to mid November 2013 inclusive. Patients who voluntarily consented and determined fit for the study were recruited. Data on subjects` demographic characteristics and status of baseline and post discussion sessions self foot care knowledge were collected and analysed.*

Results: *A total of 115 patients were studied. Females were the majority 60.9% (70) and the mean age was 33.5(SD± 1.8) years, age ranged from 11years to 65 years. A considerable number of patients had poor self foot care knowledge 54(47.0%). Young patients (<30 years) had better knowledge about self foot care. There was a parallel increase in knowledge level of foot care with increasing level of education (P value =0.000). There was a significant improvement in self foot care knowledge level score among participants after foot care education sessions as the mean knowledge score prior education and post education were 5.7(SD±3.6) and 15.6(SD±2.5) respectively (P value = 0.000).*

Conclusion and recommendation: *A considerable number of diabetic patients have poor self foot care knowledge and the level of knowledge on self foot care improved prominently following foot care education session. Therefore there is a need for establishment and strengthening effective foot care education for diabetic patients at clinics in order to prevent and reduce the incidence of foot infection, ulceration and amputations.*

Key words: Diabetic patients, Self foot care knowledge, **Self foot care education**, Diabetic foot complications

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Introduction

Diabetes mellitus is a metabolic disorder that is characterised by elevated levels of glucose in the blood (hyperglycaemia) resulting from defects (absence or reduction) in insulin secretion, insulin action or both ^{1, 2}. It is a common and potentially disabling chronic disease with multiorgans involvement and extremely affecting the quality of life of the affected individuals^{1,3,4}.

Diabetic foot complications including foot infection, ulceration and amputation remain very common in patients with diabetes in the world, and affecting predominantly the low resource countries. Factors like poverty, unhygienic environments, bare foot walking and cultural practices interact to results in diabetic foot complications ^{1,5}. Studies reveal most patients with diabetes have poor knowledge and practice of foot care ^{6,7}.

All diabetic patients are at an increased risk for developing foot ulcers and infection ^{3, 7, 8}. Diabetic foot complications play a great contribution to morbidity and mortality of patients with diabetes and are one of the main reasons for hospital admission among them ^{6, 9}. Diabetic

foot complications are preventable and the awareness about the appropriate self foot care among patients and family members forms a cornerstone for the avoidance of diabetic foot complications as well as promoting the best practice of self foot care^{2,7,8}.

Diabetic foot complications prevention and management require a collaborative multidisciplinary team for the appropriate care and best outcomes. Early risks identification, (risks like peripheral neuropathy with loss of protective sensation, dry non compliant skin, foot deformity, history of previous ulcer or amputation, inadequate diabetic control, poor vision, inappropriate foot wear, peripheral vascular disease, foot fungal infection, long term diabetes for more than 10 years, cigarettes smoking, obesity, male gender, older age >50 years, hypertension, living in rural areas) forms the base for the effective prevention and management of foot complications in diabetic patients⁴.

Despite the magnitude of the problem of diabetic foot complications and its consequences, little emphasis has been put in preventive measures including educating patients about the risk factors for foot complications and promotion of self foot care^{6,10}. In our setting the knowledge on self foot care among diabetics has not recently been evaluate. Thus this survey assessed the level of knowledge about self foot care among patients with diabetes and laid down the baseline information for future studies and suggested areas for improved care. Also in this study patients were educated on risk factors for diabetic foot complications and also about the appropriate self foot care. The strongest weapon in the fight against diabetes mellitus foot complications is having appropriate adequate knowledge on preventive measures and promotion of self foot care³.

Patients and Methods

This cross-sectional descriptive study was carried out from mid-September 2013 to mid-November 2013 at the diabetic outpatient clinic, Muhimbili National Hospital in Dar es Salaam, Tanzania. It involved all diabetic patients selected by a non probability convenient sampling technique, who agreed to participate, could read and understand, write or speak Swahili or English and fill in the questionnaire following a pilot survey of a small sample of diabetics who were excluded from the study. Patients with cognitive impairment, visual and hearing loss were also excluded. Data collection was done after obtaining a verbal consent from each participant during outpatient clinic visits. Prepared pre tested structured pre and post educational session questionnaires (both in Swahili and English languages) were used to collect data on the level of knowledge about self foot care before and after foot care education session.

Prepared pretested handouts were used for educating and counseling patients on self foot care measures. The pilot pretested Pre educational sessions questionnaires consisted of 12 True and False questions about self foot care or prevention of diabetic foot complications for assessing patients` knowledge before discussion sessions and the Post discussion/educational sessions questionnaires consisted of 17 True and False items, 12 questions of the pre educational sessions questionnaires plus 5 additional questions. These survey instruments were derived from previous guidelines and recommendations on diabetic foot care^{11,12} and which were also used by other authors^{1,2}. Each question carried 1 mark for a correct response and zero mark for wrong and don't know answers. The scores were transformed into percentage and classified as good knowledge if score was $\geq 70\%$, satisfactory if score was 50-69% and poor if score was $< 50\%$ as it was earlier done by Hasnain *et al*². Other information collected included: age, sex, education status, marital status, disease duration since diagnosis, history about having received self foot care education previously.

Patient education and discussion regarding the risk factors for diabetic foot complications and appropriate self foot care was given by the investigators in a group after completion of filling the first pre educational session questionnaires. The post educational/ discussion

questionnaires were given to patients to fill in after completion of education sessions to measure the knowledge gained following the education given. Thereafter each patient was given a structured handout copy on knowledge and prevention of diabetic foot complications for further self reading at home and so for continuous intervention about self foot care knowledge gap. Computer soft ware programme statistical package SPSS version 16 was used for data entry and analysis. The “X²” test was done to find out statistical significance of demographic variables on knowledge about self foot care and the “t” test was used to analyse the significance of difference between pre educational session and post discussion knowledge scores. A P-value of ≤ 0.05 was considered statistically significant.

Results

There were 115 diabetic patients enrolled into the study, with the mean age of 33.5 (SD±1.8) years ranging from 11 – 65 years and the mean duration of diabetes mellitus (the disease) was 8.5 (SD±5.6) years varying between 1year and 22 years. Fifty nine subjects, (51.3%), aged below 30 years and females formed the larger group 70 (60.9%) with the female to male ratio being 1:0.6 and this difference was statistically significant (X² = 15.259 df = 5 P value = 0.009). A considerable number of participants 54 (47.0%) had poor knowledge of self foot care and young participants (< 30 years of age) had better knowledge of self foot care than the old ones. However, there was no statistically significant difference in the level of knowledge of self foot care between age groups (X² = 4.093 df = 10 P value = 0.943). The number of females with poor self foot care knowledge was slightly higher 34 (48.6%) than that of males 20 (44.4%), but the difference seen was statistically not significant (X² = 4.457 df = 6 P value = 0.615) as illustrated in Table 1.

More than a half, 61 (53%), of participants had primary school level of education and below and in this group the majority had poor knowledge of self foot care. Knowledge level about self foot care was increasing with increasing level of education and this observation was statistically significant (X² = 31.355 df = 8 P value = 0.000). A large number 26 (56.5%) of married patients has poor self foot care knowledge. The difference in knowledge of self foot care between marital status groups was not statistically significant (X² = 4.457 df = 6 P value = 0.615), Table 2.

Table 1. Relationship Between Age, Sex and Knowledge of Self foot Care

Age (Years)	Knowledge score			Total (%)
	≥70%	50-69%	0-49%	
10 – 20	11(25.6%)	14(32.6%)	18(41.9%)	43(37.4)
21 – 30	4(25.0%)	6(37.5%)	6(37.5%)	16(13.9)
31 – 40	3(18.8%)	4(25.0%)	9(56.2%)	16(13.9)
41 – 50	2(22.2%)	2(22.2%)	5(55.6%)	9(7.8)
51 – 60	2(10.0%)	8(40.0%)	10(50.0%)	20(17.4)
≥61	2(18.2%)	3(27.3%)	6(54.5%)	11(9.6)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)
Sex	Knowledge score			Total (%)
	≥70%	50-69%	0-49%	
Male	9(20.0%)	16(35.6%)	20(44.4%)	45(39.1)
Female	15(21.4%)	21(30.0%)	34(48.6%)	70(60.9)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)

† Age: X² = 4.093 df = 10 P value = 0.943. ‡ Sex: X² = 0.389 df = 2 P value = 0.823

Table 2. Association between the level of education, marital status and knowledge of self foot care

Level of education	Knowledge score			Total (%)
	≥70%	50-69%	0-49%	
No formal education (can Read and write)	0(0.0%)	0(0.0%)	3(100.0%)	3(2.6)
Primary school	6(10.3%)	15(25.9%)	37(63.8%)	58(50.4)
Secondary school	12(29.3%)	19(46.3%)	10(24.4%)	41(35.7)
College	6(54.5%)	1(9.1%)	4(36.4%)	11(9.6)
University	0(0.0%)	2(100.0%)	0(0.0%)	2(1.7)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)
Marital status	Knowledge score			Total (%)
Single	15(25.9%)	19(32.8%)	24(41.4%)	58(50.4)
Married	7(15.2%)	13(28.5%)	26(56.5%)	46(40.0)
Divorced	1(33.3%)	1(33.3%)	1(33.3%)	3(2.6)
Widowed	1(12.5%)	4(50.0%)	3(37.5%)	8(7.0)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)

† Level of education: $\chi^2 = 31.355$ df = 8 P value = 0.000

‡ Marital status: $\chi^2 = 4.457$ df = 6 p value = 0.615

Table 3. Relationship between duration of diabetes, baseline self foot care education and knowledge of foot care

duration of diabetes (years)	Knowledge Score			Total (%)
	≥70%	50-69%	0-49%	
1 - 5	12(26.7%)	14(31.1%)	19(42.2%)	45(39.1)
6 - 10	8(22.9%)	9(25.7%)	18(51.4%)	35(30.4)
11 - 15	3(12.0%)	13(52.0%)	9(36.0%)	25(21.7)
16 - 20	1(20.0%)	0(0.0%)	4(80.0%)	5(4.3)
≥21	0(0.0%)	1(20.0%)	4(80.0%)	5(4.3)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)
Baseline foot care education	Knowledge score			Total (%)
Received before	15(28.3%)	18(34.0%)	20(37.7%)	53(46.1)
Did not receive before	9(14.5%)	19(30.6%)	34(54.8%)	62(53.9)
Total	24(20.9%)	37(32.1%)	54(47.0%)	115(100.0)

† Duration of diabetes: $X^2 = 11.470$ df = 8 P value = 0.176

‡ Baseline foot care education: $X^2 = 4.480$ df=2 P value=0.106

A significant number of patients 80 (69.5%) had ≤ 10 years duration of diabetes mellitus and the difference in self foot care knowledge level seen among groups of duration was not statistically significant ($X^2 = 11.470$ df = 8 P value = 0.176). Most of the participants, 62 (53.9%) never had foot care education from health care providers before and among them 34

(54.8%) had poor level of self foot care knowledge. The difference in level of knowledge seen between those who received self foot care education before and those who never had foot care education was not statistically significant ($X^2 = 4.480$ $df = 2$ P value = 0.106) (Table 3).

Majority of patients new walking with bear feet especially outdoors and wearing ill – fitting or high heel shoes predispose to foot complications 86.1% and 82.6% respectively (Table 4). The mean knowledge score of pre education sessions and post education sessions on diabetic self foot care were 5.7 (SD \pm 3.6) and 15.6 (SD \pm 2.5) respectively. The difference in level of knowledge score among participations prior education sessions and after the sessions was statistically significant (P value=0.000) (Table 5).

Table 4. Responses to Questions Regarding Self Foot Care Knowledge

Serial number	Pre educational session questions asked to determine the level of the knowledge about self foot care	Percentage of correct responses (%)
	Which are the risk factors for foot complications in patients with diabetes	
1	Neuropathy affecting the lower limbs, causing loss of protective sensation like pain and temperature sensations	30.4
2	Wearing ill-fitting (tighten) or high heel foot wear (shoes)	82.6
3	Failure to take medication regularly which may cause raised blood glucose most of the time	47.8
4	History of previous foot ulceration or amputation	19.1
5	Walking with bear feet especially out doors	86.1
6	Failure to inspect your feet often and keep skin of the feet clean and soft	64.3
7	Presence of foot skin or toenail infection like fungal infection	64.3
8	Smoking which may cause peripheral (lower limbs) vascular disease	33.9
9	Alcohol abuse	37.4
10	Having diabetes for a long duration of more than 10 years	18.3
11	Lack of foot care education (self care knowledge deficit)	54.8
12	Impaired vision	26.1

Table 5. The “t” test for the mean difference between pre and post education sessions knowledge level on self foot care assessment in patients.

Serial number	knowledge evaluation on	Number	Mean	SD	“t”value	P value
1	Pre-education	115	5.7	3.6	16.9	0.000
2	Post-education	115	15.6	2.5		

†SD=standard deviation

Discussion

Poor knowledge and inadequate education provision regarding self foot care to diabetic patients remain a problem particularly in the developing world. In 115 study patients majority were young, under thirty years of age and females were the predominant group. Regarding the age, the findings in this study are contrary to the results obtained in other studies ^{1, 6, 13} whereby most of participants were in the middle and old age groups. This difference may be due to the fact that young patients were more willing to participate into this study than the old group and also probably the outpatient clinic attendance of young patients is higher or was higher during the time of the study than that of old patients. The predominance of females in this survey was similarly present in other surveys ^{2, 13}, unlike in some studies ^{1, 6} whereby males predominated. The difference observed may be due to female patients in this study being more willing to involve into the study than males counterpart or female patients clinic attendance is higher than that of males or more female patients attended clinic during the time of study than males.

It was also found in this study a considerable number of participants (47.0%) had poor knowledge of foot care as it was also reported by other authors ^{1,6,14}, reflecting the similar situation of self foot care knowledge among diabetics in some parts of Africa and Asia. However, Jinadasa *et al* ⁴ and Rheeder *et al* ¹⁵ observed majority of diabetic patients having good knowledge about self foot care. High knowledge of self foot care in patients with diabetes in these areas may be possibly due to effective and adequately provision of diabetic and foot care education to patients by health care providers at follow up clinics or community level or may be most diabetic patients in these study places had a good baseline level of education.

A better knowledge regarding diabetic foot care was observed in young participants (≤ 30 years of age) likewise in other reports by Desalu *at al* ¹, Bijoy *et al* ⁶ and Viswanathan *at al* ¹⁴. The similarity may be reflecting /indicating a better education level, reasonable participation in health care education/ trainings or effective seeking and understanding of information about diabetes self foot care from media and internet in young patients than in the old participants. It may also be due to less social/community responsibilities in the young group making them participate effectively in diabetes self care education sessions and have ample time to read and of exposure to diabetic self foot care information. However there was no significant statistical association between the age and knowledge of self foot care in this survey.

A large number of female participants (48.6%) had slight poor foot care knowledge. Similar findings were obtained by Desalu *et al* ¹ and Viswanathan *et al* ¹⁴ although this association was not statistically significant. Bijoy *et al* ⁶ in their study reported males and female groups to have equal proportion of subjects with low diabetic foot care knowledge. However different results were reported by Moodley *et al* ³ whereby females were more knowledge gable about self foot care than men. The similarity between findings in this study and others ^{1,14} might be due to poor education level among females due to common Socio-cultural practices and beliefs of women not to be allowed to acquired higher level of education as for males in the family and consequently resulting in women having poor knowledge of self foot care as equally as explained by other authors ¹.The explanation for the difference in findings of this research and of Moodley *et al* ³ is probably women in the later study had significantly high education level status and participated effectively in the regularly conducted diabetes and foot care education sessions given by the health care providers.

Most of the patients were having primary school level of education and below and among these majority (66%) had poor knowledge on self foot care. A parallel increase in knowledge about self foot care and level of education was observed similarly to the finding of others ^{2, 6, 14}.This may be explained by the fact that the more educated patients were better able to understand and participate effectively in the counseling/training sessions provided by health care providers

and explore more information regarding diabetes self care from other sources. There was a significant statistical association between the level of knowledge about foot care and education level status.

A significant proportion of married participants have poor self foot care knowledge. This observation is in agreement with other previous study results¹³ and the similarity may be due to inadequate attendance and follow of self foot care education sessions at clinics or on media in the married group due to much social/community responsibilities than in other groups of marital status. However the difference in knowledge regarding self foot care between groups of marital status was not statistically significant.

Participant with duration of diabetes mellitus for 10 years and below were the majority (69.5%) and these results are in agreement with the previous studies^{3, 4, 7}. The level of knowledge about self foot care was not obviously related with increasing duration of the disease in this study. However Moodley *et al*³ and Sabra *et al*¹³ found foot self care knowledge to be increasing with increasing duration of diabetes mellitus, explaining the role of previous long term effective/adequate diabetes self care education and accessibility to health care information in those populations resulting into patients with long duration of diabetes mellitus to have had received more information on self foot care since long time back and therefore more knowledgeable than the new ones. However, in this study there was no statistically significant association between knowledge on diabetic foot care and the duration of diabetes. The baseline foot care knowledge in diabetic patients in this study was poor as more than a half of participants (53.9%) never had received self foot care education from health care providers, and the majority (54.8%) of them had poor foot care knowledge, likewise the results obtained by Jinadasa *et al*⁴. These findings stress on the importance of a well organized system for ensuring diabetic patients receive adequate education and counseling on self foot care. However there was no statistical association between the statuses of history of receiving foot care education before and the current knowledge score about foot care.

A significant improvement in the knowledge of diabetic foot self care was obviously noted following diabetic foot care education/counseling sessions as was also reported by Bijoy *et al*⁶, these findings also insists about the necessity for regular diabetic self foot care education session as an important key for prevention of diabetic foot infection, ulceration and amputation.

Conclusion

Young diabetic patients had better knowledge about self foot care than the old ones.

A considerable proportion of diabetic patients have poor self foot care knowledge

A high level of knowledge about self foot care is associated with a high level of education.

Effective and regular provision of a diabetes and foot care education to diabetic patients improves knowledge about self foot care and hence prevention of diabetic foot complications.

Recommendation

Establishment and incorporation of effective foot care education for patients with diabetes in our diabetic outpatient clinics is of great importance for prevention of diabetic foot infection, ulceration and amputation.

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