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A study to determine the knowledge and practice of foot care in patients with chronic diabetic ulcers

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ABSTRACT

Introduction: Diabetic foot ulcers accounts for many hospital admissions and it is also a major cause of amputations. More importantly it is preventable by effective identification, education and preventive foot care practice. Therefore, lifestyle modification remains a cornerstone of management.

Objective: Determine the level of knowledge and practice of foot care among patients with chronic diabetic foot ulcers.

Methodology: Individuals having diagnosed diabetic foot ulcers (n=110) were selected from National Hospital of Sri Lanka (NHSL) for this descriptive cross sectional study. They were given an interviewer administered, pre tested questionnaire following informed consent. Patient perceptions of foot care were inquired. A scoring system ranging from 0-10 was employed to analyze the responses given for level of knowledge and practice of diabetic foot care. The study was approved by the Ethics Review Committees of Faculty of Medicine, Colombo.

Results: Mean age was 58.4 years (SD ±8.6) and 57.3% were males. Non healing ulcers were present among 82.7% and amputations amounted to 38.2%. The control of diabetes was poor in 60%. Regarding foot care knowledge, the mean score was 8.37, 75.5% had scored above mean and 52.7% were aware of all principles of foot care. Regarding foot care practices, the mean score was 4.55, 47.3% participants had scored below mean and 22.7% did not practice any foot care principle and hence scored 0. A Statistically significant difference exists between the foot care knowledge and practice scores ($p<0.001$, $z= -8.151$). In the study sample 51% were not educated prior to occurrence of complications**.**

Conclusion: Results demonstrate a satisfactory knowledge on diabetic foot disease; however their practices of preventive techniques were unsatisfactory. Implementation of a national policy on diabetic foot management and good patient follow-up to increase compliance would help to improve this situation.

Keywords: Diabetic foot care, Knowledge and Practice

Working title: Knowledge and practice of foot care

Introduction

Diabetes mellitus is a non communicable disease with multi-organ involvement. It was known even in the ancient world as a disease that produces honey taste urine. Until recently it was believed as a disease which occurs mainly in developed countries, but more

recent findings show occurrence of new cases with diagnosed type 2 diabetes mellitus in developing countries [1-2]. As well as seeing increasing numbers of patients, many countries are reporting earlier onset of type 2 diabetes and its associated complications[3]. A recent study in Sri Lanka showed a diabetes prevalence of 16.4% among urban population and 8.7% among rural population[4].

Diabetes is associated with complications such as cardiovascular diseases, nephropathy, retinopathy and neuropathy, which can lead to severe morbidity and mortality. One of the complications associated with diabetes is peripheral vascular disease, the damage caused to the large blood vessels supplying the lower limbs. Another complication is neuropathy, which can lead to loss of sensation in feet. Diabetic neuropathy is not a single disease; it encompasses several neuropathic syndromes, of which the commonest is peripheral symmetrical polyneuropathy[5-6]. Advanced peripheral neuropathy results in insensitivity facilitating trauma, altered proprioception and small-muscle wasting which leads to altered weight loading under the foot on standing and walking. Later the foot can secondarily become infected, often with polymicrobial invasion[7] and it may need to be amputated if not managed appropriately.

In a study to detect the prevalence of diabetic neuropathy in Sri Lanka showed that 30.6% of diagnosed patients with diabetes had neuropathy and 10.2% suffered with diabetic foot[8]. Presence of amputations among 4.8% of the diabetic population highlights the importance of diabetic foot care. In developing countries walking barefoot is a common practice among rural population. This poses an additional risk for the development of diabetic foot complications[9]. The importance of diabetic foot care education and compliance with foot care practices has been emphasized in many studies[10-12]. Also they have shown that these programs must be customized according to the local situation[13]. In previous studies done in various parts of the world to assess the knowledge and practice of diabetic foot care has shown diverse results. While some countries show inadequate knowledge on foot care principals among patients[14] others have shown satisfactory knowledge but poor compliance[15]. Hence we can assume that the level of knowledge and practice may vary with the socio demographic factors of each region therefore it is essential to conduct studies to identify key lapses in diabetic foot management.

The diabetic foot should be managed by a multidisciplinary team at any part of the world[16]. The success of good patient education and self/nursing care to minimize amputations has been established by many studies[15, 17-18]. There are several established guidelines based on similar principals regarding the diabetic foot care. International Consensus on the Diabetic Foot is a prominent guide which has been found effective previously[10]. The Diabetes Committee of the American Orthopaedic Foot and Ankle Society has also issued a guideline on proper foot care[19].

Foot problems account for many hospital admissions of patients with diabetes. Also it is recognized as a major cause of amputations. An understanding of the causes of these problems enables early recognition of patients at high risk. A study on self care of diabetic foot has not been conducted previously in South Asian region. Therefore this study aims to assess the knowledge and the level of practice of foot care principals among patients with chronic diabetic foot ulcers.

Methodology

Data collection and arrangement

All patients with diagnosed diabetic foot ulcers admitted to 8 surgical wards of National Hospital of Sri Lanka (NHSL) within the study duration (1st November 2008 to 31st March 2009) were eligible for the study. The

diagnosis of diabetic foot ulcer disease must be supported by a diagnosis card. Additionally it should also give evidence for established neuropathy diagnosed using 10g monofilament test and 128Hz tuning fork test. Acutely ill patients and mentally subnormal patients were excluded. Purpose of study was explained to the patients and informed consent was obtained.

Patients were given an interviewer administered pretested questionnaire to assess the knowledge and practice of diabetic foot care. The questionnaire was based on the diabetic foot care principles found in The Diabetes Committee of the American Orthopaedic Foot and Ankle Society guidelines[19], International Consensus on the Diabetic Foot[20-22] and other guidelines and principles given in internationally accepted journals[23-25] and books. The questionnaire was given to 15 first year medical students and pretested for comprehension; following which it was reviewed and finalized.

An ordinal scoring system was used for data analysis as shown in table 1. As blood glucose control has been identified as the mainstay of prevention of diabetic foot ulcer problem it was given 3 marks. The latest HbA1C (done within last 4 months) was used as the best assessment of blood glucose control. A level below 7% was identified as a good blood glucose control. In the absence of a recent HbA1C report fasting (normal <126mg/dl) and 2 hour post prandial blood glucose(normal<200mg/dl) tests were used. Use of special foot ware is not mandatory and only recommended in selected cases so it was given 1 mark. All other items were given 2 marks each.

The study was approved by ethics review committee of Faculty of Medicine University of Colombo Sri Lanka.

Statistical Analysis

A pilot study was conducted in one of the surgical wards of National Hospital of Sri Lanka(NHSL) to assess the knowledge on diabetic foot care. It showed a mean knowledge of 80%. Accordingly for a descriptive study of a dichotomous variable the sample size is 107 (95% confidence interval, p= 0.20 total width of confidence interval is 0.15). During the study the patients were selected using Non Probability convenience sampling. Chi-square test was used to compare the proportions of knowledge and practice of foot care in this study as categorical data investigating two proportions were being dealt with. Wilcoxon signed rank test was used for the analysis of knowledge and practice scores since they were related non parametric data. Values of $p<0.05$ were considered as statistically significant. Data were recorded and analyzed using SPSS version 15.0.

Results

During the study period 110 patients with diabetic foot disease were studied. The mean age of study sample was 58.4 years(SD ±8.6years, n=110). When age was categorized into 10 year intervals the majority of them belonged to age group 51 – 60 years (40%). Another 30% belonged to 61-70 age group, while 18.1% belonged to 41-50 age group. Majority of participants were males (57.3%).

When considering duration of diabetes, 30.6% has been having diabetes for 5 years or less, 36.7% for 6-10 years, 16.1% for 11-15 years and 16.1% for 15years or more. Regarding the complications of diabetes, 84.5% showed some form of neuropathy, 54.5% had associated retinopathy, 37.3% suffered with ischemic heart disease and 30% had nephropathy.

Insulin was used by 39.1% patients for their control of diabetes and others were using oral hypoglycemics. Despite this the control of diabetes measured by either HbA1C or fasting

and 2 hour post prandial blood glucose measurements were poor among 60% of participants.

Commonest presentation of diabetic foot disease was Non-healing ulcers (82.7%). Recurrent ulcers were present among 45.5%. The most serious complication was amputation, which was present in 38.2%.

The knowledge and practice of foot care among patients with chronic diabetic foot is shown in Table 2.

More than 50% of the study sample had knowledge on diabetic foot care principals but practice is sub-standard. Only regular foot observation was carried out by 65.5%. The practice of other foot care principals was below 50%. It is also evident that there is a statistically significant difference between the knowledge and practice of each of these foot care principals.

The scoring system which was introduced earlier was employed to analyze results.

The knowledge of the foot care principles according to the scoring system is shown in Table 3. The mean knowledge score is 8.37 out of 10, which is highly satisfactory. Also there were many patients amounting to 52.7% of total who had all 10 marks. When we consider the cumulative percentage we can see that only 24.5% of sample had knowledge on foot care below the mean.

Analysis of the practice of foot care Principles is shown in Table 4. The mean Practice score is 4.55 out of 10. There are 22.7% of patients who has scored 0, While 8.2% had scored 10. From cumulative percentages 47.3% has scored 4 and below while rest has scored 5 and above

There is a statistically significant difference between knowledge score and practice score which can be established using Wilcoxon signed ranks test. ($p < 0.001$, $z = -8.151$, $r = -.55$).

80% of our sample population had been educated by a medical person as a part of his management before our contact with them. But unfortunately 51% (n=88) of them had not been educated on foot care management prior to occurrence of complications.

Discussion and conclusion

Out of 110 research subjects majority were males and belonged to age group between 51 and 60 years. This shows that diabetic foot problem is mainly concentrated on elderly population which increases the morbidity in them due to diabetes. It is well known that diabetic foot disease occur in long standing diabetic foot disease because the pathological process takes about 10 years to develop. This situation may occur due to delayed recognition and diagnosis of diabetes mellitus. This fact was also found in a previous study done in Sri Lanka[26].

Higher presence of other micro and macrovascular complications of diabetes in this group shows the importance of regular screening of all micro vascular and macro vascular complications of diabetes when a patient with diabetic foot is encountered in medical practice.

When we consider the knowledge of foot care in this sample each key principle of foot care was known by more than 50%. All aspects of foot care principles were known by 52.7% of study sample. The mean knowledge score was 8.37. The results show that patients are aware of their disease. That the health education satisfactory. Since the self care of diabetic foot is based on simple medical facts we could assume that understanding of these principals are not difficult.

In contrast the level of practice of the foot care principles were poor. Regular foot observation was followed by 65.5%. But rest of the principles were neglected by more than 50% of study sample. Use of scoring system also gives evidence for the poor commitment in part of patients for the practice of foot care principles. The mean score was 4.55 and

22.7% of subjects did not practice any foot care principle. A statistically significant difference exists between the knowledge score and practice score ($p < 0.001$).

A significant limitation of this study is that the questionnaire used has not been validated by test-retest method. Locally and internationally accepted guidelines were used to prepare the questionnaire to minimize the error rate[19-21, 24, 27]. A scientifically validated questionnaire would be valuable and could reduce duplication of work, but such questionnaire was not available at the time of the study. Even with the existence of a validated questionnaire it should be customized to local conditions.

This shows that patient reluctance to the compliance of diabetic foot care. Since self care of diabetic foot is an important management method it is important to establish reasons for the poor compliance. Also measures must be taken to improve the patient compliance. Repeated reminders of foot care principals will be useful to improve motivation, also having support schemes, health education and financial assistance is necessary. Specialized wound care centers need to be instituted in peripheries. Psychological assistance, involvement of family members in foot care management and management of co-morbidities like retinopathy and vasculopathy will be helpful.

Since 51% had not been educated prior to the occurrence of diabetic foot complications it is essential to start health education on diabetic foot care at the initial neuropathic stages. This study only looked into a certain group of patients who had complications of foot ulcers so the level of foot care knowledge on patients with diabetes with or without other known complications could be lower than this.

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Table 1: Ordinal scoring system used to analyze the relationship with knowledge and practice of foot care principles

	Knowledge score	*Practice score*
Blood sugar control	3 marks	3 marks
Regular foot observation and keep them clean	2 marks	2 marks
Use of footwear during outdoor activities	2 marks	2 marks
Nail inspection and cutting them flat	2 marks	2 marks
Use of special footwear	1 marks	1 marks
Total Marks	*10*	*10*

Table 2: Comparison of Knowledge and Practice of Foot care principals. (Chi-square test used for p value calculation)

Method of foot care	**Knowledge of foot care (n=110)**		**Practice of foot care principals (n=110)**		**P value**
	Frequency	Percentage	Frequency	Percentage	
Blood glucose control	103	93.6 %	44	40%	0.026
Regular foot observation and Keep them clean	91	82.7 %	72	65.5 %	<0.001
Nail inspection and cutting them flat	83	75.5 %	45	40.9 %	0.029
Use of footwear during outdoor activities	97	88.2 %	53	48.2 %	0.016
Use of special footwear	75	68.2 %	29	26.4 %	<0.001

Table 3: knowledge of foot care scoring

		Knowledge score
Minimum		*0*
Maximum		*10*
Central Tendency	Median	*10.00*
	Mode	*10*
	Mean	*8.37*
Scatter	Range	*10*
	Variance	*6.383*
	Std. Deviation	*2.256*
Std. Error of Mean		*.241*

Table 4: Practice of foot care score

		Practice score
Minimum		*0*
Maximum		*10*
Central Tendency	Median	*5.00*
	Mode	*0*
	Mean	*4.55*
Scatter	Range	*10*
	Variance	*11.241*
	Std. Deviation	*3.353*
Std. Error of Mean		*.320*