

Study on the current knowledge on diabetic foot care practices and footwear selections among patients attending to the diabetic clinic at Colombo South Teaching Hospital

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Abstract

Introduction: Diabetes foot complications are a leading cause of morbidity and mortality worldwide. Many presents with complicated foot ulcers which end up with amputations. Early interventions and health education significantly reduce such problems.

Objectives: To assess the current knowledge on foot care and footwear, to identify the undiagnosed foot problems and risk factors.

Methods: In this descriptive cross-sectional study, 334 patients were evaluated for knowledge on foot care and footwear practices by administering 3 questionnaires.

Results: The majority were females (73.1%). Mean duration of diabetes was 10.73(+/- 6.9) years. Most patients were non-smokers (78.8%) and non-alcoholics (84.8%). Major comorbidity was dyslipidemia (74.95%). Mean FBS and HbA1c were 137.7mg/dl (+/-43.29) and 7.66% (+/-0.78) respectively. Majority (64%) of them were within moderate risk for diabetic foot disease and 24% had history of foot ulcers. Deformed, thickened and discoloured nails were seen among 42.2%, 38% and 28.7% respectively. Peripheral neuropathy present in 35.6%. Even though 79.8% of the participants washed and 45.8% examined their feet daily, poor foot hygiene was seen among 44.9%. The majority used unsuitable footwear (70.7%). Only 9.6% wore special footwear for diabetes. Most denied adequate knowledge on footwear (80.5%). Nearly half (50.9%) of the population used footwear for > 1 year and 79.3% were not inspecting footwear. Increased age and duration of diabetes, low education, history of foot ulcer, smoking, thickened nails, calluses were significantly associated with diabetic foot ($p < 0.01$). Abnormal monofilament and vibration were predictors of diabetic foot disease ($p < 0.01$).

Conclusion: This study highlighted the gaps in the knowledge and practices of foot care and footwear among diabetic patients. Thus, there is a need to enhance patients' knowledge with a regular assessment to enforce healthy practices to minimize diabetic foot complications.

Key Words: Diabetes, knowledge, foot care, footwear, practices

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Introduction

Diabetes mellitus is one of the major chronic, a non-communicable disease with disabling long-term complications and the prevalence is rising globally⁽¹⁾. 20% of adults in Sri Lanka have either diabetes or prediabetes and one-third of overt diabetes are undiagnosed⁽²⁾. Impaired production or inadequate utilization of insulin due to resistance is the pathophysiology of hyperglycemia⁽²⁾. Inadequate glycemic control will lead to macro and microvascular complications^(1,2).

Asian diabetes patients are more prone to get neuropathy and foot problems⁽³⁾. A significant number developed such complications even before the diagnosis of diabetes^(3,4). According to the prevalence data in 1980-108 million, 2017-451 million, 2020-463 million, and 2045- projected value 700 million could be seen⁽⁵⁾. The overall global mortality rate is roughly 5.2%⁽⁶⁾.

Diabetic foot infections (DFI) are huge health and economical hazard⁽⁷⁾. According to the International Working Group on the Diabetic Foot and World Health Organization, DFI is defined clinically as the presence of manifestations of an inflammatory process in any tissue below the malleoli in a person with diabetes mellitus⁽⁷⁾. In such patients, signs and symptoms of inflammation may, however, be masked by the presence of peripheral neuropathy or peripheral artery disease or, immune dysfunction⁽⁷⁾. Such complication can occur in 50% of patients with type 1 and 2 diabetes at some point^(7,8).

The initial trigger for the DF is peripheral neuropathy, which predispose the foot to injuries⁽⁹⁾. DF ulcers affect 25% patients with diabetes and is a leading cause of non-traumatic amputations worldwide⁽⁹⁾.

A study done in Sri Lanka in 1996, revealed one in three patients with diabetes (33%) who are not on insulin, had a risk factor for DF ulcer⁽¹⁰⁾. Roughly 30% of them were diagnosed as having peripheral neuropathy (PN). One in ten patients (10.2%) was found to have an active foot ulcer, a history of a foot ulcer, or lower limb amputation⁽¹⁰⁾.

A prospective study -The Seattle Diabetic Foot Study, shows the duration and the type of diabetes, race, smoking status, diabetes education, foot insensitivity to the monofilament, previous foot ulcer or amputation, Charcot deformity, insulin usage, 20kg higher body weight, poor vision, 13mmHg orthostatic hypotension, hammer/claw deformity, history of photocoagulation are independent risk factors for the diabetic foot disease (DFD)⁽¹¹⁾.

Optimal foot care and footwear practices are extremely important to minimize patient morbidity, depression, and mortality. Identification of risk factors, proper patient education, and training on podiatric care/footwear are proven to be cost-effective^(10,11).

Objectives

General Objectives

To study the current existing knowledge on foot care practices and knowledge on footwear selection among the patients attending the diabetic clinic, Colombo South Teaching Hospital (CSTH).

Specific Objectives

1. To assess the current knowledge on foot care among patients.
2. To assess the current trends in footwear and knowledge on selecting suitable footwear.

3. To identify the possible risk factors for diabetic foot problems in the selected group of people.

Methodology

This study was conducted as a descriptive cross-sectional study at the diabetic clinic at CSTH from July to November 2019. The ethical clearance was obtained from the Ethical Review Committee CSTH. A total number of 334 patients with both type 1 and type 2 diabetes were recruited randomly (every 10th patient who is more than 18 years of age with diabetes who attended the clinic) after obtaining their voluntary informed written consent and they could withdraw anytime from the study without any issue. Patients who were mentally subnormal and who couldn't comply with medical instructions were excluded. They were evaluated for their current knowledge of foot care and footwear practices. Three questionnaires were used as the data collection tools. The first questionnaire was about socio-demographic data and the second one was about the disease variables including medical history, investigations, and complications especially relating to diabetic foot and its risk stratification (derived from the Diabetes foot care program of Nova Scotia) and they were applied as interviewer-administered and filled by specially trained medical officers. The 3rd questionnaire was a self-administered one in all 3 languages which assessed their current knowledge and practices on foot care. The final result was analyzed using the latest version of Statistical Package for Social Sciences (SPSS).

Results

Out of the total 334 patients, 73.1% (244) were females while 26.9% (90) were males. The mean duration of the diabetes was

10.73(+/- 6.9) years. The majority of the patients were educated up to Ordinary level (33.9%). Three percentage of the population has never gone to school and 51.2% were involved in sedentary employment. Nearly half of the population was overweight (53.3%). The majority of the patients were non-smokers (78.8%) and non-alcoholics (84.8%). The major comorbidity was dyslipidemia (74.9%). The mean FBS, PPBS, and HbA1c were 137.7mg/dl and 165.5mg/dl, and 7.66% respectively. The mean total cholesterol and LDL were 176.2, 107.7mg/dl respectively. The majority (73.4%) were only on oral hypoglycemic agents. Most patients had good compliance with medications (88.9%).

Among the study population 64.4% were within the moderate risk category for DFD while 24% of them experienced a past foot ulcer. High-risk category was 6.4% (Table 1). Toenail complications were common among the sample where thickened, deformed, ingrown and discoloured nails were seen in 38%, 42.2%, 18%, and 28.7% respectively (Table 3). Macerations, calluses, corns and oedema were not seen among majority (Table 3).

Peripheral neuropathy, (assessed with 10g monofilament test and vibration with 128Hz tuning fork) was seen among 35.6% of the participants (Table 3). 43.7% of the participants needs assistance for their foot care (Table 2). 83.9% walk with bare feet (Table2).

Even though 79.8% had the habit of washing their feet daily, poor foot hygiene was seen among 44.9% (Table 2), 66.8% of the patients did not soak their feet in the water. Majority (76.6%) of the patients did not use moisturizer for their feet. The majority did not use self- medication for warts in the feet

(82.3%). 45.8% of the population examined their feet daily (Table 2).

Only 9.6% were wearing special footwear for diabetes (Table 5). Although 44.3% accepted that they were informed of such foot wears, most denied having adequate knowledge on them (80.5%) (Table 5).

The majority were using unsuitable footwear (tight, damaged and with torn edges) (70.7%) and 50.9% were using their foot wears for more than one year. Furthermore, most of them did not have the habit of inspecting their footwear before wearing it (79.3%) (Table 5).

Table 1 Diabetic foot risk category

Risk category	Number of patients	Percentage (%)
Low	98	29.4
Moderate	214	64.4
High	22	6.2
Past history of foot ulcer >2weeks		
1. Yes	80	24
2. No	254	76

Table 2 Foot care practices

	Number of patients	Percentage (%)
Foot examination		
frequency	151	45.9
1. Daily	57	17.8
2. 2-6 times per week	45	12.9
3. Once a week or less	47	13.9
4. When a problem present	34	9.5
5. Not examining		
Washing feet daily		
1. Yes	268	79.8
2. No	66	20.2
Poor foot hygiene		
1. Yes	150	44.9
2. No	184	55.1
Assistance for foot care		
1. Yes	146	43.7
2. No	188	56.3

Visualize soles daily		
1. Yes	248	74.3
2. No	86	25.7
Soaking feet in water		
1. Yes	111	33.3
2. No	223	66.7
Wiping of web spaces		
1. Yes	34	10.8
2. No	300	89.2
Apply moisturizer to feet		
1. Yes	20	6.5
2. No	314	93.5
Self-medication for foot problems	59	17.7
1. Yes	275	82.3
2. No		
Keeping heat pads/ hot water bottles on feet		
1. Yes	90	26.9
2. No	244	73.1
Walking with bare feet		
1. Yes	282	83.9
2. No	52	16.1
Timing of selecting new footwear	192	57.5
1. Morning	142	42.5
2. Evening		
Have attended a lecture on foot care	164	49.1
1. Yes	170	50.9
2. No		
Have read a handout on foot care	94	28.6
1. Yes	240	71.4
2. No		
Would like to read a handout on foot care	287	85.9
1. Yes	47	14.1
2. No		

Table 3 Foot problems on examination

Foot problem	Number of patients	Percentage (%)
Macerations		
1. Absent	290	86.8
2. Present	44	13.2
Corn		
1. Absent	296	88.6
2. Present	38	11.4
Calluses		
1. Absent	277	82.9
2. Present	57	17.1
Increased temperature over feet		
1. Yes	34	89.8
2. No	300	10.2
Oedema		
1. Absent	291	87.1
2. Present	43	12.9
Peripheral Neuropathy		
1. Absent	215	64.4
2. Present	119	35.6
Nail problems		
1. Thickened nails		
Absent	207	62
Present	127	38
2. Deformed nails		
Absent	193	57.8
Present	141	42.2
3. Discoloured nails		
Absent	238	71.3
Present	96	28.7
4. Ingrown toe nails		
Absent	274	82
Present	60	18

Table 4 Footwear types

Footwear type	Number of patients	Percentage (%)
Sandals	204	61.0
Flip-flops	66	19.7
Special custom shoes	20	5.9
Athletes/sneakers/Runners	16	4.7
Shoes with broad round toes	13	3.8
Shoes with pointed toes	11	3.2
Shoes with adjustable	4	1.2

Table 5 Footwear practices

Footwear practice	Number of patients	Percentage (%)
Unsuitable footwear (ill-fitting, damaged, presence of torn edges)	236	70.7
1. Yes	98	29.3
2. No		
Special footwear		
1. Yes	32	9.6
2. No	292	90.4
Knowledge on special footwear		
1. Yes	65	19.5%
2. No	269	80.5
Previously informed on special footwear by health care professional		
1. Yes	148	44.3
2. No	186	55.7
Frequency of changing footwear		
1. >1 year		
2. <1 year	164	49.1
	170	50.1

Inspect footwear before wearing		
1. Yes		
2. No	69	20.7
	265	79.3
Have read a handout on footwear		
1. Yes		
2. No	66	19.8
	268	80.2
Would like to read a leaflet on footwear		
1. Yes	287	85.9
2. No	47	14.1

Discussion

This study was conducted to assess the knowledge on foot care and footwear selections among the diabetic patients attending a tertiary care hospital in Sri Lanka. The mean age of the sample was 58.234±10.66 years. A previous descriptive cross-sectional study done in the National Hospital of Sri Lanka revealed that the mean age of occurrence of DF ulcers was 58.4 years (SD ±8.6) [4], so our study population was also within the risk age group⁽¹⁰⁾. The majority of the population were females (73.1%). There is no significant association between gender and diabetes foot disease is found so far. However, according to a Sweden study females were active in self, and preventive foot care measures searched for information and tried to adapt to the situation in acute foot problems. Men often sought help for acute foot problems, discussed more foot-related problems, had a pessimistic view and passive attitudes regarding the future, so they would easily develop psychological disturbances when compared with the females⁽¹²⁾.

PN, which is a major risk factor for DFD was

seen among 35.6% and 24% of the study population has experienced a past foot ulcer. A Jordan study had a similar prevalence (34.9%) of PN with a foot ulcer prevalence of 14.9%. They have found a significant association between foot ulceration and the presence of PN, male gender, and the increased duration of diabetes⁽¹³⁾. A similar African study found out that the PN and the insulin treatment were the main risk factors for DFD⁽¹⁴⁾.

Even though a significant proportion had the habit of washing feet daily (79.8%), poor foot hygiene was seen among 44.9%. A study done in 2007 shows a significant association between poor foot hygiene and the DFD⁽¹⁴⁾. Another study shows poor knowledge and awareness of diabetes and its complications and lack of appropriate podiatry services are the main reasons for poor foot hygiene, which is a major risk factor for DFD⁽¹⁵⁾.

Interestingly a significant proportion of the population examined their feet daily (45.8%). According to an American study, many patients skipped individual self-care

elements: 37.9% reported no foot care. One-fourth of patients with severe foot neuropathy symptoms spent no time on foot care^[16]. This highlights the importance of the vigilant delivery of the facts on proper foot care, a good establishment of podiatric care, and the importance of periodic foot care assessment. A study, using a diabetic foot care programme based on the International Working Group on the DF revealed that a person who is getting proper foot care nursing for their feet have a significantly reduced level of severity score of tinea pedis ($P<0.001$) and improved callus grade ($P<0.001$) and future risk of DF ulcer⁽¹⁷⁾

Toenail complications were common among the study population which indicates toenail fungal infections and improper nail cutting habits. In a previous cross-sectional, observational study, 58% of patients had toenail onychomycosis mainly suggested by thickened and deformed nails⁽¹⁸⁾. The high prevalence of onychomycosis was significantly associated with non-washing of feet daily⁽¹⁸⁾. Furthermore, increased nail thickness was significantly correlated with higher HbA_{1c} levels⁽¹⁸⁾. This study concluded the importance of proper nail care.

Walking bare-feet (83.9%) is a major risk factor for foot ulceration. The majority of the study population was using ill-fitting or damaged footwear (70.7%). Patient education regarding foot hygiene, nail care, and proper footwear are crucial to reduce the risk of an injury that can lead to ulcer formation⁽¹⁹⁾. Both above factors have been identified as major risk factors for diabetic foot ulcers⁽¹⁹⁾.

Furthermore, patients' knowledge of proper footwear selection and maintenance needs to be improved and ideally, their footwear should be periodically assessed by a

podiatrist⁽²⁰⁾. Custom therapeutic footwear is recommended in high-risk diabetic patients, including those with significant neuropathy, foot deformities, or previous amputation⁽²⁰⁾.

This study has potential limitations. The majority of our study population (73.1%) consists of females. Although the global diabetes prevalence is more among males, recent Sri Lankan data shows higher female prevalence (Katulanda et al). Moreover, females were voluntarily participating in the study, and males were reluctant to spend time on three questionnaires because most of them were engaged in occupations and they need to leave the clinic soon after obtaining their medications.

Conclusion and recommendations

This study highlighted the deficits in the knowledge and practices of foot care and footwear among diabetic patients. These gaps make them vulnerable to DFD and its complications.

It is mandatory to develop an awareness of diabetes mellitus and its related complications. Proper foot care practices and footwear selection are an important integral part of this education. A multidisciplinary care approach should be well established. There should be proper communication between the health care personnel and the patients to create awareness for effective foot care. Patients themselves have the responsibility to adhere to healthy foot care practices and they should be periodically assessed and updated by the health care providers.

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