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Illiteracy and diabetic foot complications



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ABSTRACT

Background: Diabetes is especially common in the United Arab Emirates. Its complications in patients residing in the region have yet to be fully explored. This study reports on foot problems in our diabetic patients, with emphasis on the impact of illiteracy on foot care and complications due to diabetes.

Methods: Adults were randomly recruited from the Diabetes Center at Tawam-John Hopkins affiliated hospital. A questionnaire addressing foot care and problems was completed for all patients. In addition, an examination was performed by a trained nurse, an endocrinologist, and a podiatrist.

Results: Four hundred twenty-two adults with type 2 (93%) or type 1 (7%) diabetes were enrolled; 67% were females. Patients' mean age was 52 ± 13 years and duration of diabetes ≥ 1 year. Illiterate patients were 51% and were less likely to practice foot care ($p = 0.002$), recognize foot risk factors ($p = 0.004$), use proper footwear ($p = 0.010$), and being physically active ($p < 0.001$). In addition, they were more likely to have diabetic complications, such as neuropathy ($p = 0.027$), eye disease ($p = 0.032$), hypertension ($p < 0.001$), obesity ($p = 0.003$), increased body fat percentage ($p < 0.001$), reduced capillary refill time ($p = 0.002$), reduced monofilament ($p = 0.003$), and reduced vibration ($p < 0.001$). Logistic regression analysis revealed literates [OR = 2.4, CI = 1.1–5.4, $p = 0.031$], female gender [OR = 2.7, CI = 1.1–6.2, $p = 0.023$], and history of foot ulcer [OR = 6.0, CI = 2.1–17.2, $p = 0.001$] were predictors of practicing foot care.

Conclusion: Illiteracy invoked significant challenges to diabetic attentiveness and imposed increased foot complications. Physicians should realize that illiterate patients are vulnerable and require effective strategies to improve their education about the disease and reduce their diabetic complications.

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Abbreviations: BMI, body mass index; eGFR, estimated glomerular filtration rate; SBP, systolic blood pressure; DBP, diastolic blood pressure; PAD, peripheral artery disease; MNSI, Michigan Neuropathy Screening Instrument; ABI, ankle-brachial index.

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1. Introduction

Foot problems are important source of morbidities in diabetic patients [1]. These complications are a frequent reason of hospital admission and impose excessive distress and expenses [2-8]. Diabetic neuropathy and vasculopathy can lead to loss of foot sensation, foot deformities (resulting in pressure points and ulcerations), increased susceptibility to infections (including osteomyelitis), and gangrene. In developing countries, additional factors, such as poverty, barefoot walking, unhygienic conditions, and certain cultural/religious practices further increase the susceptibility to foot injuries [14-18]. The presence of fissures, ulcers (having a lifetime risk of about 25%), or refractory infections may result in foot amputation; it has been estimated that a lower limb is lost every 30s as consequence of diabetes [1]. Known risk factors for amputation include advanced age, increased duration of diabetes, male gender, certain ethnicities, poor glycemic control, and lack of preventive care [9-13].

Studies have shown that appropriate foot care ameliorates foot complications and decreases the risk of amputation [14,26-28]. Preemptive interventions include self-alertness (endorsed by diabetic educators), practicing proper foot care, diabetic control (glycemic control, decent nutrition, proper body weight, and regular physical activities), and frequent medical assessments [19-22]. Thus, diabetic health-care providers should rigorously deliver proper foot care knowledge and perform regular foot examinations, especially for high-risk patients, such as the non-educated individuals.

Diabetes is common in the Gulf countries; and diabetes-related foot problems are expected to be numerous, especially since illiteracy is exceptionally prevalent in our region (more prominent in the females) and podiatrist care services are still limited in the UAE [23-25].

Illiteracy adversely influences the delivery of good medical care; illiterate patients are more likely to miss medical appointments, misunderstand medical instructions, and misuse medications due to inability to read prescription labels [29]. In one study, poor glycemic control was more frequent in patients with low literacy [30]. In other studies, literacy level and diabetes-related knowledge were not correlating with self-efficacy or glycemic (metabolic) control [31-35]. This study assessed the extent of diabetic foot complications in our region, with emphasis on increasing awareness and good practice of foot care in illiterate patients.

2. Methods

2.1. Ethical statement

All study protocols, including written consent for literate patients and verbal consent for illiterate patients were approved by Al-Ain Medical District Human Research Ethics Committee (Abu Dhabi, UAE).

Table 1 – Distribution of variables relevant to foot care (n = 422).

	No. of patients (%) ^a
Illiterate ^b	221 (51)
Female	176 (80)
Male	45 (20)
Smoking	
Current	27 (6)
Past	50 (12)
Never	336 (82)
Hypertension on examination (BP >140/90 mm Hg)	233 (55)
Body mass index	
≤25 kg/m ²	58 (14)
>25 to <30 kg/m ²	136 (33)
≥30 kg/m ²	215 (53)
Body fat >35%	236 (60)
History of eye disease	50 (12)
Retinopathy on examination	
None	327 (86)
Background	24 (6)
Preproliferative	13 (3)
Maculopathy	4 (1)
Proliferative	10 (3)
Advanced eye disease	2 (<1)
Ulcer/fissure	
History of foot ulcer/fissure	292 (69)
Foot ulcer/fissure on examination	50 (12)
Monofilament	
Normal	324 (77)
Reduced	78 (18)
Absent	20 (6)
Abnormal MNSI-sign score (≥3.0)	104 (26)
Ankle-brachial index <0.9	35 (9)
Estimated glomerular filtration rate	
<60 mL/min	65 (17)
≥60 mL/min	310 (83)
Abnormal urinary albumin:creatinine ^c	104 (25)
LDL >2.5 mmol/L	264 (63)

^a Values are number (percent) of patients; percentages were calculated based on number of patients with available information.

^b *p*-Value between gender was <0.001.

^c Males ≥2.5 mg/mmol; females ≥3.5 mg/mmol.

2.2. Study population

Four hundred twenty-two diabetic patients were recruited by systematic random sampling from appointment lists at the Diabetes Centre at Tawam-John Hopkins Hospital (Al-Ain, UAE). This center hosts over 20,000 diabetic visits per year from all regions of the UAE.

Literate patients were those who could read and write; illiterate patients were those who could not read and write. As shown in Table 1, the prevalence of illiteracy in female patients was 80% and in male patients 20%, giving an overall prevalence of 51%. Therefore, random sampling was the most appropriate design to address the two aims of the study: (1) foot problems in our region and (2) impacts of illiteracy on foot care and foot complications.

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